

DIARRHOEA

Tackling the problem of moderate-to-severe diarrhoea in developing countries

New research has revealed the burden and aetiology of diarrhoeal diseases in children <5 years old in sub-Saharan Africa and South Asia. These data could be used to reduce the global burden of diarrhoeal diseases.

“Diarrhoeal diseases continue to be major causes of childhood mortality in developing countries, causing an estimated 800,000 deaths among children <5 years of age annually,” say Karen Kotloff and Myron Levine (University of Maryland School of Medicine, USA), two of the study authors. Interventions targeted at the aetiology of diarrhoeal disease and the children at highest risk should reduce the burden of disease. However, many gaps exist in our knowledge of these factors. Kotloff and co-workers designed the Global Enteric Multicenter Study (GEMS) to address these gaps.

The GEMS was a matched case–control study that included 9,439 children with moderate-to-severe diarrhoea and 13,129 children without diarrhoea as controls. The control children were matched for age, sex and the neighbourhood in which they lived. The children were enrolled over a period of 3 years and were from four sites in sub-Saharan Africa (Kenya, Mali, Mozambique and The Gambia) and three in south Asia (Bangladesh, India and Pakistan); all were aged 0–59 months. When the children were enrolled in the study, clinical and epidemiological data were gathered, anthropometric measurements were taken and faecal

samples were used to identify the enteropathogens causing disease. A home visit was made 50–90 days after enrollment to determine the vital status of the child, clinical outcomes and interval growth.

The researchers found that ~1 in 5 children <2 years old experienced an episode of moderate-to-severe diarrhoea every year. These children were 8.5 times more likely to die during the follow-up period than children who had not had moderate-to-severe diarrhoea. In addition, the children that did survive tended to have stunted growth compared with control children.

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Four pathogens were identified that caused the majority of moderate-to-severe diarrhoea in these children: rotavirus; *Cryptosporidium*; *Shigella*; and ST-EPEC (a type of *Escherichia coli*). Other pathogens were identified that were important in particular locations, for example, *Campylobacter jejuni* was a major cause of diarrhoea in south Asia and Mozambique, but not the other sites in Africa. ST-EPEC was associated with an increased risk of death in children aged 0–11 months, and children aged 12–23 months had an increased risk of death if they were infected with *Cryptosporidium*.

“The GEMS findings suggest that if interventions target just four pathogens, the global burden of diarrhoeal disease can be substantially reduced, saving thousands of lives,” explain Kotloff and Levine. Indeed, the researchers calculated that targeting these four pathogens in sub-Saharan Africa and south Asia could mean that 40% fewer children will develop moderate-to-severe diarrhoea and its sequelae during their first 2 years.

The authors suggest that access to existing preventive tools, such as the rotavirus vaccine, should be expanded in developing countries. The introduction of simple and effective treatments for diarrhoea, such as zinc and oral rehydration solutions, should also be accelerated. New tools need to be developed that target the four major pathogens. Particular focus should be given to developing a method to diagnose *Cryptosporidium* infection, as this is not currently possible. Kotloff and Levine also suggest that children should be followed-up after they leave the hospital or health centre to prevent growth delay and death.

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