Estimating the global burden of foodborne disease

For more on **FERG** see http://www.who.int/foodsafety/foodborne_disease/ferg/en/index3.html

For more on **FERG's second annual meeting** see http://www.who.int/foodsafety/foodborne_disease/ferg2/en/index.html

For more on **surveillance of foodborne diseases in Australia** see http://www.ozfoodnet.org.au/

For more on **surveillance of foodborne disease in the US** see http://www.cdc.gov/foodnet

Later this spring, WHO will publish the annual report of the Foodborne Disease Burden Epidemiology Reference Group (FERG), summarising the outcome of the second FERG meeting held Nov 17–21, 2008, in Geneva, Switzerland. Declared a "resounding success", the event brought together world experts and stakeholders committed to the WHO initiative to provide reliable and accurate estimates of the global burden caused by all foodborne diseases. "The FERG initiative is now looking forward to another year of fruitful collaboration between the many experts in this field and we anticipate the launch of the new country studies taskforce later in 2009", commented Claudia Stein who leads the initiative at WHO (Geneva, Switzerland) .

Arie Havelaar (RIVM, Bilthoven, and Utrecht University, Netherlands), Chair of FERG, regards the aims of the group as "ambitious" but says that every effort will be made to meet the target of estimating the global burden of foodborne illness caused by chemicals, parasites, and enteric infections by 2012. "Where possible, this includes estimating the disease burden that is attributable to specific commodities, such as meats of animal origin, fish, fresh produce, and so on", he said. "This is a particular challenge for pathogens commonly spread by food but that are also transmitted by water, animals, or through person to person contact", added Neyla Gargouri (Hakim Pharmaceuticals, formerly Ministry of Health, Amman, Jordan), Chair of the FERG parasitic diseases taskforce.

FERG's three current thematic taskforces are now doing thorough reviews to assess the burden of different diseases that may be transmitted by food, evaluating what proportion of each disease is foodborne. Tools are also being developed to enable individual countries to accurately assess their own burden of foodborne disease. Some developed countries have done assessments showing that the burden of foodborne illness is considerable, but most lack data on problems caused by chemicals or parasites. "These studies estimate incidence of illness but do not use burden of disease methodologies using standard metrics, such as disability-adjusted life years (DALY). These metrics are needed to compare the burden of diseases with different severities and mortality rates", explained Havelaar.

Jorgen Schlundt, Director of the Department of Safety, Zoonoses and Foodborne Diseases at WHO points out that the FERG initiative will provide an important baseline against which to compare future changes in foodborne disease incidence. "We know that the problem of foodborne disease has increased during the past few decades, but measuring the rate of future decreases as a function of efficient interventions is impossible without this all-important baseline—which means we really will not know which interventions succeed and which fail", he told *TLID*. This will be a particularly important part of the work of the chemical and toxins taskforce, since very little data on the global burden of illness caused by chemical contamination of food exist anywhere in the world, despite well-publicised occurrences that are "the tip of the iceberg" according to Herman Gibb (Tetra Tech Sciences, Washington DC, USA, formerly of the Environmental Protection Agency).

The Enteric Diseases Taskforce has a priority listing of 21 enteric pathogens for early review. "Foodborne diseases such as cholera, dysentery, brucellosis, and typhoid are major concerns due to their severity and their impact on developing countries", commented Martyn Kirk, Senior Epidemiologist of OzFoodNet (Canberra, Australia)—Australia's national system of surveillance of foodborne diseases—and Chair of the FERG enteric diseases taskforce. Others, such as non-typhoidal salmonellosis, campylobacteriosis, and norovirus infections, are also important causes of illness in developed countries. "In many cases these pathogens cause mild, self-limiting illness but the sheer number of cases of enteric disease makes the social and economic costs significant", said Kirk. He stresses that clearer statements and appropriate priorities will only be possible once the FERG has completed its work and looked at all enteric diseases comprehensively, predicting that "we may see some surprising results from the country studies".

Gargouri says that the mildness of many foodborne diseases is, in her experience, one of the major factors that makes accurate surveillance difficult, and under-reporting considerable. "Cases of diarrhoea, for example, that do not require medical attention are generally not detected by the health-care system", she said. One of the major projects of the enteric diseases taskforce is a systematic review of the incidence and mortality due to diarrhoeal diseases in people over 5 years old. "Led by Robert Black (Johns Hopkins University, Baltimore, USA), this review is gathering data on the incidence and specific microbiological causes of diarrhoeal disease to allow attribution of diarrhoea to different pathogens in the priority list", explained Kirk. He points out that this review is different from many others already published since it focuses on diarrhoeal diseases affecting age

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A food market in Beijing, China

groups other than small children. At the recent meeting of FERG, the enteric diseases taskforce recommended that WHO commission further work to examine the global incidence of invasive foodborne illnesses, brucellosis and listeriosis, along with toxin-based illness, such as food poisoning due to *Clostridium botulinum*, *C perfingens*, and *Staphylococcus aureus*.

The parasitic diseases taskforce has identified several major foodborne parasites worthy of study, including *Entamoeba histolytica, Giardia intestinalis, Toxoplasma gondii, Fasciola* spp, *Echinococcus* spp, and *Taenia solium*. "The prioritisation criteria included the severity and magnitude of the parasitic disease, its geographical distribution, the propensity of the parasite to cause point-source outbreaks, and the availability of existing data", explained Gargouri. In the next 3 years, the parasitic diseases taskforce intends to conduct epidemiological reviews of the morbidity, mortality, and disability, by age and sex of all these parasitic diseases for all regions of the world, discovering what proportion is foodborne. By the end of the first 5 years, interactive maps will be created using geographic information system (GIS)-type technologies to show the available literature and the distribution by country, along with the potential sources of infection where applicable. "Mapping the parasitic diseases data will contribute to identifying the gaps in the literature and ultimately to advising WHO on research priorities at the country level", said Gargouri.

The country studies taskforce that will be launched later this year will do the groundwork that will lead to the development of new methods to consistently monitor the burden of foodborne disease at an individual country level. "One of the major objectives will be to provide countries with relevant and validated tools and protocols", said Stein. Pilot studies will be completed in a range of different countries, in order to develop selection criteria for suitable country sites and identify the sites of the key pilot projects. "Strengthening the capacity to monitor foodborne diseases at a country level is a key aim of FERG and will contribute to the initial estimates of foodborne disease burden obtained by 2012", said Stein. Beyond that, an online global foodborne diseases atlas will provide morbidity, disability, and mortality data to a wide audience, including scientists in the developing world. "Our main goal is to eventually enable countries to monitor their own disease burden for the purpose of informing policy makers and assisting them in the evaluation and development of food safety standards and policies", she concluded.

Kathryn Senior

Substantial progress made in malaria research, say experts

Two phase II studies in Tanzania and Kenya make "a strong case" for moving forward to phase III trials of the most advanced malaria vaccine candidate, GlaxoSmithKline Biologicals' RTS,S/AS, say researchers. This broader evaluation is now essential to ascertain long-term efficacy, says Chris Drakeley (London School of Hygiene and Tropical Medicine [LSHTM], UK). However, continued development of new medications and vector control, needs to maintained. "We have several approaches to malaria control", he says, "but we need to know which combinations of available options are most cost effective, in the different malaria regions".

The studies, coordinated by the PATH Malaria Vaccine Initiative (MVI), show that RTS,S/AS reduced malaria episodes by 53% in children aged 5–17 months, and in 65% of infants (aged less than 12 months), with a favourable safety profile. The latter study was "the first time the vaccine has been given alongside routine vaccinations", says David Schellenberg of LSHTM, and their efficacy was not compromised. The WHO Expanded Program on Immunization could therefore provide an optimal delivery platform. Drakeley, who was part of the LSHTM team that collaborated with Tanzanian researchers on the infant study, suggests that proposed phase III studies are likely to take about 5 years to complete. If these studies are successful, the licensing application will take a further 2–3 years.

Although both studies found strong immune responses, a previous version of the vaccine, with a different adjuvant, found that protection in adults required a booster dose beyond 6 months, and that protection in children was around 30–40%, Drakeley explains. "The results of these latest trials are very encouraging, but we still need more data on how this vaccine is working and how this new adjuvant has enhanced its effect. Despite this promising work, we need to continue other research efforts, including those on treatments", says Drakeley.

In the first trial of its kind to evaluate the use of artemisinin combination therapy (ACT) in 253 pregnant women, published in December, the current standard six-dose ACT used in Thailand (artemether-lumefantrine) was found to be safe to use to treat pregnant women. However its efficacy was inferior to the 7-day artesunate monotherapy because drug concentrations were reduced during pregnancy. Neither course of treatment achieved the 95% cure rate recommended by WHO. The researchers conclude that a higher-dose ACT regimen should now be evaluated for the treatment of pregnant women with uncomplicated falciparum malaria. These findings have sparked "renewed optimism over eradication of malaria", says Drakeley.

Kelly Morris

For more on the **RTS,S/AS malaria vaccine studies** see *N Engl J Med* 2008; **359:** 2521–32, 2533–44, 2599; DOI:10.1056/NEJMoa0807381, DOI:10.1056/NEJMoa0807773, DOI:10.1056/NEJMe0808983

For more on **malaria treatment in pregnancy** see *PloS Medicine* 2008; **5:** e253; DOI:10.1371/journal.pmed.0050253