

196. Feasey, N.A., Dougan, G., Kingsley, R.A., Heyderman, R.S. & Gordon, M.A. 2012. Invasive non-typhoidal *Salmonella* disease: an emerging and neglected tropical disease in Africa. *Lancet*, 379(9835): 2489-2499.
197. Majowicz, S.E., Musto, J., Scallan, E., Angulo, F.J., Kirk, M., O'Brien, S.J., Jones, T.F., Fazil, A. & Hoekstra, R.M. and the International Collaboration on Enteric Disease Burden. 2010. The Global Burden of Nontyphoidal *Salmonella* Gastroenteritis. *Clinical Infectious Diseases*, 50(6): 882-889.
198. Ram, P.K., Crump, J.A., Gupta, S.K., Miller, M.A., Mintz, E.D. 2008. Part II. Analysis of data gaps pertaining to Shigella infections in low and medium human development index countries, 1984-2005. *Epidemiology and Infection*, 136(5): 577-603.
199. Crump, J.A. 2014. Updating and refining estimates of typhoid fever burden for public health action. *Lancet Global Health*, 2(10): e551-e553.
200. Plass, D., Mangen, M.J.J., Kraemer, A., Pinheiro, P. and 10 others. 2014. The disease burden of hepatitis B, influenza, measles and salmonellosis in Germany: first results of the Burden of Communicable Diseases in Europe Study. *Epidemiology and Infection*, 142(10): 2024-2035.
201. Vally, H., Glass, K., Ford, L., Hall, G., Kirk, M.D., Shadbolt, C., Veitch, M., Fullerton, K.E., Musto, J. & Becker, N. 2014. Proportion of illness acquired by foodborne transmission for nine enteric pathogens in Australia: An Expert Elicitation. 2014. *Foodborne Pathogens and Disease*, 11(9): 727-733.
202. Ravel, A., Davidson, V.J., Ruzante, J.M. & Fazil, A. 2010. Foodborne proportion of gastrointestinal illness: estimates from a Canadian Expert Elicitation Survey. *Foodborne Pathogens and Disease*, 7(12): 1463-1472.
203. Pires, S.M., Vieira, A.R., Hald, T. & Cole, D. 2014. Source attribution of human salmonellosis: An overview of methods and estimates. *Foodborne Pathogens and Disease*, 11(9): 667-676.
204. Verhoef, L., Hewitt, J., Barclay, L., Ahmed, S.M., Lake, R., Hall, A.J., Lopman, B., Kroneman, A., Vennema, H., Vinje, J. & Koopmans, M. 2015. Norovirus genotype profiles associated with foodborne transmission. *Emerging Infectious Diseases*, 21(4): 592-599.
205. Haagsma, J.A., Polinder, S., Stein, C.E., Havelaar, A.H. 2013. Systematic review of foodborne burden of disease studies: Quality assessment of data and methodology. *International Journal of Food Microbiology*, 166(1): 34-47.
206. Budke, C.M., Deplazes, P. & Torgerson, P.R. 2006. Global socioeconomic impact of cystic echinococcosis. *Emerging Infectious Diseases*, 12(2): 296-303.
207. Bresson-Hadni, S., Vuitton, D.A., Bartholomot, B., Heyd, B., Godart, D., Meyer, J.P., Hrusovsky, S., Becker, M.C., Manton, G., Lenys, D. & Miguet, J.P. 2000. A twenty-year history of alveolar echinococcosis: analysis of a series of 117 patients from eastern France. *European Journal of Gastroenterology & Hepatology*, 12(3): 327-336.
208. Torgerson, P.R., Schweiger, A., Deplazes, P., Pohar, M., Reichen, J., Ammann, R.W., Tarr, P.E., Halkik, N., Mullhaupt, B. 2008. Alveolar echinococcosis: From a deadly

- disease to a well-controlled infection. Relative survival and economic analysis in Switzerland over the last 35 years. *Journal of Hepatology*, 49(1): 72-77.
209. Bruno, E., Bartoloni, A., Zammarchi, L., Strohmeyer, M., Bartalesi, F., Bustos, J.A., Santivanez, S., Garcia, H.H. & Nicoletti, A. and the COHEMI Project Study Group. 2013. Epilepsy and neurocysticercosis in Latin America: A systematic review and meta-analysis. *PLOS Neglected Tropical Diseases*, 7(10): Article Number e2480.
210. Montano, S.M., Villaran, M.V., Ylquimiche, L., Figueroa, J.J., Rodriguez, S., Bautista, C.T., Gonzalez, E., Tsang, V.C.W., Gilman, R.H., Garcia, H.H. and the Cysticercosis Working Group. 2005. Neurocysticercosis- Association between seizures, serology, and brain CT in rural Peru. *Neurology*, 65(2): 229-234.
211. Thiebaut, R., Leproust, S., Chene, G., Gilbert, R. and the SYROCOT Study Group. 2007. Effectiveness of prenatal treatment for congenital toxoplasmosis: a meta-analysis of individual patient's data. *Lancet*, 369(9556): 115-122.
212. Wong, W.K., Upton, A. & Thomas, M.G. 2013. Neuropsychiatric symptoms are common in immunocompetent adult patients with *Toxoplasma gondii* acute lymphadenitis. *Scandinavian Journal of Infectious Disease*, 45(5): 357-361.
213. Demar, M., Ajzenberg, D., Maubon, D. and 11 others. 2007. Fatal outbreak of human toxoplasmosis along the maroni river: Epidemiological, clinical, and parasitological aspects. *Clinical Infectious Diseases*, 45(7): E88-E95.
214. Torrey, E.F., Bartko, J.J., Lun, Z.R. & Yolken, R.H. 2007. Antibodies to *Toxoplasma gondii* in patients with schizophrenia: A meta-analysis. *Schizophrenia Bulletin*, 33(2): 729-736.
215. Torrey, E.F., Bartko, J.J. & Yolken, R.H. 2012. *Toxoplasma gondii* and other risk factors for schizophrenia: an update. *Schizophrenia Bulletin*, 38(3): 642-647.
216. Yonghua, Z., Yue, C., Lei, Z. & Qi, G. 2011. Analysis of probable correlation between *Toxoplasma gondii* and schizophrenia: a sero-epidemiological longitudinal investigation from 2002 to 2007 in Suzhou and Wuxi regions, Jiangsu, China. *Tropical Medicine & International Health*, 16(Suppl.1; Special Issue): 367-368.
217. Dorny, P. & Praet, N. 2007. *Taenia saginata* in Europe. *Veterinary Parasitology*, 149(1-2): 22-24.
218. Pereira, K.S., Sciimidt, F.L., Guaraldo, A.M.A., Franco, R.M.B., Dias, V.L. & Passos, L.A.C. 2009. Chagas' Disease as a foodborne illness. *Journal of Food Protection*, 72(2): 441-446.
219. Alarcón de Noya, B., Noya González, O. & Robertson, L.J. 2016. *Trypanosoma cruzi* as a foodborne pathogen. Springer International Publishing.
220. Abanyie, F., Harvey, R.R., Harris, J.R. and 24 others, and the Multistate Cyclosporiasis Outbreak Investigation Team. 2015. 2013 multistate outbreaks of *Cyclospora cayetanensis* infections associated with fresh produce: focus on the Texas investigations. *Epidemiology and Infection*, <http://dx.doi.org/10.1017/S0950268815000370> 8 p.

221. Hall, R.L., Jones, J.L., Hurd, S., Smith, G., Mahon, B.E. & Herwaldt, B.L. 2012. Population-based active surveillance for *Cyclospora* infection- United States, Foodborne Diseases Active Surveillance Network (FoodNet), 1997-2009. *Clinical Infectious Diseases*, 54(Suppl.5): S411-S417
222. Adams E, Yoder J, Gould LH, Hlavsa MC, Gargano J. (2015) Giardiasis outbreaks in the United States, 1971-2011. In: Proceedings of the International Conference on Emerging Infectious Diseases, August 24-26, 2015, Atlanta Georgia. P105. Available from: www.iceid.org/images/2015/ICEID2015_web.pdf
223. Robertson, L.J., van der Giessen, J.W.B., Batz, M.B., Kojima, M. & Cahill, S. 2013. Have foodborne parasites finally become a global concern? *Trends in Parasitology*, 29(3): 101-103.
224. FAO/WHO. 2014. Multicriteria-based ranking for risk management of food-borne parasites. . Food and Agriculture Organization of the United Nations/World Health Organization. Rome, Italy. 302 p.
225. Craig, P.S. and C. Echinococcosis Working Group. 2006. Epidemiology of human alveolar echinococcosis in China. *Parasitology International*, 55(Suppl.): S221-S225.
226. Al Shahrani, D., Frayha, H.H., Dabbagh, O., Al Shail, E. 2003. First case of neurocysticercosis in Saudi Arabia. *Journal of Tropical Pediatrics*, 49(1): 58-60.
227. Petney, T., Sithithaworn, P., Andrews, R., Kiatsopit, N., Tesana, S., Grundy-Warr, C. & Ziegler, A. 2012. The ecology of the *Bithynia*- first intermediate hosts of *Opisthorchis viverrini*. *Parasitology International*, 61(1; Special Issue): 38-45.
228. WHO, 2015. Global burden of disease regions used for WHO-CHOICE analyses. Cost effectiveness and strategic planning. World Health Organization.
229. Wild, C.P. & Hall, A.J. 2000. Primary prevention of hepatocellular carcinoma in developing countries. *Mutation Research- Reviews in Mutation Research*, 462(2-3): 381-393.
230. Haagsma, J.A., Polinder, S., Stein, C.E. & Havelaar, A.H. 2013. Systematic review of foodborne burden of disease studies: Quality assessment of data and methodology. *International Journal of Food Microbiology*, 166(1): 34-47.
231. Polinder, S., Haagsma, J.A., Stein, C. & Havelaar, A.H. 2012. Systematic review of general Burden of disease studies using disability-adjusted life years. *Population Health Metrics*, 10: Art 21.
232. Mathers, C.D., Vos, T., Lopez, A.D., Salomon, J., Ezzati, M. (ed.) 2001. National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Programme on Evidence for Health Policy. WHO, Geneva. Available at <http://www.who.int/healthinfo/nationalburdenofdiseasemanual.pdf> Accessed 2015-10-22.
233. Etienne, C.F. 2013. Supplement on Caribbean burden of illness study. Foreword. *Journal Of Health, Population and Nutrition*, 31(4; Suppl.1): 1-2.
234. Valenciano, M., Bergeri, I., Jankovic, D., Milic, N., Parlic, M. & Coulombier, D. 2004. Strengthening early warning function of surveillance in the Republic of Serbia:

- lessons learned after a year of implementation. *Euro surveillance*, 9(5): 24-26.
235. Fabiana, A., Donia, D., Gabrieli, R., Petrinca, A.R., Cenko, F., Bebeci, D., Altan, A.M.D., Buonomo, E. & Divizia, M. 2007. Influence of enteric viruses on gastroenteritis in Albania: Epidemiological and molecular analysis. *Journal of Medical Virology*, 79(12): 1844-1849.
236. Sejdini, A., Mahmud, R., Lim, Y.A.L., Mahdy, M., Sejdini, F., Gjoni, V., Xhaferraj, K. & Kasmi, G. 2011. Intestinal parasitic infections among children in central Albania *Annals of Tropical Medicine and Parasitology*, 105(3): 241-250.
237. UNICEF. No date. Albania: Children in Albania Health Access. Available from: http://www.unicef.org/albania/children_24931.html Accessed 2015-10-22.
238. Kumagai, Y., Gilmour, S., Ota, E., Momose, Y., Onishi, T., Bilano, V.L.F., Kasuga, F., Sekizaki, T. & Shibuya, K. 2015. Estimating the burden of foodborne diseases in Japan. *Bulletin of the World Health Organization*, 93(8): 540-549.
239. Tangcharoensathien, V., Limwattananon, S., Patcharanarumol, W. & Thammatacharee, J. 2014. Monitoring and evaluating progress towards universal health coverage in Thailand. *Plos Medicine*, 11(9): Article No. e1001726. DOI: 10.1371/journal.pmed.1001726
240. Agaba, F. 2015. FERG: The WHO Initiative To Estimate The Global Burden of foodborne diseases. Uganda. The MOH/WHO/FAO/ FERG Pilot Country Study. [accessed 20 August 2015.]. Available from: <http://www.ugansociety.org/wp-content/.../FERG-Presentation-April-2015.ppt>
241. Pariyo, G.W., Ekirapa-Kiracho, E., Okui, O., Rahman, M.H., Peterson, S., Bishai, D.M., Lucas, H. & Peters, D.H. 2009. Changes in utilization of health services among poor and rural residents in Uganda: are reforms benefitting the poor? *International Journal for Equity in Health*, 8: Article No. 39. DOI: 10.1186/1475-9276-8-39
242. Devleesschauwer, B., Ale, A., Duchateau, L., Dorny, P., Lake, R., Dhakal, P., Pun, S.B., Pandey, B.D. & Speybroeck, N. 2013. Understanding the burden of disease in Nepal: a call for local evidence. *Journal of Nepal Health Research Council*, 11(24): 221-224.
243. Kang'ethe, E. 2011 *Situation analysis: Improving food safety in the maize value chain in Kenya*. Report prepared for FAO. 89 p. Available from: http://www.fao.org/fileadmin/user_upload/agns/pdf/WORKING_PAPER_AFLATOXIN_REPORTDJ10thOctober.pdf Accessed 2015-10-22.
244. Bennett, G. & Jessani, N.E. 2011. *The Knowledge Translation Toolkit. Bridging the Know-Do Gap: A Resource for Researchers*. SAGE/IDRC 2011. Available from: <http://www.idrc.ca/EN/Resources/Publications/Pages/IDRCBookDetails.aspx?PublicationID=851> Accessed 2015-10-22.
245. IHME [Institute for Health Metrics and Evaluation]. Online. *Country Profiles, 2013*. Available from <http://www.healthdata.org/results/country-profiles>. Accessed 2015-10-22.

246. Codex Alimentarius Commission. 2007. Principles and guidelines for the conduct of microbiological risk management (MRM). CAC/GL 63-2007. Available from: www.codexalimentarius.org/input/download/standards/10741/CXG_063e.pdf Accessed 2015-10-22.
247. Ezzati, M., Lopez, A.D., Rodgers, A., Vander Hoorn, S. & Murray, C.J.L. 2002. Selected major risk factors and global and regional burden of disease *Lancet*, 360(9343): 1347-1360.
248. OIE [World Organisation for Animal Health]. No date; online. World Organisation for Animal Health Information Database (WAHID). 2013. Available from: http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home Accessed 2015-10-22.
249. EFSA [European Food Safety Authority]. 2012. The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in the European Union in 2010. *EFSA Journal*, 10(3): 2597.
250. Pappas, G., Papadimitriou, P., Akritidis, N., Christou, L. & Tsianos, E.V. 2006. The new global map of human brucellosis. *Lancet Infectious Diseases*, 6(2): 91-99.
251. Dean, A.S., Crump, L., Greter, H., Schelling, E. & Zinsstag, J. 2012. Global burden of human brucellosis: A systematic review of disease frequency. *PLOS Neglected Tropical Diseases*, 6(10): Article No. e1865. DOI: 10.1371/journal.pntd.0001865
252. Cressey, P. & Lake, R. 2011. Estimated incidence of foodborne illness in New Zealand: application of overseas models and multipliers. Client Report FW11006. A report for the New Zealand Ministry of Agriculture and Forestry. ESR, Christchurch. Available from: <http://www.foodsafety.govt.nz/elibrary/industry/estimates-burden-foodborne-disease-2011.pdf>
253. Zhong, Z.J., Yu, S., Wang, X.C., Dong, S.C., Xu, J., Wang, Y.F., Chen, Z.L., Ren, Z.H. & Peng, G.N. 2013. Human brucellosis in the People's Republic of China during 2005-2010. *International Journal of Infectious Diseases*, 17(5): E289-E292. DOI: 10.1016/j.ijid.2012.12.030
254. Dean, A.S., Crump, L., Greter, H., Hattendorf, J., Schelling, E. & Zinsstag, J. 2012. Clinical manifestations of human brucellosis: a systematic review and meta-analysis. *PLOS Neglected Tropical Diseases*, 6(12): Article e1929.
255. Al Dahouk, S., Neubauer, H., Hensel, A., Schoneberg, I., Nockler, K., Alpers, K., Merzenich, H., Stark, K., Jansen, A. 2007. Changing epidemiology of human brucellosis, Germany, 1962-2005. *Emerging Infectious Diseases*, 13(12): 1895-1900.
256. Al-Tawfiq, J.A. 2008. Therapeutic options for human brucellosis. *Expert Review of Anti-Infective Therapy*, 6(1): 109-120.
257. Buzgan, T., Karahocagil, M.K., Irmak, H., Baran, A.I., Karsen, H., Evirgen, O. & Akdeniz, H. 2010. Clinical manifestations and complications in 1028 cases of brucellosis: a retrospective evaluation and review of the literature. *International Journal of Infectious Diseases*, 14(6): e469-478.
258. Muller, B., Durr, S., Alonso, S., Hattendorf, J., Laisse, C.J.M., Parsons, S.D.C., van Helden,

- P.D. & Zinsstag, J. 2013. Zoonotic *Mycobacterium bovis*-induced tuberculosis in humans. *Emerging Infectious Diseases*, 19(6): 899–908.
259. Durr, S., Muller, B., Alonso, S., Hattendorf, J., Laise, C.J.M., van Helden, P.D. & Zinsstag, J. 2013. Differences in primary sites of infection between zoonotic and human tuberculosis: results from a worldwide systematic review. *PLOS Neglected Tropical Diseases*, 7(8): Art e2399.
260. Buckle, G.C., Walker, C.L.F. & Black, R.E. 2012. Typhoid fever and paratyphoid fever: Systematic review to estimate global morbidity and mortality for 2010. *Journal of Global Health*, 2(1): 010401.
261. Torgerson, P.R., Devleeschauwer, B., Praet, N., Speybroeck, N., Willingham, A.L., Kasuga, F., Rokni, M.B., Zhou, X.-N., Fèvre, E.M., Sripa, B., Furst, T., Budke, C.M., Carabin, H., Kirk, M.D., Angulo, F.J., Havelaar, A. & de Silva, N. 2015. World Health Organization estimates of the global and regional disease burden of 11 foodborne parasitic diseases, 2010: a data synthesis. *PLOS Medicine*, DOI:10.1371/journal.pmed.1001920
262. Crump, J.A., Luby, S.P. & Mintz, E.D. 2004. The global burden of typhoid fever. *Bulletin of the World Health Organization*, 82(5): 346–353.
263. Butler, T., Islam, A., Kabir, I. & Jones, P.K. 1991. Patterns of morbidity and mortality in typhoid fever dependent on age and gender: review of 552 hospitalized patients with diarrhoea. *Reviews of Infectious Diseases*, 13(1): 85–90.
264. ECDC [European Centre for Disease Prevention and Control]. No date [online]. Factsheet for health professionals–Hepatitis A. Available at http://ecdc.europa.eu/en/healthtopics/hepatitis_A/factsheets/Pages/factsheet-professionals.aspx Accessed 2015-10-15.
265. Majowicz, S.E., Scallan, E., Jones-Bitton, A., Sargeant, J.M., Stapleton, J., Angulo, F.J., Yeung, D.H., Kirk, M.D. 2014. Global incidence of human Shiga toxin-producing *Escherichia coli* infections and Deaths: A systematic review and knowledge synthesis. *Foodborne Pathogens and Disease*, 11(6): 447–455.
266. Lamberti, L.M., Fischer Walker, C.L. & Black, R.E. 2012. Systematic review of diarrhoea duration and severity in children and adults in low- and middle-income countries. *BMC Public Health*, 12: Art. no. 276.
267. ECDC [European Centre of Disease Prevention and Control]. No date; online. Disease specific information: Shiga/Vero toxin producing *Escherichia coli* infection (STEC/VTEC). Available from: http://ecdc.europa.eu/en/healthtopics/escherichia_coli/basic_facts/Pages/basic_facts.aspx. Accessed 2015-10-22.
268. Havelaar, A.H., Van Duynhoven, Y.T.H.P., Nauta, M.J., Bouwknegt, M., Heuvelink, A.E., De Wit, G.A., Nieuwenhuizen, M.G.M. & Van De Kar, N.C.A. 2004. Disease burden in The Netherlands due to infections with Shiga toxin-producing *Escherichia coli* O157. *Epidemiology and Infection*, 132(3): 467–484.
269. Varma, J.K., Katsitadze, G., Moiscrafishvili, M., Zardiashvili, T., Chokheli, M., Tarkhashvili, N., Jhorjholiani, E., Chubinidze, M., Kukhalashvili, T., Khmaladze, I.,

- Chakvetadze, N., Imnadze, P. & Sobel, J. 2004. Foodborne botulism in the republic of Georgia. *Emerging Infectious Diseases*, 10(9): 1601-1605.
270. Czerwinski, M., Czarkowski, M.P. & Kondej, B. 2012. [Botulism in Poland in 2010]. *Przegl Epidemiol*, 66(2): 267-271.
271. Sobel, J., Tucker, N., Sulka, A., McLaughlin, J. & Maslanka, S. 2004. Foodborne botulism in the United States, 1990-2000. *Emerging Infectious Diseases*, 10(9): 1606-1611.
272. Kirk, M., Ford, L., Glass, K. & Hall, G. 2014. Foodborne Illness, Australia, Circa 2000 and Circa 2010. *Emerging Infectious Diseases*, 20(11): 1857-1864.
273. Bennett, S.D., Walsh, K.A. & Gould, L.H. 2013. Foodborne disease outbreaks caused by *Bacillus cereus*, *Clostridium perfringens*, and *Staphylococcus aureus*-United States, 1998-2008. *Clinical Infectious Disease*, 57(3): 425-433.
274. Fischer Walker, C., Sack, D. & Black, R. 2010. aetiology for diarrhoea in older children, adolscents, and adults: a systematic review. *PLOS Neglected Tropical Diseases*, 4(8):Art. No. e768. doi:10.1371/journal.pntd.0000768.
275. Lamberti, L.M., Bourgeois, A.L., Fischer-Walker, C.L.F., Black, R.E. & Sack, D. 2014. Estimating diarrhoeal illness and Deaths attributable to Shigellae and Enterotoxigenic *Escherichia coli* among older children, adolescents, and adults in South Asia and Africa. *PLOS Neglected Tropical Diseases*, 8(2): Art. No. e2705. DOI: 10.1371/journal.pntd.0002705
276. Foodborne Diseases Active Surveillance Network (FoodNet). No date; online. Available from: <http://www.cdc.gov/foodnet> Accessed 2015-10-22.
277. Ao, T.T., Feasey, N.A., Gordon, M.A., Keddy, K.H., Angulo, F.J. & Crump, J.A. 2015. Global Burden of Invasive Nontyphoidal *Salmonella* Disease, 2010. *Emerging Infectious Diseases*, 21(6): 941-949.
278. Biggs, H.M., Lester, R., Nadjm, B., Mtove, G., Todd, J.E., Kinabo, G.D., Philemon, R., Amos, B., Morrissey, A.B., Reyburn, H. & Crump, J.A. 2014. Invasive *Salmonella* infections in areas of high and low malaria transmission intensity in Tanzania. *Clinical Infectious Diseases*, 58(5):638-647.
279. Koch, K., Kristensen, B., Holt, H.M., Ethelberg, S., Molbak, K. & Schonheyder, H.C. 2011. International travel and the risk of hospitalization with non-typhoidal *Salmonella* bacteremia. A Danish population-based cohort study, 1999-2008. *BMC Infectious Diseases*, 11: Art. No. 277. DOI: 10.1186/1471-2334-11-277.
280. Poropatich, K., Fischer Walker, C. & Black, R. 2010. Quantifying the association between *Campylobacter* infection and Guillain Barre syndrome: a systematic review. *Journal of Health, Population and Nutrition*, 28(6): 545-552.
281. ECDC. No date; online. Disease-specific information: *Campylobacteriosis*. Available from: http://ecdc.europa.eu/en/healthtopics/Campylobacteriosis/basic_facts/Pages/Factsheet_generalpublic.aspx Accessed 2015-10-22.
282. Fischer Walker, C.L., Sack, D. & Black, R.E. 2010. aetiology

- of diarrhoea in older children, adolescents and adults: a systematic review. *PLOS Neglected Tropical Diseases*, 4(8): Art e768. Available at <http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0000768> Accessed 2015-10-16.
283. Ahmed, S.M., Hall, A.J., Robinson, A.E., Verhoef, L., Premkumar, P., Parashar, U.D., Koopmans, M., Lopman, B.A. 2014. Global prevalence of norovirus in cases of gastroenteritis: a systematic review and meta-analysis. *Lancet Infectious Diseases*, 14(8): 725-730.
284. Phillips, G., Tam, C.C., Conti, S., Rodrigues, L.C., Brown, D., Iturriza-Gomara, M., Gray, J. & Lopman, B. 2010. Community incidence of norovirus-associated infectious intestinal disease in England: improved estimates using viral load for norovirus diagnosis. *American Journal of Epidemiology*, 171(9):1014-1022.
285. Ali, M., Lopez, A.L., You, Y.A., Kim, Y.F., Sah, B., Maskery, B. & Clemens, J. 2012. The global burden of cholera. *Bulletin of the World Health Organization*, 90(3): 209-218.
286. WHO. 2015. Population with sustainable access to improved sanitation. Available from: <http://apps.who.int/whosis/data/>.
287. Sur, D., Deen, J.L., Manna, B. and 12 others. 2005. The burden of cholera in the slums of Kolkata, India: data from a prospective, community based study. *Archives of Disease in Childhood*, 90(11): 1175-1181.
288. Agtini, MD (Agtini, MD); Soeharno, R (Soeharno, R); Lesmana, M (Lesmana, M); and 23 others. 2005. The burden of diarrhoea, shigellosis, and cholera in North Jakarta, Indonesia: findings from 24 months surveillance. *BMC Infectious Diseases*, 5: Art. No. 89. DOI: 10.1186/1471-2334-5-89
289. Lucas, M.E.S., Deen, J.L., von Seidlein, L., and 15 others. 2005. Effectiveness of mass oral cholera vaccination in Beira, Mozambique. *New England Journal of Medicine*, 352(8): 757-767.
290. Siddique, A.K., Nair, G.B., Alam, M., and 11 others. 2010. El Tor cholera with severe disease: a new threat to Asia and beyond. *Epidemiology And Infection*, 138(3): 347-352.
291. Valcin, C.L., Severe, K., Riche, C.T., and 8 others. 2013. Predictors of disease severity in patients admitted to a cholera treatment center in urban Haiti. *American Journal of Tropical Medicine and Hygiene*, 89(4): 625-632.
292. Gujral, L., Sema, C., Rebaudet, S., Taibo, C.L.A., Manjate, A.A., Piarroux, R., Gessner, B.D. & Jani, I.V. 2013. Cholera epidemiology in Mozambique using national surveillance data. *Journal of Infectious Diseases*, 208(Suppl.1): S107-S114.
293. Qadri, F., Khan, A.I., Faruque, A.S.G., Begum, Y.A., Chowdhury, F., Nair, G.B., Salam, M.A., Sack, D.A. & Svennerholm, A.M. 2005. Enterotoxigenic *Escherichia coli* and *Vibrio cholerae* diarrhoea, Bangladesh, 2004. *Emerging Infectious Diseases*, 11(7): 1104-1107.
294. Yoder, J.S., Wallace, R.M., Collier, S.A., Beach, M.J. & Hlavsa, M.C. 2012. Cryptosporidiosis surveillance-United States, 2009-2010. *Morbidity and mortality weekly report. Surveillance summaries*, 61(5): 1-12.

295. Yoder, J.S., Gargano, J.W., Wallace, R.M. & Beach, M.J. 2012. Giardiasis surveillance- United States, 2009-2010. *Morbidity and mortality weekly report. Surveillance summaries*, 61(5): 13-23.
296. Havelaar, A.H., Kemmeren, J.M. & Kortbeek, L.M. 2007. Disease burden of congenital toxoplasmosis. *Clinical Infectious Diseases*, 44(11): 1467-1474.
297. Kortbeek, L.M., Hofhuis, A., Nijhuis, C.D.M. & Havelaar, A.H. 2009. Congenital toxoplasmosis and DALYs in the Netherlands. *Memorias do Instituto Oswaldo Cruz*, 104(2): 370-373.
298. Hens, N., Aerts, M., Faes, C., Shkedy, Z., Lejeune, O., van Damme, P. & Beutels, P. 2010. Seventy-five years of estimating the force of infection from current status data. *Epidemiology and Infection*, 138(6): 802-812.
299. Balasundaram, M.B., Andavar, R., Palaniswamy, M. & Venkatapathy, N. 2010. Outbreak of Acquired Ocular Toxoplasmosis involving 248 patients. *Archives of Ophthalmology*, 128(1): 28-32.
300. Neves, E.S., Bicudo, L.N., Curi, A.L., Carregal, E., Bueno, W.F., Ferreira, R.G., Amendoeira, M.R., Benchimol, E. & Fernandes, O. 2009. Acute acquired toxoplasmosis: clinical-laboratorial aspects and ophthalmologic evaluation in a cohort of immunocompetent patients. *Memorias do Instituto Oswaldo Cruz*, 104(2): 393-396
301. Noble, A.G., Latkany, P., Kusmierczyk, J., Mets, M., Rabiah, P., Boyer, K., Jalbrzikowski, J., Wroblewski, K., Karrison, T., Swisher, C.N., Mieler, W.F., Meier, P., McLeod, R. and the Toxoplasmosis Study Group. 2010. Chorioretinal lesions in mothers of children with congenital toxoplasmosis in the National Collaborative Chicago-based, Congenital Toxoplasmosis Study. *Scientia Medica (Porto Alegre)*, 20(1): 20-26.
302. Usualieva, J., Minbaeva, G., Ziadinov, I., Deplazes, P. & Torgerson, P.R. 2013. Human Alveolar Echinococcosis in Kyrgyzstan. *Emerging Infectious Diseases*, 19(7): 1095-1097.
303. Nahorski, W.L., Knap, J.P., Pawlowski, Z.S., and 18 others. 2013. Human Alveolar Echinococcosis in Poland: 1990-2011. *PLOS Neglected Tropical Diseases*, 7(1): Art. No. e1986. DOI: 10.1371/journal.pntd.0001986
304. IHME [Institute for Health Metrics and Evaluation]. DisMod 3. Available from: <http://winthrop.ihme.washington.edu>
305. IARC [International Agency for Research on Cancer]. No date. GLOBOCAN 2012: All Cancers (excluding non-melanoma skin cancer): Estimated cancer incidence, mortality and prevalence worldwide in 2012 [Online]. [16 March 2012]. Available from: http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx
306. Yeh, F.S., Yu, M.C., Mo, C.C., Luo, S., Tong, M.J. & Henderson, B.E. 1989. Hepatitis B virus, aflatoxins, and hepatocellular carcinoma in southern Guangxi, China. *Cancer Research*, 49(9): 2506-2509.
307. Wu-Williams, A.H., Zeise, L. & Thomas, D. 1992. Risk assessment for aflatoxin B1: a modeling approach. *Risk Analysis*, 12(4): 559-567.

308. WHO. No date [online]. Global Health Estimates by Cause, Age, Sex and Country, 2000–2012. Available from: http://www.who.int/entity/healthinfo/global_burden_disease/
309. Tshala-Katumbay, D., Banea-Mayambu, J.-P., Kazadi-Kayembe, T., Nunga-Matadi, R., Bikangi-Nkiabungu, F., Edebol Eeg-Olofsson, K. & Tylleskär, T. 2001. *African Journal of Neurological Science*, 20(1): 8–12.
310. WHO. 2013. WHO methods and data sources for global burden of disease estimates 2000–2011. *Global Health Estimates Technical Paper, 2013-4. Doc. ID: WHO/HIS/HSI/GHE/2013.4*. Available at http://www.who.int/healthinfo/statistics/GlobalDALYmethods_2000_2011.pdf Accessed 2015-10-23.
311. Yu, S.C., Tan, F., Zhou, M.G., Liu, S.W., Zhu, X.J. & Zhu, Y.L. 2014. Global Burden of Disease, Injury and Risk Factor Study 2010: Its Policy Implications for China. *Biomedical and Environmental Sciences*, 27(1): 45–48.

LIST OF TABLES

Table 1. FERG hazards, causally related health states and corresponding disability weights (DWs). Details on the derivation of the DWs are provided in Appendix 4.....	43
Table 2. Foodborne hazards, and structure of the expert panels.....	46
Table 3. Examples of calibration seed questions.....	48
Table 4. Exposure routes included in the expert elicitation, per hazard.....	51
Table 5. Modelling strategies for the hazards included in the WHO global burden of foodborne disease estimates.....	53
Table 6. The number of experts enrolled, interviewed and finally included in the elicitation across panels.....	63
Table 7. Median global number of foodborne illnesses, deaths, Years Lived with Disability (YLDs), Years of Life Lost (YLLs) and Disability Adjusted Life Years (DALYs), with 95% uncertainty intervals, 2010.....	73
Table 8. Median rates of foodborne Disability Adjusted Life Years (DALYs) per 100 000 population, by subregion, with 95% uncertainty intervals, 2010.....	78
Table 9. Comparisons of the total burden of parasitic diseases (foodborne and non-foodborne) with 95% uncertainty intervals, estimated by FERG and by GBD2010 [9].....	108
Table A7.1 Subregional estimates (median and 95% uncertainty interval) of the proportion of illnesses caused by <i>Campylobacter</i> spp., non-typhoidal <i>Salmonella</i> spp., Shiga-toxin producing <i>Escherichia coli</i> (STEC), <i>Brucella</i> spp. and <i>Shigella</i> spp. through each exposure pathway.....	199
Table A7.2 Subregional estimates (median and 95% uncertainty interval) of the proportion of Diarrhoeal Disease illnesses caused by four hazards: enteropathogenic <i>E. coli</i> (EPEC), enterotoxigenic <i>E. coli</i> (ETEC), <i>Cryptosporidium</i> spp. and <i>Giardia</i> spp. through each exposure pathway.....	202
Table A7.3 Subregional estimates (median and 95% uncertainty interval) of the proportion of Diarrhoeal Disease illnesses caused by <i>Salmonella</i> Typhi, <i>Vibrio cholerae</i> , <i>Entamoeba histolytica</i> , norovirus, and hepatitis A virus through each exposure pathway.....	204
Table A7.4 Subregional estimates (median and 95% uncertainty interval) of the proportion of illnesses caused by <i>Toxoplasma gondii</i> , <i>Echinococcus multilocularis</i> , <i>Echinococcus granulosus</i> and <i>Ascaris</i> spp. through each exposure pathway.....	206
Table A7.5 Subregional estimates (median and 95% uncertainty interval) of the proportion of illnesses caused by exposure to lead through each pathway.....	209
Table A7.6 Percent of illness acquired through the foodborne transmission route for six national studies and this study.....	210
Table A8.1 Median number of foodborne illnesses, Deaths, and Disability Adjusted Life Years (DALYs), with 95% uncertainty intervals, 2010.....	211
Table A8.2 Median rates of foodborne illnesses, deaths and Disability Adjusted Life Years (DALYs) per 100 000 persons, by region, with 95% uncertainty intervals, 2010.....	213
Table A8.3 Median number of illnesses, Deaths, and Disability Adjusted Life Years (DALYs) by age group, with 95% uncertainty intervals, 2010.....	215
Table A8.4 Median rate per 100 000 of foodborne illnesses, Deaths and Disability Adjusted Life Years (DALYs) by region, with 95% uncertainty intervals, 2010.....	217
Table A8.5 Median number of total and foodborne illnesses, Deaths, and Disability Adjusted Life Years (DALYs), with 95% uncertainty intervals, 2010.....	219
Table A8.6 Median number of foodborne illnesses, Deaths, and Disability Adjusted Life Years (DALYs), with 95% Uncertainty Intervals, 2010.....	221
Table A8.7 Median rate per 100 000 foodborne (FB) illnesses, Deaths, and Disability Adjusted Life Years (DALYs) by region, with 95% uncertainty intervals, 2010.....	221

LIST OF FIGURES

Figure 1. Structure of the initiative to estimate the global burden of foodborne diseases	6
Figure 2. Hazards for which burden of foodborne disease estimates were prepared by FERG, grouped according to TF. Hazards in grey boxes were addressed by individual TFs but were not included in the global overview. Hazards in blue boxes are pending.	31
Figure 3. Geographical distribution of experts according to working experience (>3 years) per subregion. Several experts had experience in more than one subregion.	64
Figure 4. Statistical accuracy versus informativeness of the experts included, when using equal weight (blue) or performance weight (red) combinations, respectively.	65
Figure 5. Subregional estimates of the proportion of foodborne illnesses caused by <i>Campylobacter</i> spp., non-typhoidal <i>Salmonella</i> spp., Shiga-toxin producing <i>Escherichia coli</i> (STEC), <i>Brucella</i> spp. and <i>Shigella</i> spp. Indicated on the line plot are the 2.5th, 5th, 50th, 95th and 97.5th percentiles.	67
Figure 6. Subregional estimates of the proportion of foodborne illnesses caused by enteropathogenic <i>E. coli</i> (EPEC), enterotoxigenic <i>E. coli</i> (ETEC), <i>Cryptosporidium</i> spp. and <i>Giardia</i> spp.	68
Figure 7. Subregional estimates of the proportion of foodborne illnesses caused by typhoidal <i>Salmonella</i> , <i>Vibrio cholerae</i> , <i>Entamoeba histolytica</i> , norovirus, and hepatitis A virus.	69
Figure 8. Subregional estimates of the proportion of foodborne illnesses caused by <i>Toxoplasma gondii</i> , <i>Echinococcus multilocularis</i> , <i>Echinococcus granulosus</i> and <i>Ascaris</i> spp.	70
Figure 9. Subregional estimates of the proportion of disease caused by foodborne exposure to lead.	71
Figure 10. Subregional estimates (medians) of the proportion of disease caused by exposure to lead through eight different exposure routes.	71
Figure 11. Ranking of foodborne hazards, based on Disability-Adjusted Life Years at the global level, with 95% uncertainty intervals, 2010.	76
Figure 12. The global burden of foodborne disease (DALYS per 100 000 population) by hazard groups and by subregion, 2010.	80
Figure 13. Relative contribution of Years of Life Lost due to premature mortality (YLL) and Years Lived with Disability (YLD) to the global burden of 31 hazards in food, 2010.	81
Figure 14. Age-distribution of disability adjusted life years for 31 hazards contributing to the global burden of foodborne disease, 2010.	82
Figure 15. Scatterplot of the global burden of foodborne disease per 100 000 population and per incident case.	83
Figure 16. The global burden of foodborne disease by subregion (DALYS per 100 000 population) caused by enteric hazards, 2010.	85
Figure 17. Disability Adjusted Life Years for each pathogen acquired from contaminated food ranked from lowest to highest with 95% Uncertainty Intervals, 2010.	86
Figure 18A. The relative contribution to the DALY incidence by each agent for each of the subregions. This includes enteric protozoa to complete the picture on foodborne parasitic diseases. However the detail is reported in the accompanying manuscript on foodborne enteric pathogens [168].	87
Figure 18B. Disability Adjusted Life Years for each parasite acquired from contaminated food ranked from lowest to highest with 95% Uncertainty Intervals, 2010. This includes enteric protozoa to complete the picture on foodborne parasitic diseases. However the detail is reported in the accompanying manuscript on foodborne enteric pathogens [168].	88
Figure 19. The relative proportion of the burden of each of the foodborne parasitic diseases contributed by YLLs and YLDs	88
Figure 20. The relative contribution to the DALY incidence by each of four chemicals for each of the WHO Regions.	90
Figure 21. The relative contributions from YLLs and YLDs for each of four chemicals.	90
Figure 22. Disability Adjusted Life Years for each of four chemicals from contaminated food ranked, from lowest to highest, with 95% uncertainty intervals.	91
Figure 23. Major transmission routes of human foodborne diseases indicate two points of attribution: the reservoir level and the exposure level.	101
Figure A6.1 FERG hazards, causally related health states and corresponding disability weights (DWs). The fourth column describes how the various DWs were derived from the Global Burden of Disease Studies (GBD) and the World Health Organization Global Health Estimates (WHO/GHE).	195

GLOSSARY

Foodborne disease

A foodborne disease (FBD) can be defined as a disease commonly transmitted through ingested food. FBDs comprise a broad group of illnesses, and may be caused by microbial pathogens, parasites, chemical contaminants and biotoxins.

Burden of disease

In the context of this Initiative, the term “burden of disease” follows the principles of the Global Burden of disease Study, and includes the quantification of morbidity, all disabling complications and mortality in a single summary measure (DALY).

DALY (disability-adjusted life year)

A health gap measure that combines the years of life lost due to premature death (YLL) and the years lived with disability (YLD) from a disease or condition, for varying degrees of severity, making time itself the common metric for death and disability. One DALY equates to one year of healthy life lost.

Food

According to the Codex Alimentarius Commission, “food means any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of food but does not include cosmetics or tobacco or substances used only as drugs”. The definition includes all bottled drinks.

Source attribution

Source attribution (SA) is the partitioning of the human burden of a particular disease to specific sources. With regards to foodborne diseases, SA can be conducted at various points along the food distribution chain, from the animal reservoir to the point of consumption.

ABBREVIATIONS

BMD	Benchmark Dose
BMDL	Benchmark Dose lower 5% confidence bound
BMDU	Benchmark Dose upper confidence limit
BoD	Burden of Disease
BW	Body Weight
CDC	Centers for Disease Control and Prevention [of the United States of America]
CE	Cystic Echinococcosis
CEA	Comparative Exposure Assessment
CFR	Case fatality ratio
CHERG	Child Health Epidemiology Reference Group
CI	Confidence Interval
CNS	Central nervous system
COPD	Chronic obstructive pulmonary disease
CRA	Comparative Risk Assessment
CSTF	Country Studies Task Force
CT	Congenital Toxoplasmosis
CTF	Computational Task Force
CTTF	Chemicals and Toxins Task Force
DALY	Disability-adjusted life year
DOI	Declaration of interests
DRC	Democratic Republic of Congo
DW	Disability Weight
EAggEC	Enterogaggerative <i>E. coli</i>
ECDC	European Centre for Disease Prevention and Control
EDTF	Enteric Disease Task Force
EFSA	European Food Safety Authority
EPEC	Enteropathogenic <i>Escherichia coli</i>
ESRD	End-stage renal disease
ETEC	Enterotoxigenic <i>Escherichia coli</i>
EU	European Union
FAO	Food and Agriculture Organization of the United Nations

FBD	Foodborne Diseases
FDA	United States Food and Drug Administration
FERG	Foodborne Disease Burden Epidemiology Reference Group
FOS	[WHO] Department of Food Safety, Zoonoses and Foodborne Diseases
GBD	Global Burden of Disease
GBD2010	Institute of Health Metrics and Evaluation Global Burden of Disease Study, 2010.
GBS	Guillain-Barré Syndrome
GEMS	Global Environment Monitoring System
GFN	Global Foodborne Infections Network
HALE	Health-Adjusted Life Expectancy
HAV	hepatitis A virus
HBV	hepatitis B virus
HCC	Hepatocellular Carcinoma
HUS	[STEC] haemolytic uraemic syndrome
IARC	International Agency for Research on Cancer
IHME	Institute of Health Metrics and Evaluation
iNTS	Invasive non-typhoid salmonellosis
JECFA	Joint FAO/WHO Expert Committee on Food Additives
KT	Knowledge Translation
KTPG	Knowledge Translation and Policy Group
LE	life expectancy
LOS	Lipo-oligosaccharides
MAR	“missing at random”
MAL-ED	Interactions of Malnutrition & Enteric Infections: Consequences for Child Health and Development
MDG	Millennium Development Goal(s)
NBD	National Burden of Disease
NCC	Neurocysticercosis
NGO	non-governmental organization
NTP	National Toxicology Program
NTS	Non-typhoidal <i>Salmonella enterica</i>

OIE	World Organisation for Animal Health
PAF	population attributable fraction
PAHO	Pan American Health Organization
PCB	Polychlorinated Biphenyl
PCR	polymerase chain reaction
PDTF	Parasitic Diseases Task Force
RfD	Reference Dose
RIVM	The Dutch National Institute for Public Health and the Environment
SA	Source attribution
SATF	Source Attribution Task Force
SPS	[Agreement on the Application of] Sanitary and Phytosanitary Measures [of the WTO]
STEC	Shiga toxin-producing <i>Escherichia coli</i>
TF	task force
TWI	Tolerable Weekly Intake
UI	uncertainty interval
UN	United Nations
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Funds
US EPA	United States Environmental Protection Agency
USA	United States of America
USDA	United States Department of Agriculture
WHA	World Health Assembly
WHO	World Health Organization
WTO	World Trade Organization
YLD	years lived with disability
YLL	years of life lost

This report presents the first global and regional estimates of the burden of foodborne diseases. The large disease burden from food highlights the importance of food safety, particularly in Africa, South-East Asia and other regions. Despite the data gaps and limitations of these initial estimates, it is apparent that the global burden of foodborne diseases is considerable, and affects individuals of all ages, particularly children <5 years of age and persons living in low-income regions of the world. By incorporating these estimates into policy development at both national and international levels, all stakeholders can contribute to improvements in safety throughout the food chain. These results will also help to direct future research activities.



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