Diarrhoeal diseases and the global health agenda: measuring and changing priority

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We investigate priority setting and the global health agenda by analysing the control of diarrhoeal diseases (CDD). CDD was one of the ‘twin engines’ of the 1980s’ child survival movement, but now has a low priority on the global health agenda, even though diarrhoeal diseases still claim around 1.5 million children annually. In this article, we develop a framework and four indicators of priority to measure CDD’s overall prominence on the global health agenda over the last three decades: trends in treatment coverage, changes in perceived priority, changes in financial support and institutional involvement and bibliographic trends. We find that CDD’s priority is now one-sixth to one-third of its level in 1985. We then use political analysis to suggest strategies for reframing CDD as an issue and promoting its priority on the global health agenda.

Keywords Priority setting, global health policy, diarrhoeal diseases

KEY MESSAGES
- Develops a framework for measuring the political priority of health issues.
- Generates four indicators to assess the priority of diarrhoeal diseases (DD) on the global health agenda over time.
- Finds that the global-level priority of DD is about one-sixth to one-third as high as in 1985.
- Presents political reframing strategies that could be used to promote the priority of DD in the future.

Introduction
To investigate priority setting and the global health agenda (both terms defined below), this article studies the history of the control of diarrhoeal diseases (CDD). CDD figured prominently as one of the ‘twin engines’ of the child survival movement of the 1980s, but now has a low priority on the global health agenda compared with malaria, tuberculosis (TB) and HIV/AIDS. Yet diarrhoeal diseases (DD) still claim around 1.5 million child lives annually (Boschi-Pinto et al. 2008; Black et al. 2010), about twice the child mortality due to malaria (732 000), around seven times that of HIV (201 000) and far more than that of TB, which is not a major killer of children at all (Black et al. 2010). To explain how and why some health problems are prioritized over others and how priority can be measured, analysts must look beyond mortality and other basic health measures. We first measure CDD priority on the global health agenda over time, using four kinds of indicators, and then propose strategies for changing its priority to reinvigorate efforts to save more children from DD. In a separate paper, we report our narrative of the history of CDD and explain the primary reasons behind the changes in priority we measure and discuss here.

Diarrhoeal diseases, mortality estimates and control approaches
By convention, diarrhoea is defined as the passage within 24 h of three or more stools ‘sufficiently liquid to take the shape of the container in which they are placed’ (Keusch et al. 2006).
In general, insufficient nutrition, poor hygiene, contaminated water and inadequate sanitation all contribute to the incidence of diarrhoea. The specific causative agents of diarrhoea are typically transmitted via the faecal–oral route; the principal known causes include bacteria such as *Escherichia coli*, *Vibrio cholerae*, *Salmonella* and *Shigella*, viruses such as rotavirus and protozoa such as *Cryptosporidium* and *Giardia* (Hashmy et al. 1997a,b; Parashar et al. 2003; Crum et al. 2005; Keusk et al. 2006; Fischer Walker and Black 2007).

These causative agents provoke three types of diarrhoea, each with different morbidities. Acute watery diarrhoea causes dehydration, which can be fatal, especially in young children. The most common dangerous causes are rotavirus, *E. coli* and *V. cholerae*. Persistent diarrhoea, defined as lasting 2 weeks or more, causes nutrient losses, prevents absorption by the intestines and results in wasting. It is associated with poor nutritional status, which is often caused or worsened by the disease. Bloody diarrhoea reflects intestinal inflammation and damage, and can lead to severe depletion of nutrients and body stores of carbohydrates, fats and proteins (Keusch et al. 2006).

Most global estimates of DD have extrapolated from the mortality proportions reported by facilities, which significantly undercount conditions that cause death outside formal health facilities. Diarrhoeal diseases have long been too ubiquitous to enumerate when not fatal, and too invisible to the formal health system to count reliably when they do result in death. In addition, the diversity of causes presents difficulties in classifying—and therefore in counting—cases of diarrhoea.

Over the last three decades, researchers have produced estimates of DD mortality in the developing world. The most important of these papers are presented in Table 1 (Snyder and Merson 1982; Claeson and Merson 1990; Bern et al. 1992; Kosek et al. 2003; Boschi-Pinto et al. 2008; Black et al. 2010).

The lack of data collection, especially in recent years, and the absence of comparable methodologies present significant problems for estimating current DD mortality and severely limit the degree to which past estimates can be compared. All sources we consulted supported the conclusion that CDD programming has reduced DD mortality since the early 1980s. But data collection efforts were systematic for little more than a decade, from the early 1980s into the mid-1990s. Both before and since that time investigators have confronted significant obstacles. For instance, in 1982 Snyder and Merson could identify 24 suitable studies, but only 10 of these defined diarrhoea and of these 10, 8 used different definitions (Snyder and Merson 1982). In contrast, global estimates of DD treatment rates in 1993 could draw on 276 surveys in 60 countries. But a decade later in 2003, only 31 surveys in 20 countries were available ‘reflecting diminished support for the systematic collection of incidence data’ (Keusch et al. 2006).

In this article, the ‘CDD’ refers primarily to oral rehydration therapy (ORT) as the administration of oral rehydration solution (ORS) or homemade substitutes, which was specified in World Health Organization (WHO) guidelines to include feeding the sick patient. We use the term in this sense because when CDD became a global health priority, ORT was the only intervention delivered at scale. Even though DD could have been reduced by improving infrastructure (especially for water and sanitation), or improving long-term nutritional status, CDD referred in practice primarily to ORT and related training and outreach.

### The global health agenda and a framework for measuring priority

The concept of a ‘global health agenda’ has been used by policy makers and policy analysts to describe general trends and priorities in the field of international health, even though no formal or specific agenda exists. Indeed, there are multiple ways in which it could be defined. In common usage, the global health agenda may refer to issues debated at the Executive Board of WHO, or problems that receive the most funding from international and national health agencies, or items frequently discussed on the front pages of major newspapers, or public health problems receiving the most frequent hits on Google. In this article, we approach the global health agenda by examining

### Table 1 Estimates of DD mortality

<table>
<thead>
<tr>
<th>Authors</th>
<th>Publication date</th>
<th>Date range of underlying survey data</th>
<th>Estimates of annual childhood DD mortality</th>
<th>Data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snyder and Merson</td>
<td>1982</td>
<td>1955–80 (data collection)</td>
<td>4.6 million</td>
<td>Review of 24 published DD studies (18 countries)</td>
</tr>
<tr>
<td>Claeson and Merson</td>
<td>1990</td>
<td>1981–86 (data collection)</td>
<td>4 million</td>
<td>276 DD morbidity, mortality and treatment surveys in 60 countries</td>
</tr>
<tr>
<td>Bern et al.</td>
<td>1992</td>
<td>1978–87 (data collection)</td>
<td>3.3 million</td>
<td>Review of published DD studies and 40 national surveys conducted by CDD programmes</td>
</tr>
<tr>
<td>Kosek et al.</td>
<td>2003</td>
<td>1985–98 (data collection)</td>
<td>2.5 million</td>
<td>Review of 34 published DD studies (21 countries)</td>
</tr>
<tr>
<td>Boschi-Pinto et al.</td>
<td>2008</td>
<td>1975–98 (middle years of surveys)</td>
<td>1.87 million</td>
<td>Review of published epidemiological studies, regression model calculation of DD mortality</td>
</tr>
<tr>
<td>Black et al.</td>
<td>2010</td>
<td>2008 or closest year in high-coverage vital registration systems; in low-coverage systems qualifying community surveys 1979 to present.</td>
<td>1.336 million</td>
<td>Multi-cause proportionate model calculation using regression analysis</td>
</tr>
</tbody>
</table>
the actions of major multilateral and bilateral agencies, and assessing the published literature in PubMed indexed journals.

The concepts of ‘agenda setting’ and ‘priority setting’ have been widely invoked by researchers and practitioners to describe the methods used to put something on a policy agenda or to move something higher on an agenda (Lind and Wiseman 1978; Murray 1990; Reichenbach 2002; Shiffman et al. 2002; Bryce et al. 2005; Baltussen et al. 2006; Kroeger and Nathan 2006; Rudan et al. 2007). The analysis of policy agendas and related political processes represents an important sub-field of political science (Kingdon 1995). In this analysis, we build on two conceptual frameworks that have been proposed for understanding political priorities and agenda-setting processes in global health by Reich (1995) and Shiffman and Smith (2007). Table 2 compares these two efforts and also presents the categories we selected to analyse CDD and the indicators we developed to measure priority. Our usage of ‘priority setting’ is broader than is typical in the public policy literature. Our primary focus is on how CDD’s priority changed once it was on the global health agenda (‘priority setting’), as opposed to how CDD initially entered the agenda (‘agenda setting’), but for simplicity, we use the term ‘priority setting’ throughout.

Our analysis of CDD’s place on the global health agenda uses four indicators to assess priority: trends in treatment coverage, changes in perceived priority, changes in financial and institutional involvement and bibliographic trends. Using multiple measures helps to overcome limitations in each indicator and provides a basis for evaluating the consistency of our findings. As it is difficult to measure priority directly, we gather inferences from several indicators related to the processes of policy implementation.

Each of the four indicators reflects a separate category of analysis. The first indicator on ORT treatment coverage provides an assessment of policy implementation as an important aspect of priority. This output measure provides a way of assessing how much priority CDD was given at a particular time. We suggest that increasing or high treatment coverage shows growing or high priority and decreasing or low treatment coverage shows diminishing or low priority. Although other interventions affect the incidence of DD, such as water supply and sanitation projects, ORT coverage rates remain a reasonable indicator of priority. There are two important limitations for this approach. First, trends in treatment coverage are hard to establish because data have not been collected consistently over time. Second, the trend in treatment coverage assesses CDD’s priority relative to itself at different points in time, but not compared with other items on the global health agenda.

The second indicator on the ‘perception of problem’ was investigated through interviews in which we asked key informants to rate the relative priority of CDD in 1985 vs 2008. This method provides a measure of perceived priority by experts in DD control. A primary limitation of this measure is that the choice of interviewees can influence the reported changes in perceived priority. It is also limited as subjective and retrospective.

Our third indicator on ‘institutional involvement’ was based on interviews with experts and a review of published literature. Using these data, we assessed how funding and staffing levels changed at selected global health institutions, and we compared the extent of co-operation among institutions at different times. This indicator reflects how much money and how many staff members were dedicated to CDD at different times, both of which are important signals of institutional priority. This assessment is affected by the choice of institutions. Although financial flows may be a more objective measure, the data are hard to gather. Furthermore, spending is conditioned by other factors distinct from priority, such as the cost of a given intervention, the absorptive capacity of executing entities, differing degrees of participation by host governments and the location and size of the targeted problem.

Our fourth indicator, ‘research attention’, was assessed by bibliographic trends. To measure the research resources dedicated to CDD, we analysed the number of publications over time. These trends in the number of publications reflect broader policy interest in CDD, but they also have some limitations. Bibliographic trends might reflect changes in research more than in implementation, and this measure does not account for secular changes in all PubMed-indexed publications. In addition, the indicator only measures activity in the PubMed database.

Data collection
We began our data collection by systematically searching the PubMed database. Our initial search used the MeSH terms ‘diarrhoea’ and ‘developing countries’, and identified 2970 articles. All citations (and abstracts, where available) were reviewed. We obtained potentially relevant papers, based on a mention of DD and the presence of at least one other inclusion criterion: any discussion of historical, political or strategic...
perspectives, including a comparison of time periods for some aspect of DD, or describing trends in prevalence, treatment or mortality; global or regional estimates of prevalence, treatment or mortality; and review articles discussing broad scientific issues or dealing with the global or regional levels on any DD topic. This method yielded a subset of 119 papers, which we supplemented with additional papers contained in the references.

We then conducted further research on prominent institutions and authors. We contacted 12 experts identified through these publications. Ten experts responded positively and were interviewed. The interviewees suggested six additional experts, all of whom had extensive implementation experience, but had not been as prominent in the published literature as those in our initial sample. All six responded positively to an interview request. We conducted 16 total interviews, 12 of which covered our complete interview guide (available online). The remaining four interviews did not complete all the questions, typically because of a lack of time.

The experts held current or previous affiliations with multilateral or bilateral global health institutions, implementing entities, academic centers, private foundations or pharmaceutical firms. These included the Centers for Disease Control and Prevention (CDC), UNICEF, the World Bank, WHO, the United States Agency for International Development (USAID) and the United States Public Health Service; John Snow International and Management Sciences for Health; Boston University, Harvard University, the International Centre for Diarrhoeal Disease Research, Bangladesh (ICCCDR,B), Johns Hopkins University, the National Institutes of Health (NIH) and the University of Maryland; the Ford Foundation and the Rockefeller Foundation; and Merck & Co., Inc. Notes were taken during each interview and these were used immediately afterward to produce detailed records of the interview. We also searched the websites of important institutions for relevant reports. The literature review provided the basis for our assessment of each indicator. Papers containing estimates of DD mortality or CDD’s impact were analysed to establish trends in treatment coverage (indicator #1). Using a list of prominent authors in the literature review, we identified senior experts in DD and/or CDD, 16 of whom agreed to participate in structured interviews to explore perceived priority (indicator #2). The literature review also provided the basis for identifying important institutions for our research on financing and institutional involvement (indicator #3). For our bibliometric research, we counted publications by year in the PubMed database as detected by search terms such as ‘diarrhoea’ and MeSH subject searches such as ‘diarrhoeal, infantile’. We also used the Dissertation Abstracts database to compare the number of theses on DD with the number completed on other diseases (indicator #4).

Our methods represent only one way to investigate the priority setting history of CDD. Limitations of interviews include problems of recall, which can result in imprecise estimated numbers. This method trades the exactitude of archival documents for the thematic richness of first-person accounts. Furthermore, as we identified our interviewees through a search of the PubMed database, we were dependent on these published interviewees to identify other important experts whose work was not reflected in the authorship of published papers. However, this method could not fully address biases towards those who published or otherwise worked in English, which probably over-represents the US perspective. This account is also dominated by health perspectives, reflecting our identification strategy.

## Measuring priority

### Indicator #1: Trends in treatment coverage

There was zero ORT coverage in the mid-1970s and limited ORT coverage in 1980. By 1989, however, WHO estimated that between 20 and 30% of the annual 1.5 billion child diarrhoeal episodes were treated with ORT in most regions. Only Africa was significantly lower at ~13% (Claeson and Merson 1990).

Two recent papers on treatment rates highlight some of the challenges in understanding coverage trends (Forsberg et al. 2007; Ram et al. 2008). Forsberg et al. seek to understand broad trends in DD case management over the period 1986–2003. They find that the mean trend in ORT use rates in their sample of 40 low- and middle-income countries increased slightly, by an average of 0.39% per year. The overall ORT use rate increased from ~35% to around 41%. The authors highlight this ‘unfinished agenda’, which leaves hundreds of millions of children with diarrhoea and without ORT each year (Forsberg et al. 2007).

The mean trend analysis of treatment rates, however, obscures the heterogeneity of recent national experiences, many of which show declining trends in coverage. Comparing ORT use rates in the two most recent Demographic and Health Survey rounds, Ram et al. examine the experiences of 34 countries. Three countries have seen ORT use rates fall by 30% or more between the last two surveys, and coverage has declined by around 10% or more in another 12 countries. Eight countries slipped by a smaller margin. Five countries increased coverage by <5% and six countries made gains of ~10% or more (Ram et al. 2008). We cannot interpret the extent to which this sample of 34 countries may be representative of other low- and middle-income countries.

Treatment coverage rates display a clear global trend of rapid growth in ORT use only from the mid-1970s until the early 1990s. Based on Claeson and Merson’s evidence, treatments in that period rose from none per year to around 300–400 million per year. That trend represents an increase in the priority of CDD on the global health agenda. After the early 1990s, data constraints and national-level heterogeneity limit the usefulness of global-level estimates of ORT use and treatment coverage. The lack of data reflects a reduction in the number and size of CDD projects, which suggests a decline in global-level priority. In the median country analysed by Ram et al., for instance, ORT treatment rates declined by around 4% between the last two DHS surveys.

### Indicator #2: Changes in perceived priority

To assess perceptions of priority over time, we conducted structured interviews with senior experts in DD, as described earlier. The interviews were used to assemble historical facts, political insights and personal experiences related to the perceived priority of CDD.
Each interviewee was asked to rate the priority of CDD in 2008, based on a global health agenda priority score of 10 for the year 1985. We selected 1985 as the comparison year to represent a high activity point for CDD and we used the number ‘10’ to provide a scale for comparing years. Subjects were asked to rate the priority in 2008 compared with 1985. Twelve interviewees provided a numeric estimate. Responses ranged from 0 to 7, with a mean and median response of 3.

To some extent, the range of scores reflected differing personal definitions of CDD. One respondent whose career has been closely associated with ORT noted that in 1985 CDD was nearly synonymous with ORT. Compared with 1985, this person said, there was in 2008 much less emphasis on ORT, but far more effort was being invested in rotavirus vaccine development (primarily at academic and pharmaceutical vaccine manufacturing organisations) and measles immunization campaigns. At the global level, an ORT priority score would be very low compared with 1985, but accounting for all programmes that affect DD justified a 2008 score of 5 for this person. Another respondent whose career has been in maternal and child health assigned a 2008 score of 1 because CDD was no longer a prominent, independent topic in global health. The highest score, 7, was given by an interviewee who has long been involved with vaccine research. This person judged CDD’s priority to have declined because of weak leadership at the global health institutions, but was hopeful that a vaccine would rejuvenate the CDD movement. Although Millennium Development Goal 4 concerns child survival, no interviewee mentioned any impact on DD, except as a possible consequence of measles immunization because increased diarrhoeal episodes have been reported in individuals in the developing world during recovery from measles.

Several respondents noted that CDD derived some of its momentum in the 1980s from the high priority given to child health then. In today’s priorities, child health is much lower, which has had the effect of de-emphasizing CDD, they said. Some interviewees felt that this decline in global-level CDD priority was partially appropriate because countries themselves should now play a larger role in ORT implementation. However, almost all interviewees expressed frustration that the transition away from internationally funded CDD had been poorly executed and that recent country experiences have been heterogeneous.

In the aggregate, this assessment of perception among senior DD experts suggests that the relative priority of DD on the global agenda in 2008 was far lower—perhaps only about one-third of its level in the mid-1980s.

Indicator #3: Changes in financial support and institutional involvement

Trends in funding and institutional activities were analysed for WHO, USAID and UNICEF, the three most important agencies involved in CDD in the past. The many ways in which DD can be addressed complicated the inquiry. Some funding figures were available for some of the large vertical projects in the 1980s, but funding for DD control was not broken out as a line item in any source we obtained for the last 15 years. That lack of financial data in itself reflected a low priority for CDD in recent years. In the absence of reliable documentation, the interviews with experts were used to collect impressions and figures on both funding and activities at international agencies.

At all three institutions (WHO, USAID and UNICEF) we found that support for CDD in institutional and monetary forms was far lower in 2008 than it was in the 1980s. At WHO, one respondent recalled that in 1985, there were 20–25 full time staff members working exclusively on DD. These staff comprised the Diarrhoeal Disease Control Programme (DDCP; often abbreviated as CDD, but we use DDCP for clarity). With success the DDCP saw its mandate broadened, first to include acute respiratory infections (ARIs), and later to become responsible for all of child health under WHO’s Integrated Management of Childhood Illness (IMCI) strategy launched in 1992. Under IMCI, direct support for CDD alone was discontinued. In mid-2008, there was only one full-time staff member at WHO headquarters who worked exclusively on DD. There was one person assigned full-time to cholera, and around five other people who worked on DD ~20% of the time. In all, there were about three full-time equivalent staff assigned to DD at WHO-Geneva. Although the overall size of the former DDCP remains about the same, it was charged with all aspects of child health, resulting in a major reduction of staff for CDD.

Available financial resources have also declined. The 1985 budget for WHO’s DDCP was ~US$22.5M (1985 dollars), and by 1989 it was more than US$40M (1989 dollars). Adjusting these sums for inflation using data from the US Bureau for Labor Statistics yields 2008 equivalents of about $45M and $70M, respectively. These estimates compare with the 2008 DD budget of ~$2M. Funding for DD at WHO in 2008 was thus ~3% of what it was in 1989.

At USAID, interviewees could provide only rough estimates, which resembled the trends related by informants at WHO. USAID previously employed a large professional staff working on DD, but these staff members have since been assigned to all aspects of child health. In 2008, there was only one person working full time on DD. In financial terms, USAID previously spent tens of millions of dollars annually on CDD programming, training and support. Much of the funding was channelled to implementers through projects such as Technology for Primary Health Care Project (PRITECH) and Basic Support for Institutionalizing Child Survival (BASICS). Although BASICS continued to fund CDD on a much-reduced scale in five countries, none of the large vertical CDD projects have been continued (BASICS 2008). In late 2008, BASICS was folded into a new global project, Maternal and Child Health Integrated Programme (MCHIP), which combines maternal, child and newborn health. The Obama administration’s Global Health Initiative places importance on country ownership and health systems strengthening (HSS) but we have not been able to assess the impact of these programmes on DD.

Starting in 1988 James Grant directed UNICEF away from CDD to focus more on immunizations. By the time of his death in 1995, UNICEF had essentially abandoned direct support for CDD programming, although some was still given via activities related to IMCI programmes. In the decade that followed, UNICEF managed only a ‘boat adrift’ approach to child survival (Bryce et al. 2006). Interviewees assessed Grant’s leadership in universally positive terms, but the general perception was that the policies of his successor, Carol Bellamy, were negative for CDD programming. Some held strong views, terming her tenure an ‘utter disaster’ and a ‘lost decade’, with policies that were
‘folly’. Under Bellamy, both ‘twin engines’ of Grant’s child survival revolution—ORT and immunization—languished, particularly ORT. Subsequently, immunization was taken up and funded under the Global Alliance for Vaccines and Immunization (GAVI). To work with GAVI, UNICEF sustained a staff of technical experts in immunizations. In contrast, the technical staff who had worked on DD was not maintained. Other specific diseases have gained support via the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), but no new mechanism for CDD support has emerged.

This analysis of financial and institutional support for CDD suggests that CDD’s priority has fallen sharply since the mid-1980s. The information on full-time equivalent staff assigned to DD and the estimated funding for CDD at WHO, USAID and UNICEF all suggest that by 2008 support had been reduced to around 5–10% of that of the mid-1980s.

**Indicator #4: Bibliographic trends**

We examined trends in the published literature to assess the priority of DD in several dimensions. We constructed histograms of publications by year using PubMed searches with terms designed to discriminate among various aspects of research broadly related to diarrhoea. Figure 1 presents the histogram generated by the MeSH categorical terms ‘diarrhoecal, infantile’ and ‘developing countries’.

This analysis shows that publications on infantile diarrhoea in developing countries rose quickly in the 1980s and tapered off in the late 1990s and 2000s. Our other searches, available online, found that publications on diarrhoea in general have been steady or trended upward slightly, and that publications on DD vaccines have risen in recent years.

To broaden our measure of priority, we used a related method to compare DD with two diseases now at the top of the global health agenda—TB and malaria. HIV/AIDS was not included because of the difficulty of limiting the search to the global health context.

We used the ProQuest database of dissertations to compare the numbers of new researchers studying DD, malaria and tuberculosis, as one measure of current and future interest in each area. We excluded as many veterinary terms as possible from the DD search. As shown in Figure 2, dissertations on malaria and TB have been growing steadily in number, and even rapidly in the most recent years. In contrast, dissertations on DD have been flat and far less numerous. Over the 5 years from 2003 to 2007, inclusive, the search identified 143 dissertations on DD, 322 on malaria and 441 on TB (additional bibliographic figures are available online).

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**Figure 1** Bibliographic Search 4: publications by year identified with PubMed MeSH terms ‘diarrhoecal, infantile’ and ‘developing countries’.

**Figure 2** Number of dissertations on DD, malaria and TB identified by a search in the Dissertation Abstracts Database.
Many factors pose challenges to the interpretation of our bibliographic data, including diversity in the types and length of articles, and changes in the overall rates of publication since 1975. Nonetheless, as many of these factors are common to all of the graphs, we believe they can be interpreted as a measure of relative priority.

We interpret these graphs to suggest that CDD in developing countries grew in priority starting in the late 1970s, peaked in the late 1980s or the early 1990s and has declined since. Rotavirus vaccine research funded by WHO followed this same pattern, but in recent years the private sector and product development partnerships have made progress in this area. The rise in publications in the past few years was related primarily to the development and testing of rotavirus vaccines.

Taken together, these bibliographic indicators suggest a pattern of priority similar to that revealed by the other three indicators. CDD rose in priority during the late 1970s and 1980s and began declining in the 1990s through the early years of the 21st century, with a small uptick in the last few years, possibly related to rotavirus vaccines. Dissertation-based comparisons between DD, TB and malaria suggest that there are fewer new scientists studying DD.

A visual assessment of the histograms supports the finding that DD priority in 2008 was ~10–30% as high as it was in the mid-1980s.

Assessment of the four indicators

Each indicator suggests significant declines in CDD’s priority since the mid-1980s. Our interviews revealed some diversity of opinion regarding the extent of CDD’s priority reduction. The discrepancy between perceived priority, ~30% of the 1985 level, and funding, ~3% of the 1985 level, was investigated in follow-up questioning. We determined that interviewees tended to underestimate the effect of inflation and therefore believed that funding in 2008 compared more favourably to that of the 1980s than is true.

Taken in combination, the four indicators of priority strongly suggest that CDD’s priority on the global health agenda has declined significantly since the 1980s. Compared to the level in 1985, the decline of CDD’s priority on the global health agenda was estimated at ~30% with the perception indicator, ~5–10% with the institutional and financial indicator and ~10–30% with the bibliographic indicator. Considered together, these three indicators suggest that CDD’s 2008 priority on the global health agenda was around one-sixth to one-third the level it was in 1985. However, our bibliographic analysis suggests that interest in DD is rising again, which may be due to increasing vaccine research. Although imperfect, these four indicators all show a similar pattern, highlighting the advantages of a multifaceted approach to assessing priority on the global health agenda.

Changing the priority of CDD

To identify strategic options that could increase the priority of CDD on the global health agenda, we performed a stakeholder analysis of the most influential institutions and their positions on CDD, and developed a series of strategies for change. We employed PolicyMaker, a software application for computer-assisted political analysis, to conduct the stakeholder analysis and develop political strategies (Reich and Cooper 1995–2004). PolicyMaker’s political mapping feature analyses the policy environment based on assessments of players, positions and power. The analysis included three multilateral organizations, two global initiatives, four bilateral agencies, one government, two private foundations, two pharmaceutical firms, four non-governmental organisations, three partnerships and two media organisations. The stakeholder analysis found little support for vertical CDD programming; this confirmed the previous analysis of the four indicators of priority on the global health agenda. A discussion of the stakeholder analysis and our detailed results are available online.

The political analysis showed that reframing the CDD issue could be effective in raising its priority on the global health agenda. Reframing is a political advocacy technique used to influence opinion by changing the context within which an issue is perceived (Chong and Druckman 2007). When perceived as a possible vertical programme, CDD has very low potential for increased support. The analysis identified four reframing alternatives that could advance CDD’s priority: (1) new attention to Primary Health Care (PHC), (2) vaccine preventable diseases, (3) private product promotion and distribution and (4) HSS. These frames were selected based on their 2008 prominence in global health. In addition, three possible ways to focus control strategies for DD were considered, based on the technology, the disease and child or family health. These foci were chosen according to their importance in global health and applicability to CDD. The four frames and three priority foci created a 12-cell matrix of possibilities, presented in Table 3 along with the potentially interested institutions.

From this matrix of reframing options, we selected three combinations most likely to reduce DD or related mortality. We based our assessment on the effectiveness of activities in each frame and how much support each received in 2008, along with the fit between the frame, the focus area and the available or forthcoming CDD interventions.

Option one: Frame DD as a vaccine-preventable disease and focus on the technology of a new rotavirus vaccine

This option for immediate action offers an obvious partner in GAVI, a well-functioning, well-funded initiative with demonstrated interest in interest in rotavirus vaccines, which are now recommended by WHO for inclusion in all national immunization plans (WHO-PATH-GAVI 2009). In 2011, GAVI supported rotavirus vaccinations in Sudan and by 2015 plans to do so in more than 40 countries (GAVI 2012). Initial results with Merck’s Rotateq in the USA have been very positive, which has the twin advantages of demonstrating the vaccine’s effectiveness and the potential of raising awareness of the problem of DD with new constituencies, particularly, parents of young US children. The existence of the vaccine helps to bring home the threat of DD, which could serve as a powerful point of leverage. The vaccine also moves the issue away from diarrhoea, which has many negative associations, and towards rotavirus, a pathogen that as yet has no well-developed connotations. That rotavirus can be blamed for a few deaths annually in the USA and for ~450 000 deaths in the developing world could be useful in raising public awareness (most recent estimates; 2008 data) (WHO 2012). Pursuing a
vaccine-only strategy, however, may not generate support for case management, including the use of ORT.

The rotavirus reframing option focuses on a technology-based approach and a vertical perspective on CDD. Deploying a rotavirus vaccine makes individuals more resistant to DD caused by rotavirus and has community impact through herd immunity if coverage is high enough.

Advocates for the rotavirus option, however, may need to prepare for several counter-arguments. A rotavirus vaccine would not improve hygiene habits, would not build health system capacity and would not reduce environmental exposure to the non-rotavirus causes of DD, for instance. A vaccine could help safeguard nutritional status, but would not improve it. Opponents to the inclusion of rotavirus vaccines in immunization programmes might also point out that coverage with the current portfolio of essential vaccines is <40% in many countries and that adding more vaccines may further over-burden delivery mechanisms.

**Option Two: Frame DD within the PHC movement and focus on the disease**

This option seeks to raise priority for CDD through WHO’s efforts to resurrect the movement for PHC (WHO 2008). CDD remains a core issue within PHC because of its huge morbidity and mortality, its broad range of causes and the ongoing need for ORT and related education. However, it may be difficult to revive the focus on diarrhoea as a disease in a campaign similar to that of the 1980s, according to the experts we interviewed and because of the difficulty of generating enthusiasm for what is perceived as an old issue. In addition, our interviewees were uniformly negative about disease-centred advocacy for CDD.

Operating within the disease framework has the potential advantages of using a horizontal approach to address multiple causes of DD. These include nutrition programmes to fortify children, water, sanitation and environmental programmes to reduce exposure, behavioural campaigns to promote hygiene and breastfeeding and outreach campaigns to train caregivers to administer ORT. The pitfalls of this multifaceted approach are shown in the history of CDD. Many of these options are difficult to implement because they require cross-sectoral collaboration and produce benefits that are hard to link with specific interventions and actors.

Although there is a natural fit between DD and PHC, we believe this framing option is difficult for practical reasons. As an issue, it is similar to the CDD of the 1980s, which is an old issue and may therefore be difficult to restore to the global health agenda. As a problem, addressing all-cause DD requires broad economic and social development, which cannot be implemented or managed through the existing institutional
Option Three: Frame DD within the HSS movement and focus on DD’s impact on child or family health

Health systems are an essential element in DD prevention and control, because the causes of DD are too diverse to permanently eliminate. A strong health system provides the capacities to reduce DD mortality through many mechanisms, including preventative measures such as administering vaccines, and promoting proper nutrition and hygiene, and therapeutic measures such as providing ORT and ORT-related education at the village level. Because disease-specific programmes often provide support for strengthening health systems—as vertical CDD programming did via training programmes for managers in the 1980s and early 1990s—packaging one or more interventions for CDD in this context would leverage funding provided for other diseases. A family health focus could be helpful for delivering many services because those families with the greatest need for DD interventions may also have greater needs for other interventions as well.

Since DD is among the top causes of childhood morbidity and mortality, there is a strong case to be made for including it within an essential package of childhood interventions, which would be determined on a country-by-country basis. This package could include other elements such as immunizations and interventions for ARIs and malaria. In the current funding environment, the impact on child mortality can be stressed in terms of meeting the target of Millennium Development Goal 4, which calls for a two-thirds reduction in child mortality by 2015 (vs 1990).

Some of our interviewees noted that child health advocates would be receptive to this approach, and that both UNICEF and the World Bank would probably support some version of it. In recent years, many global health professionals have grown tired of disease-specific programmes and would prefer broader approaches that provide interventions for several leading causes of sickness and death.

The HSS movement is heterogeneous, but CDD could be positioned as a core element. If CDD was advanced via the HSS movement there could be many possible links, for instance, treatment rates could be built into the definition of the minimum package of services, and these rates could be included in monitoring and evaluation metrics. Or outreach programmes could be designed to include education on ORT, water filtration or sanitation. These options would help keep focus on activities that reduce DD prevalence or treat DD episodes as an outcome indicator of health system performance and an input indicator for child health. Pursuing this option has the additional advantage of re-labelling CDD within the context of child health, family health or maternal and child health, which is much less likely to be perceived as an old issue than standalone CDD.

In the summer of 2012, while this article was under review, USAID launched a major new child health initiative, calling for DD control and rotavirus vaccinations as significant components (USAID 2012). At the time we conducted our research, primarily in 2008, we noted the political and technical appeal of approaching CDD within a child health frame, although we believed it would be more likely to succeed as a part of HSS, rather than under a banner of child survival, which had little support at the time. Since then, child health as an issue has gained momentum from new leadership at UNICEF, and now from USAID as well. Including CDD within a package of child health interventions is now much more likely to succeed than before. However, our research suggests that successfully controlling DD ultimately will rest more on effective co-operation among major players, rather than on the particular frame under which it is promoted.

Conclusion

Priority setting is a complex process not easily measured by a single indicator. In this article, we employed multiple indicators to assess the priority of DD control on the global health agenda. The article illustrates how priority on the global health agenda can be measured and how political analysis can generate strategies for influencing the priority setting process. Although none of our indicators are perfect, we believe that in combination they create a persuasive picture of how the priority of CDD has changed over the past three decades. The priority analysis also provides the basis for conducting a political analysis to propose strategies for promoting CDD’s priority on the global health agenda. With around 1.5 million children dying each year from DD, we believe that global health institutions should be paying more attention to this issue.

In our view, the most promising reframing strategies for increasing the priority of CDD are option #1 (technology and vaccine-preventable diseases frame) and option #3 (child or family health and HSS frame or now the renewed child health frame promoted by USAID and UNICEF). Both options involve a logical fit between available (or forthcoming) interventions and existing important movements in global health. These two options can be synergistic. Advancing rotavirus vaccines within the context of vaccine-preventable diseases with GAVI is likely to be helpful in promoting CDD within a broader frame of child health with other partners. Addressing DD via a child or family health frame as part of a major movement in global health is an increasingly likely possibility given UNICEF and USAID’s renewed interest in child survival and the fit with other movements, such as HSS.

Supplementary Data

Supplementary data are available at HEAPOL online.

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