

## Undernutrition 5



# Effective international action against undernutrition: why has it proven so difficult and what can be done to accelerate progress?

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Many transnational organisations work to support efforts to eliminate maternal and child undernutrition in high-burden countries. Financial, intellectual, and personal linkages bind these organisations loosely together as components of an international nutrition system. In this paper, we argue that such a system should deliver in four functional areas: stewardship, mobilisation of financial resources, direct provision of nutrition services at times of natural disaster or conflict, and human and institutional resource strengthening. We review quantitative and qualitative data from various sources to assess the performance of the system in each of these areas, and find substantial shortcomings. Fragmentation, lack of an evidence base for prioritised action, institutional inertia, and failure to join up with promising developments in parallel sectors are recurrent themes. Many of these weaknesses can be attributed to systemic problems affecting most organisations working in the field; these are analysed using a problem tree approach. We also make recommendations to overcome some of the most important problems, and we propose five priority actions for the development of a new international architecture.

### Introduction

Undernutrition kills or disables millions of children every year, and prevents millions more from reaching their full intellectual and productive potential.<sup>1,2</sup> Although the causes of maternal and child undernutrition are multiple and inextricably linked to poverty, the third paper in this Series showed that effective policy and programmatic interventions are available.<sup>3</sup> Such interventions could avert, in 36 high-burden countries, the loss of 25% or 63 million disability-adjusted life years associated with stunting, intrauterine growth restriction, and micronutrient deficiencies. The fourth paper in this Series showed that these interventions are not reaching those in need, and many of the worst affected countries lack the human resources and institutional capacity to plan and implement effective responses.<sup>4</sup>

This paper starts from the observation that there are many people and many organisations based outside these worst affected countries that are also working to reduce the global burden of undernutrition. They are to be found in: agencies and programmes of the UN (at least 14); international and regional development banks (five); regional cooperation organisations such as the African Union (at least five major); bilateral (or country-to-country) aid agencies (over 20), charitable foundations (at least five major), and the implementing agencies they create (at least 15); international non-governmental organisations (over 30); major universities and research centres (at least 20 with international scope, plus the 15 centres of the Consultative Group on International Agricultural Research); academic journals (several hundred) and the non-specialist media; and multinational commercial food and nutrition companies (at least 12 major). At best, these international actors are able

*Lancet* 2008; 371:

This is the fifth in a Series of five papers about undernutrition

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### Key messages

- The international nutrition system—made up of international and donor organisations, academia, civil society, and the private sector—is fragmented and dysfunctional. Reform is needed so that it can perform key stewardship functions, mobilise resources, provide services in emergencies, and strengthen capacity in low-income and middle-income countries
- Current processes for producing normative guidance are laborious and duplicative, and fail to produce guidance that is prioritised, succinct, and evidence-based. Programme evaluation is weak, and insufficient resources are devoted to analysing and responding to major global challenges (including the evolving epidemiology of nutrition)
- The funding provided by international donors to combat undernutrition is grossly insufficient and poorly targeted, and is inappropriately dominated by food aid and supply-led technical assistance. Much more investment is needed in human and institutional capacity for nutrition in low-income and middle-income countries
- The problems of the international nutrition system are long-standing and deeply embedded in organisational structures and norms. The international community needs to identify and establish a new global governance structure that can provide greater accountability and participation for civil society and the private sector
- Linkages with national-level processes need to be significantly enhanced, so that priorities that are felt at country level are better reflected in international normative guidance, donor funding, research, and advanced training

to mobilise financial, intellectual, and political resources that support country-level initiatives. Although they make up a disparate group, with different objectives, products, and ways of working, we contend that they do nonetheless comprise a system; they are interlinked, financially, intellectually, and personally, and they also share a common target group—the malnourished populations that are their beneficiaries and clients. Although there is great potential for complementary and mutually reinforcing actions, the various organisations often

behave adversarially and compete for attention from the same few interlocutors at country level. At worst, they can siphon off scarce human resources and promote poorly designed solutions to problems they cannot solve independently.

We aim to explain why the international nutrition system has not been able to do more of its best and less of its worst. We limit our analysis to those actions which consciously set out to improve or preserve nutritional outcomes. Adapting the language of the 2000 World

### Panel 1: Sources and methods

Multiple methods were used to generate and analyse the material presented in this paper:

- Systematic reviews. First, we reviewed all research included in the CABI nutrition and food sciences database (CABI, Wallingford, UK) in the second half of 2005. The research was categorised by nutritional problem and disciplinary knowledge area with slightly modified versions of the definitions set out by Llanos et al.<sup>10</sup> One reviewer classified all 6023 abstracts. Second, we reviewed all published research on the linkages between undernutrition and global change processes. Publications were identified from: Popline, Medline, Sociological Abstracts, Applied Social Sciences Index and Abstracts, PAIS International, Social Services Abstracts, Econlit, AgEcon, Agricola, Worldcat, CABDirect, ID21, Eldis, BLDS, Google, and Google Scholar. The search was done between May and July, 2006, with the keyword “nutrition” together with each of 12 selected global issues as keywords. Papers were included in the analysis if: the study specifically tested associations between undernutrition and the global issues of interest; were published between 1995 and 2006; and proposed a sound study design. General articles, reviews, nutritional assessments, and conceptual or theoretical studies were excluded. The same combinations of topics were searched for in major world newspapers using LexisNexis. This search was done on May 10, 2006, and was limited to the past year. Finally, we reviewed the key project documents relating to all World Bank projects started by 1995 and closed by early April, 2006, in the 20 countries with the greatest number of stunted children. The projects were identified using the Bank’s project portfolio advanced search engine and the keywords “nutrition\*”, “malnutrition”, and “food”
- Quantitative analysis of financial flows. We analysed data for donor funding for nutrition recorded in the creditor reporting system of the Development Assistance Committee of the Organisation for Economic Co-operation and Development. We included all funds classified by the various donor agencies as being for the purposes of basic nutrition, development food aid/food security assistance, and emergency food aid. We focused on funds committed (but not necessarily disbursed, since these records are incomplete) during 2000–04. From the same source, we also estimated total net overseas development assistance to the 20 countries with the greatest number of stunted children. We also analysed donor disbursements to the World Food Programme over the same period, on the basis of data reported in that organisation’s own annual reports, and estimated private income transfers (remittances) to the same countries according to data reported in the World Bank’s World Development Indicators database
- Semi-structured key informant interviews. We interviewed key informants about the roles and activities of the nutrition sections of: the Food and Agriculture Organization, the Standing Committee on Nutrition, UNICEF, the World Food Programme, the World Health Organization; the International Committee for the Red Cross, the International Food Policy Research Institute, the Save the Children alliance, the World Bank; the UK Department for International Development, USAID, the Bill & Melinda Gates Foundation, and the Nestlé company. All interviewees provided a large amount of documentary evidence. Similar but less detailed data were obtained for a range of other actors based on publicly available materials. We did 15 additional semi-structured interviews with international training centres and their funding sources, specifically focusing on investment in capacity strengthening
- Problem tree analysis focusing on systemic constraints to performance. We extracted over 120 constraints to good performance from the key informant interviews and 21 major reviews and evaluations.<sup>11–30</sup> Most of the specific constraints identified applied to more than one international nutrition actor. By use of the so-called focal problem approach,<sup>31</sup> these constraints were organised by core problem and structured hierarchically so that superficial causes were distinguished from the more important causes of causes.<sup>50</sup> Individuals working in the international system were invited to comment on the original draft of the problem tree. The writing team then reviewed the full set of constraints and identified the corresponding solutions, which were graded (separately by each author, and then summed) by likely effect on undernutrition outcomes and by feasibility of implementation. Only solutions that were considered both potentially important and feasible were included in the final recommendations of this paper
- Organisational effectiveness assessments. We elicited self-assessments and peer-assessments of organisational effectiveness from 15 key organisations. The results were incomplete and clearly non-comparable; no further use was made of this material

Health Report on health systems,<sup>5</sup> we refer to such activities as nutrition actions. We recognise that some actions and processes which have a huge effect on nutritional outcomes—such as the sudden imposition of comprehensive economic sanctions on pariah regimes for example,<sup>6</sup> or climate change<sup>7</sup>—are not nutrition actions, and are determined by actors outside the international nutrition system. For such actions we ask not “why have these processes evolved?” but “why has the international nutrition system not done a better job analysing their implications, advocating for the protection of the vulnerable and proposing mitigating interventions?” Other nutrition-relevant actions, such as the education of girls and the empowering of women, have a strong positive effect on nutrition outcomes<sup>8</sup> even though these actions are usually implemented for other reasons. In these cases, the challenge is to ensure that these actions are actively supported by the nutrition community, and that opportunities for synergies with direct nutrition actions are fully exploited.

The rest of this paper is divided into six sections, the first four of which discuss the current performance of the international system in four functional areas. Again, we have built on the conceptual framework laid out in the 2000 World Health Report<sup>5</sup> to put some structure around the functions that we believe an adequate international nutrition system should perform. These functions should directly support national actors in high-burden countries, as well as producing so-called global public goods, which can be taken advantage of by interested parties anywhere. They include: regulating, setting standards, and identifying priorities—a crucial function that has been referred to as stewardship;<sup>9</sup> mobilising, pooling, and distributing financial resources for nutrition, and, where desirable, procuring programme inputs to take advantage of economies of scale; providing food and nutrition services directly where national actors are unable or unwilling to do so themselves; and strengthening human and institutional resources for nutrition by training, capacity building, and research and development;

The final sections of the paper ask what needs to change now to improve the performance of the international nutrition system, focusing on features of the entire system. The analyses presented throughout this paper draw on a large number of new and existing reviews (some in the public domain and others held by individual institutions), as well as primary data collected through interviews with key informants, surveys, and statistical analysis of publicly accessible data sources. Detailed information on sources and methods is presented in panel 1.

We should acknowledge that the analyses and recommendations in this paper necessarily reflect the organisational experience and disciplinary biases of the authors, and others analysts might have emphasised differently the various strands of data that we present.

Many different voices will need to be listened to in order to generate the inclusive discourse that the nutrition profession so desperately needs.

### Stewardship

Stewardship embodies notions of “manag[ing] assets without owning them, anticipat[ing] future trends and devis[ing] grand plans”.<sup>9</sup> Grand plans are certainly familiar to the international nutrition community, which set out one major and seven other supporting nutrition-related goals in the World Summit for Children in 1990,<sup>32</sup> made 28 references to nutrition in the 1996 World Food Summit Plan of Action,<sup>33</sup> and included the halving of the prevalence of childhood underweight as one of 48 millennium development indicators in the road map towards the implementation of the UN Millennium Declaration.<sup>34</sup> Currently, the Millennium Development Goals (MDGs), derived from this road map, provide a guiding framework for many international organisations, and many feel that the inclusion of the underweight indicator has been crucial for preventing the disappearance of nutrition from the international development agenda. Critics of the framework, however, object to aspects such as: the choice of underweight rather than other more functionally specific indicators of nutritional status; the juxtaposition of the indicator (under the same target of halving the proportion of people who suffer from hunger) with the highly contentious availability of dietary energy statistic of the Food and Agriculture Organisation of the UN, and the fact that the hunger target itself is grouped (under the first goal) with the much more politically salient target of halving poverty. Since there is no chance of further modifications to the indicators, targets, or goals before the end of the MDG period in 2015, these discussions should not be allowed to distract from the more important task of finding ways to scale-up effective interventions against undernutrition.

Nutrition has not been neglected in international human rights law (though there is limited awareness of the opportunities this provides). The Convention on the Rights of the Child,<sup>35</sup> the International Covenant on Economic, Social and Cultural Rights,<sup>36</sup> and the Convention on the Elimination of all forms of Discrimination Against Women<sup>37</sup> commit states that have ratified them and, more indirectly, non-state actors, to promote and protect the nutritional wellbeing of women and children. As follow-up to these commitments, these states are obliged, through their ministries and executive agencies, legislators, and the judiciary, to incorporate the rights in question into domestic law, translate them into practical policies, set benchmarks for their implementation, periodically report on progress to the relevant UN treaty bodies, and educate both those with entitlements (rights-holders) and those with corresponding responsibilities. Official state reporting has often been inadequate, and international actors

should be proactive in building in-country capacity for communicating violations of rights and for drafting alternative or shadow reports to help the treaty bodies in their global monitoring function.

International organisations also support voluntary codes of conduct such as the International Code of Marketing of Breastmilk Substitutes,<sup>38</sup> which aims to ensure that the marketing of breastmilk substitutes does not undercut efforts to promote breastfeeding. The International Baby Food Action Network has been successful in highlighting violations of the Code,<sup>39</sup> but they continue to occur and the unresolved nature of the issue regularly threatens to undermine attempts at fostering a more constructive relation between public and private sectors. More recently, the Voluntary Guidelines on the Right to Food,<sup>40</sup> a milestone in the pursuance of a rights-based approach to food and nutrition, included an 11-paragraph guideline specifically on nutrition.

The international system also provides much normative guidance on nutrition policy, but some of it is expressed in abstract language that does not easily translate into implementation. For example, in 2002, WHO and UNICEF launched a Global Strategy for Infant and Young Child Feeding,<sup>41</sup> which identifies general lines of action that countries should pursue, such as “ensuring that suitable—preferably locally available—complementary foods are selected and fed”. The accompanying workbook for assessing national practices, policies, and programmes<sup>42</sup> identifies a large number of country-level initiatives that could support this goal, but risks giving the impression that all are equally important and effective, irrespective of the intensity of inputs. Sometimes normative guidance is provided by a bewildering array of organisations including, in the case of micronutrient policy and implementation, FAO, the IMMPaCT programme at the US Centers for Disease Control and Prevention, the Micronutrient Initiative, the Micronutrient Forum (replacing the International Nutritional Anemia, Vitamin A, and Zinc Nutrition Consultative Groups), USAID’s micronutrient project (A2Z), UNICEF, WHO, and others. Again, much of the guidance that these organisations provide favours comprehensiveness over prioritisation. The 376-page WHO/FAO Guidelines on food fortification with micronutrients,<sup>43</sup> for example, devotes almost as much space to selenium as to zinc. We urge all micronutrient-focused organisations to work together to produce a single set of succinct, up-to-date, evidence-based position papers on different interventions, much in the style of those provided for vaccines by the WHO Department of Immunization, Vaccines and Biologicals.<sup>44</sup>

Meanwhile, the international system provides no guidance on how agricultural policy and policies that regulate trade in food can be designed to support better nutritional outcomes. Although the workings of the

Codex Alimentarius Commission<sup>45</sup> show that the UN is capable of addressing issues relating to trade in food, this forum has paid scant attention to the needs of the world’s undernourished women and children.

Gathering evidence about what works is an essential precursor to the development of normative guidance. Unfortunately, as shown in the third paper in this Series,<sup>3</sup> rigorous evaluations of the effects of projects or programmes are scarce (and cost-effectiveness studies even rarer). Many international organisations have not undertaken any evaluations of their investments in nutrition. USAID is unusual in commissioning external reviews of all of its initiatives and placing the reports on a public website (<http://dec.usaid.gov>), although several key documents are missing from this archive. The World Bank also has monitoring and evaluation documents accessible via its project portfolio search engine. We reviewed the obligatory project implementation completion reports of all nutrition projects done between 1995 and 2006 in 20 high-burden countries, and found that 24 out of 37 reports could be downloaded and another ten could be obtained by contacting officials directly. The information in the reports varied widely and was not consistently informative in identifying nutrition-specific inputs, outputs, and outcomes. Even when external evaluations are commissioned, few organisations employ evaluators with sufficiently secure funding and reputation to be able to provide truly independent open criticism. The International Food Policy Research Institute has been unusually successful in promoting gold-standard randomised evaluations of large-scale nutrition-relevant programmes,<sup>46,47</sup> and the nutrition community should ensure that the new International Initiative for Impact Evaluation<sup>48</sup> does not neglect nutrition endpoints, by promoting rigorous evaluation methods, and helping to meet the costs of their implementation.

Finally, effective stewardship implies not just evaluating past actions but also anticipating the future. The international nutrition system urgently needs a better understanding of the implications for nutrition of a series of major global change processes such as international trade liberalisation, climate change, and rising energy prices. We reviewed the extent to which the international system is currently undertaking such analyses, and note that although the print media seemed to be aware of some of these issues, rigorous analysis was sparse (table 1). Now that there is a good understanding of past and present trends in nutritional outcomes and behaviours,<sup>49–52</sup> as well as of the long-term effects of different patterns of growth in childhood,<sup>2</sup> international organisations should devote substantially more attention to the challenges of the future.

## Financing

Every year, the international community invests large amounts of money in improving nutritional outcomes in

Academic publications				Number of articles in international print media
	Number of studies	Geographic location of studies	Institutional affiliations of the principal authors	
<b>Global demographic shifts</b>				
Population growth and migration	7	Country studies in India, Thailand, Turkey, Pakistan, Peru, Mexico, Jamaica, Russia, South Africa, Senegal, UK, and US; regional studies in Africa	Universities and research institutes in developed countries; research institutes in developing countries	72
Urbanisation	13	Low-income and middle-income countries of Asia, Africa, Middle East, Latin America and the Caribbean; country studies in Brazil, Bangladesh, Russia, South Africa, Mozambique, and Ghana	Consultative Group on International Agricultural Research; UN agencies; universities in developing and developed countries	15
HIV/AIDS	25	Global, but primarily in sub-Saharan Africa; country studies in Tanzania, Côte d'Ivoire, Zambia, Congo, Uganda, Lesotho, Malawi, Mozambique, Swaziland, Zimbabwe, Rwanda, Kenya, Indonesia, USA, and Mexico	Consultative Group on International Agricultural Research; multilateral agencies; university and research institutes in developing countries; universities, research institutes, and government agencies in developed countries; international NGOs; national NGOs; UN agencies	369
<b>Global governance</b>				
Foreign aid/investment	3	Low-income and middle-income countries of Asia, Africa, and Latin America and the Caribbean	Consultative Group on International Agricultural Research; UN agencies	77
Financial crisis	13	Country studies in Indonesia, Thailand, Korea, Malaysia, Congo, Senegal, South Africa, Rwanda, Tanzania, Cuba, Jamaica, and Bangladesh; regional studies in central Asia	Universities and research institutes in developed countries; UN agencies; universities in developing countries; multilateral agencies; Consultative Group on International Agricultural Research	7
Trade liberalisation	8	Global; country studies in Afghanistan, Bangladesh, Philippines, Uganda, Côte d'Ivoire, sub-Saharan Africa, Asia, and the Caribbean	UN agencies; Consultative Group on International Agricultural Research; multilateral agencies; universities and research institutes in developed countries	5
Fragile states or conflict	8	Global; country studies in Angola, Nigeria, Guinea-Bissau, Zimbabwe, and El Salvador	Consultative Group on International Agricultural Research; universities and research institutes in developed countries; national NGO	317
Climate change	2	Global	UN agencies; research institutes in developed countries	66
Intellectual property rights	0	..	..	16
<b>Global resource distribution</b>				
Water wars or drought	9	Country studies in Lesotho, Malawi, Mozambique, Swaziland, Zambia, Kenya, Zimbabwe, Greece, and India; regional studies in Africa	Research institutes and universities in developed countries; universities in developing countries; Consultative Group on International Agricultural Research	206
Information and communications technology	0	..	..	18
Energy prices	0	..	..	13
NGO=non-governmental organisations.				

**Table 1: Analyses of the effects of major global change processes on undernutrition**

poor countries. Exactly how much is not clear, because of the difficulty in isolating a discrete set of nutrition investments and because each donor's financial management information system is different, with few routinely reporting on maternal and child nutrition as a distinct budget line.

One imperfect but accessible source of information is the aid database of the Development Assistance Committee of the Organisation for Economic Cooperation and Development (OECD, panel 1). According to this

source, just 20 donors committed virtually all international aid for food and nutrition (basic nutrition, development food aid or food security assistance, and emergency food aid) during 2000–04 (table 2). The USA is by far the largest donor in each of the three categories considered. The contribution of the World Bank to nutrition is grossly underestimated in this analysis because its assistance is mostly channelled through broader health sector loans not classified as basic nutrition. The total nutrition portfolio value of the World Bank has been estimated, as

of January, 2006, at US\$731 million (Meera Shekar, January 2007), which—assuming a 6-year average disbursement period—equates to about \$120 million a year. Additionally, the Bill & Melinda Gates Foundation, which, as a private foundation does not report to the OECD, also committed \$25 million per year over the same period. Even allowing for these and other less significant omissions, total donor investment in basic nutrition in low-income and middle-income countries probably did not exceed \$250–300 million a year in the first half of this decade. If all of this sum were allocated with perfect targeting to the 20 countries accounting for 80% of all stunted children,<sup>14</sup> then each of the roughly 130 million infants younger than 2 years living in these countries could benefit from an investment of just over \$2 a year, which is far less than the \$5–10 per child that effective large-scale community nutrition programmes

are estimated to cost.<sup>53</sup> By way of reference, HIV/AIDS, which causes the loss of less disability adjusted life years than does child undernutrition,<sup>1,53</sup> received \$2.2 billion a year in foreign aid during 2000–02.<sup>54</sup> The small amount of aid for nutrition is also vastly outweighed by the cost to rural populations in low-income and middle-income countries of agricultural subsidies and protectionism in high-income countries. Such practices are thought to result in a reduction of rural gross domestic product in low-income and middle-income countries of at least \$8.6 billion [A: ok as rephrased?].<sup>55</sup>

Of all the 2000–04 basic nutrition aid transfers recorded in the OECD database, 41.3% went to “less developed countries unallocated” [A: is this the wording used in the OECD database? If so, please provide a reference]. In reality, much of this funding was for USAID’s global leadership programmes, which fund technical assistance

	Commitments reported to the OECD-DAC *						Disbursements to the World Food Programme†		Total net Overseas development assistance disbursed to 20 priority countries‡	
	Basic nutrition		Development food aid/food security assistance		Emergency food aid		\$millions	% of total	\$millions	% of total
	\$millions	% of total	\$millions	% of total	\$millions	% of total				
Arab countries	..	..	..	..	..	..	8.2	0.4%	213.1	1.2%
AsDF/AsDB	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	518.2	2.8%
Australia	0.8	0.6%	33.7	2.0%	13.3	1.2%	44.0	2.1%	222.4	1.2%
Belgium	0.4	0.3%	8.7	0.5%	5.9	0.5%	8.0	0.4%	315.0	1.7%
Canada	4.1	3.3%	50.6	2.9%	12.0	1.1%	68.3	3.3%	227.9	1.2%
Denmark	1.6	1.3%	0.1	0.0%	0.0	0.0%	40.8	2.0%	337.0	1.8%
EC	0.5	0.4%	441.3	25.6%	94.9	8.3%	164.7	8.0%	1,220.4	6.7%
France	0.0	0.0%	29.8	1.7%	6.8	0.6%	24.3	1.2%	782.6	4.3%
Germany	1.8	1.5%	18.8	1.1%	65.1	5.7%	55.3	2.7%	759.7	4.1%
IDA	23.3	18.8%	17.0	1.0%	1.0	0.1%	0.0	0.0%	3,069.5	16.7%
IMF	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	266.2	1.5%
Italy	4.6	3.7%	40.3	2.3%	1.1	0.1%	36.5	1.8%	192.2	1.0%
Japan	3.3	2.7%	48.2	2.8%	0.0	0.0%	141.9	6.9%	2,771.5	15.1%
Netherlands	8.1	6.5%	4.1	0.2%	33.2	2.9%	61.9	3.0%	666.9	3.6%
Norway	1.6	1.3%	1.0	0.1%	14.2	1.2%	44.2	2.2%	301.4	1.6%
Spain	2.8	2.3%	8.0	0.5%	4.8	0.4%	6.8	0.3%	92.8	0.5%
Sweden	1.0	0.8%	0.0	0.0%	10.2	0.9%	35.2	1.7%	344.9	1.9%
Switzerland	0.0	0.0%	3.6	0.2%	19.8	1.7%	25.7	1.3%	152.9	0.8%
UNICEF	11.7	9.5%	0.0	0.0%	0.0	0.0%	..	..	180.6	1.0%
UK	4.0	3.2%	39.2	2.3%	58.3	5.1%	87.0	4.2%	1,433.9	7.8%
US	52.8	42.7%	968.1	56.1%	784.7	68.9%	1,082.8	52.7%	2,870.2	15.7%
TOTAL main donors	122.4		1,712.5		1,125.3		1,935.7		16,939.5	
Overall TOTAL	123.8		1,725.4		1,138.3		2,053.7		18,328.1	

OECD-DAC=Development Assistance Committee of the Organisation for Economic Cooperation and Development. AsDF=Asian Development Fund; AsDB=Asian Development Bank; EC=European Commission; IDA=International Development Assistance; IMF=International Monetary Fund. \*Data from the Creditor Reporting System. Classifications are as reported by each individual donor. †Data from the annual reports of the World Food Programme. Mostly already included in the OECD-DAC aggregates. ‡Data from World Development Indicators.<sup>59</sup> Priority countries are those with stunting prevalence of 20% or more and accounting for 80% of stunted children in the world.<sup>1</sup>

**Table 2: Aid from developed countries to nutrition and related issues, 2000–04**

delivered through consultants and contractors based in high-income countries. Of the country-specific financing for basic nutrition, 19·6% went to Bangladesh, 4·5% to India, 2·7% to Senegal, and 2·5% to Nepal, with other countries receiving smaller proportions of the total. This lumpy geographic distribution further reduces the availability of funding for implementation of national nutrition programmes across the high-burden countries.

During 2000–04, development food aid and food security assistance exceeded aid for basic nutrition by a factor of at least five. This aid was more evenly divided between a larger number of countries. Because roughly two-thirds of US food aid, and thus a third of the total, is sold on recipient country markets before reaching the final beneficiaries,<sup>56</sup> generalising about the effectiveness of development food aid is difficult. However, one review concludes that although: “it is clear that improvements in human nutritional status, asset protection, school attendance, and a variety of other areas have been made using food aid. Questions linger nonetheless as to whether the same improvements could have been made much more efficiently using resources other than food aid”.<sup>56</sup> The US Government Accountability Office has also criticised the efficiency and effectiveness of US food aid, noting that “these programmes are vulnerable to not getting the right food to the right people at the right time”.<sup>57</sup>

Emergency food aid went principally to just six countries: Ethiopia, Sudan, Afghanistan, Angola, Iraq, and North Korea, a clearly politicised distribution that lends weight to Christopher Barrett’s assertion that “food aid allocations at the ... macro level have traditionally served primarily domestic agricultural interests and ... foreign policy objectives”.<sup>58</sup> Around two-thirds of all food aid—both emergency and development—was handled by the World Food Programme, which, with contributions averaging US\$2 billion a year, is one of the largest aid operations in the world (table 2). Despite the scale of global food aid, it is still small relative to the total flows of aid to the 20 countries accounting for 80% of the global burden of stunted children (table 2).

Two sources of private finance for families at risk of undernutrition have grown in importance in recent years. The first consists of the money sent by emigrant workers from high-burden countries to their non-emigrant families (remittances), which—according to data in the World Bank’s World Development Indicators database<sup>59</sup>—exceeded total aid flows over the same period by a factor of two in Pakistan and Bangladesh, and perhaps as much as 13 in India. Little is known about the effect of remittances on nutrition outcomes (table 1). The second source consists of the funding for nutrition raised from the private sector by projects such as the Global Alliance for Improved Nutrition, which has secured commitments of over \$350 million (over 5 years) of private sector investment in new equipment for food fortification, micronutrient premix, quality assurance systems, and marketing infrastructure (Barbara MacDonald, personal

communication). There is thus a strong suggestion that public-private partnerships can increase the overall funding available for basic nutrition, provided that these commitments translate into disbursements.

With the small sums of official aid allocated to basic nutrition, donors signal their lack of commitment to the issue. The most resource-constrained countries with high rates of stunting need to be assisted to establish effective interventions at high coverage, and this is likely to imply at least a doubling or even quadrupling of dedicated aid flows. In view of the lack of government commitment in the worst affected countries, donor expenditure on global public goods is not a substitute for country-level action.

### Direct service provision by international organisations

Most service provision is, and should be, the purview of national actors. But natural disasters and armed conflict often preclude effective action against undernutrition by national governments, and in these circumstances the international system can assist with both situation assessment and humanitarian response. Nutrition assessment includes information generated by early warning systems and surveys. Early warning systems are largely focused on tracking food availability and access using a combination of remote methods such as satellite imagery, and special informant and population surveys including food production, prices, and consumption.<sup>60</sup>

Like most systems related to food security, the famine early warning system network funded by USAID mainly focuses on Africa. The US government expects to have spent around \$12·7 million on this operation in the 2006 financial year (Gary Eilerts, personal communication). The costs for such information systems can be daunting, but well-run and integrated information systems that include baseline vulnerability assessments, early warning, emergency needs assessments, effect evaluation, context monitoring, and overall programme monitoring can save resources often expended in responding to emergencies.<sup>60</sup> Other global systems from the UN agencies (global information and early warning system on food and agriculture, food insecurity and vulnerability information and mapping systems, and vulnerability analysis and mapping) are well placed to track food access and availability information. However, they are challenged to adequately integrate nutrition information, including food intake, dietary diversity and adequacy, and nutritional status, owing to difficulties of incomplete information, quality of data, lack of standardised indicators, analysis, and data integration. Integration of the various systems is still limited, although there has been some progress in basic data sharing.

Surveys tend to be generated by non-governmental organisations and UN agencies as rapid assessments to establish needs, location of problems, and descriptions of affected or vulnerable groups. A lack of standardised

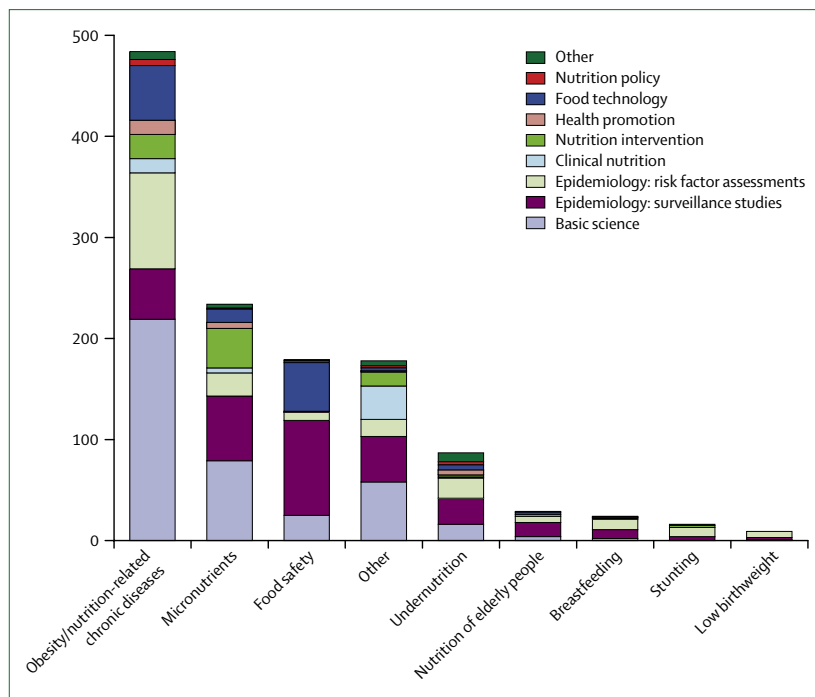


Figure 1: Number of nutrition-related publications added to the CAB Direct human nutrition database in the second half of 2005, by nutritional problem and disciplinary knowledge area

methods and variable quality makes the use and interpretation of survey findings difficult,<sup>61–63</sup> and efforts are underway to address these limitations, including the Health and Nutrition Tracking Service<sup>64</sup> and Sphere Humanitarian Charter and Minimum Standards in Disaster Response.<sup>65</sup>

Humanitarian response ranges from a narrow food or nutrition action such as therapeutic to selective or supplementary feeding programmes (for individuals with moderate or severe wasting), counselling, micronutrient supplementation, and cash or food transfers either through employment schemes or free distribution. Complementing these nutrition actions are livelihood support programmes and appropriate public health and water, sanitation, and hygiene interventions including measles vaccination. Efforts to ensure appropriate infant and young child feeding practices are often important in emergencies.<sup>62,66,67</sup> Humanitarian assistance to support and accelerate peace building processes is also a key intervention in environments characterised by insecurity.<sup>68</sup>

Information on coverage of nutrition services in emergencies is difficult to obtain. The dynamic nature of emergencies, and their resulting disrupted and mobile populations, make estimating coverage challenging, and some have questioned the ethics of doing even applied research in these environments. Design and implementation errors seen in many emergency nutrition surveys<sup>69</sup> have diminished the confidence in reporting. Methods such as lot quality assurance sampling<sup>70,71</sup> and

centric systematic area sampling<sup>72</sup> have improved the ability to estimate coverage and the prevalence of severe acute malnutrition, and to pinpoint the need for further information.

There is little published information on the effect of humanitarian response on nutrition outcomes or, more specifically, on the effect of nutrition interventions in emergencies.<sup>60,73,74</sup> A report by the UN has made several clear and important recommendations on improving humanitarian response, including health and nutrition information.<sup>68</sup> Assessments and reviews of nutrition actions in emergencies have largely focused on the effect of various feeding programmes on nutrition outcomes such as growth and micronutrient status. A review of the effect of general ration distribution programmes and supplementary feeding programmes found only 9 and 15 studies, respectively, of each programme; most of these studies did not provide convincing evidence of effect.<sup>75</sup> The results of different feeding responses are mixed and suggest a clear need for improved problem analysis, targeting and selection of ration mix and counselling actions.<sup>76–79</sup> What is often lacking is a clear analysis of the cost-effectiveness of different interventions to enable recommendations to be made on the optimum ration composition, targeting and exit criteria, and the appropriate mix of complementary activities to improve health and nutrition outcomes.

One key challenge is the absence of an agency with responsibility for taking an overview of the effectiveness (and cost-effectiveness) of different types of intervention. Nutrition in emergencies is a mix of multiple agencies, agendas, protocols, and methods. The general lack of coordination and leadership has allowed the institutional status quo to prevail. Thus agencies that have built up expertise and mandates around certain types of intervention (or intervention designs) will continue to practise these interventions in emergencies without serious examination or challenge.<sup>62,68,73,75,80</sup>

Several groups—including the UN Inter-Agency Standing Committee Nutrition Cluster,<sup>81</sup> the Sphere Project,<sup>65</sup> SMART,<sup>82</sup> ReliefWeb,<sup>83</sup> and the Emergency Nutrition Network<sup>67</sup>—are providing guidance on best practice in emergency settings. Building on and consolidating these experiences will generate a minimum set of operational standards and a source of much needed documentation.

### Strengthening human and institutional resources

Although strengthening human resources for tackling undernutrition must ultimately take place at country-level, international actors also play a major part: at least 20 major universities in high-income countries offer postgraduate training in international nutrition, public (health) nutrition, or human nutrition with a focus on low-income and middle-income countries, and international donors provide much of their support for nutrition in the form



of technical assistance. Yet the shortage of appropriately skilled personnel continues to be noted as one of the major constraints to better nutrition programming. In 1996, a meeting convened by the Food and Nutrition Programme of the United Nations University and the International Union of Nutritional Sciences brought together over 30 stakeholders representing UN organisations, bilateral agencies, and academic centres from around the world to examine issues around institution-building for research and advanced training in food and nutrition. The resulting Manila Report<sup>84</sup> concluded that: advanced training should lead to the acquisition of knowledge, attitudes, and skills necessary for specific job-related activities; nutrition training programmes should reach out to diverse disciplines and recruit multidisciplinary teams; advanced training should enhance the motivation and ability of professionals from other sectors to address the nutritional problems, as well as equipping nutrition professionals to contribute to broader development issues; and training centres should review their syllabi, and identify mechanisms of mutual support.

In interviews with various international training centres—including some based in low-income countries but with a transnational reach—we were unable to detect substantial progress in the type of training being provided and in the mode of teaching over the intervening decade. Even centres present at the Manila meeting have made only minor changes in their training curricula or staffing procedures. With some notable exceptions, social, economic, and food sciences are poorly represented and training methods are seldom problem-oriented and do not support policy and programme needs. Human resource constraints limit the ability of the institutions to do policy-relevant and programme-relevant research, as well as restricting innovation in training curricula.

Since nutrition research output is likely to indicate objectively the disciplinary preferences of university staff combined with the priorities of the major donors, we reviewed recent nutrition-related and food-related publications (panel 1). The CABI nutrition and food sciences database included 6023 abstracts published in the second half of 2005. Most studies (72.9%) originated from high-income countries, and of these, 89 articles (2.0%) were specifically targeted at low-income or middle-income settings. Of the 1240 abstracts targeting these countries and clearly related to a nutrition problem, the major focus—irrespective of country of origin—was obesity and non-communicable chronic diseases (39.0%; figure 1). Micronutrients were the subject of 18.9% of these publications, whereas general undernutrition was the subject of 7.0% of articles, and was more prominent in the research output of low-income and middle-income countries than in that generated in high-income countries but targeting issues in low-income and middle-income countries. Few articles focused on low birthweight, stunting, or breastfeeding. The highest proportion of

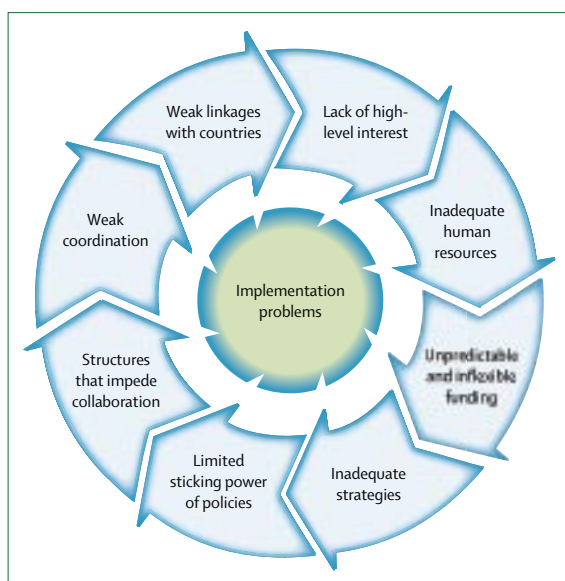


Figure 2: Core problems reducing the effectiveness of the international nutrition system

publications (40.5%) was in the epidemiological, statistical, econometric category, and 61.4% of these were simple surveillance studies. Only a small percentage of publications were about nutrition interventions (6.8%) or health promotion studies (2.3%), and even less were about nutrition policy (1.2%, none of which was an explicit policy paper). The 1240 abstracts were published in a diverse set of publications (417 journals), which is a major impediment to policymakers and practitioners wishing to follow developments in this topic, and raises serious questions about quality control.

Several aspects of this analysis are worthy of note. First, despite the public health and economic burden associated with undernutrition in low-income and middle-income countries,<sup>1,2</sup> researchers interested in these countries focus overwhelmingly on overnutrition. This focus is probably indicative of the greater availability of research funds and the higher prestige of journal articles on these topics. Sheila Slaughter<sup>85</sup> has shown how the research activities of university scientists are profoundly affected by external markets and increasingly linked to commercial opportunities (which are more obvious for overnutrition than for undernutrition). Second, our analysis shows that research into micronutrients is far more prominent than research into other aspects of undernutrition, which might be indicative of the many barriers to interdisciplinary research: in a web-based survey of 423 researchers and research administrators, the Committee on Facilitating Interdisciplinary research of the US National Academies found that the impediments to interdisciplinary work most often identified by respondents were promotion criteria, budget control, indirect cost returns, and incompatibility with organisational strategic plans.<sup>86</sup> Finally, the research base in nutrition is largely descriptive

### Panel 2: Priorities for research

This paper, together with previous papers in this series,<sup>3,4</sup> has drawn attention to the lack of rigorous programme evaluation data on which to build strong evidence-based guidance for national nutrition programmes. Our analysis has also shown how market forces and institutional barriers in international research centres have conspired to distort the research agenda away from solution-oriented analysis of the problems that contribute the greatest burden of disease and lost human potential. Improving the quality and relevance of nutrition research is a crucial part of strengthening the international nutrition system, and among the many pressing needs, we would single out:

- Research into the accountability and responses of governments to their nutrition-relevant commitments under international conventions such as the UN Convention on the Rights of the Child and the Convention on the Elimination of all forms of Discrimination against Women, as well as on the effectiveness of alternative mechanisms to strengthen these instruments
- Rigorous analysis of the linkages between nutrition outcomes and global change processes such as climate change, trade liberalisation, international migration and remittances, and long-term trends in energy prices. There is also an important need to assess the effect on nutritional status outcomes of changes in agricultural technologies and policy
- Research into the quantity and effectiveness of international aid for improved nutrition, including modalities such as country-level technical assistance, budget support (sector and general), and humanitarian intervention, as well as investment in nutritional global public goods. This research would include rigorous assessment of the effect of public-private partnerships in nutrition
- Evaluation and prioritisation of interventions to ensure timely and relevant emergency responses, including improved problem analysis, more efficient sampling methods for the estimation of the prevalence of severe acute malnutrition and targeting of interventions, and cost-effectiveness studies of different food commodities and therapeutic foods
- Research on the gap between current and required manpower, training capacity and training resources, at national, regional and global levels, as well as research on best practices for designing and delivering the pre-service training, continuing education, and knowledge management systems that practitioners need to address undernutrition effectively
- Meaningful self-assessment and peer-assessment of the effectiveness of individual organisations involved in designing and delivering goods, services, and ideas relevant to the elimination of maternal and child undernutrition

and falls short of identifying solutions, echoing the findings of Leroy and colleagues,<sup>87</sup> who have shown that, in the case of child health, 97% of research grants support the development of new technologies, but only 3% investigate ways of achieving full use of existing technologies—even though this approach has the potential to save three times more lives than the development of new technologies. Since intervention delivery research is expensive, this is a key area where grant-making organisations should do more to change the balance of incentives.

Separate from the world of academic nutrition research is the Consultative Group on International Agricultural Research, an alliance of 15 research centres working on improving crops and agricultural policy. The centres are increasingly devoting resources to creating crops that are

richer in micronutrients and to leveraging the nutrition effects—often indirect, through improved rural livelihoods—of agricultural technology.<sup>88</sup> However, they still need to do much more to show that the technologies being developed will lead to improvements in the nutritional status of populations.

Compared with these extensive portfolios of research and advanced training, the international community devotes few resources to nutrition-relevant organisational development in low-income and middle-income countries. Even where organisational development is a goal, efforts are mostly limited to technical assistance. Although high-quality technical assistance can sometimes be transformative, its aggregate effectiveness is constantly being questioned in published work about development. As early as 1993, a major UN report declared “almost everyone acknowledges the ineffectiveness of technical cooperation in what is or what should be its major objective: achievement of greater self-reliance in the recipient countries by building institutions and strengthening local capacities”.<sup>89</sup> The international nutrition community should explore the extensive experience of other sectors to find more effective ways of supporting institutional and organisational capacity in low-income and middle-income countries.

### Overall performance of organisations

We have shown that there remain significant deficits in the international nutrition system. If the challenge of reducing global undernutrition is to be met, then all organisations that are part of this system need to re-examine their strategies, resources, and internal incentives; this will require frank dialogue best undertaken in a forum where different kinds of organisations are present and can give feedback to each other about what they perceive as the barriers to effective collaborative working. There are precedents to such an approach in the peer reviews undertaken by all bilateral donors that are members of the OECD Development Assistance Committee,<sup>90</sup> and recently the Food and Agriculture Organization has solicited opinions from a wide range of other organisations about its nutrition-related work. We urge other organisations—both public, non-for profit, and private—to show similar openness in addressing perceived internal weaknesses.

Many of the factors that hold back the performance of international organisations working in nutrition are system-wide and cannot be tackled by individual organisations working alone. To identify these constraints, we reviewed 21 evaluations and commentaries on relevant aspects of the international system,<sup>11–30</sup> and combined these with observations from the key informant interviews to generate a so-called problem tree (panel 1, webfigure 1). The problem tree analyses the structural determinants of eight core problems that affect almost all actors in the system. These issues (figure 2) are both of long-standing concern to the international nutrition

See Online for webfigure 1

community, and are common to other branches of international development, from which useful lessons could be learnt. Here, we discuss some of the principal conclusions, as well as possible remedial actions.

Many commentators note the lack of high-level interest in nutrition. Although the traditional explanation for this is that the serious consequences of undernutrition are simply not understood, there are other equally plausible explanations relating to the way that the nutrition community has sought to make its case and the narrow frameworks that afflict the discipline. A new and more inclusive framework needs to be generated, bringing in actors who are closer to solutions (such as politicians, ministries of finance, and the private sector), and creating incentives for research that goes beyond mere description to identify solutions. The Global Alliance for Improved Nutrition, and the Clinton Foundation, are examples of organisations that have started to work in this way.

Many of the major organisations in the international nutrition system seem to lack appropriately skilled staff at central level, possibly because of the narrowness of the advanced training programmes described previously, or even uncompetitive hiring and promotion practices in some organisations. Many improvements could be made by updating the profiles of skills profiles and competencies that are needed to achieve the specific nutrition-related objectives of each organisation, and linking these effectively to training plans and individual performance management. UNICEF has made a start in developing such skills profiles.

Many organisations lack well thought-out strategies for addressing undernutrition, or else have policies that do not stick when concrete interventions are implemented. We believe that funding organisations are best placed to create the incentives for better strategic planning, especially if they include an assessment of compliance with strategic plans as part of joint performance reviews. This approach has recently been incorporated into the relation between donors and the International Centre for Diarrhoeal Disease Research, Bangladesh, and needs to become a key element of performance reporting for all organisations.

As noted in the fourth paper in this Series,<sup>4</sup> the organisations of the international nutrition system are weakly linked into country systems, with priorities often internally generated rather than responding to national agendas. Reasons for this include a shortage of nutrition staff at country level, weak mechanisms for listening to the ultimate clients, and a mandate gap around qualitative and functional scaling-up of small-scale successes. Major organisations need to commit much more strongly to long-term capacity building at national level, and be prepared to engage—opportunistically, if need be—with key national processes such as Poverty Reduction Strategies, political agenda setting, and large-scale investments in other sectors. The new International Health Partnership<sup>91</sup> has identified similar challenges in

the health sector, and nutrition professionals should engage proactively with this and other high-profile health initiatives.

Sometimes, the interventions of the international nutrition system can go wrong, and these failures can often be traced back to weak designs or an unwillingness to allocate resources to project support during implementation. More organisations need to undertake (and make available to others) credible effect evaluations of their projects so that the whole system can learn from past successes and failures. The Inter-American Development Bank is one organisation that has commissioned robust evaluations with nutrition outcomes in the past. Different types of organisations also need to come together more systematically at the design stage, so that the full range of relevant experience is incorporated in newly designed initiatives.

### **Towards a new international architecture for nutrition**

Fragmentation has been a persistent theme of this paper, from reams of uncoordinated normative guidance, through multiple projects and agencies with almost indistinguishable names, to the 417 journals publishing so-called new research on undernutrition. This fragmentation makes it difficult for any one organisation to muster sufficient resources to act at scale, and prevents a shared understanding of the range of interventions that are currently being deployed. Worst of all, as each organisation struggles to gain influence at country level (as they are required to do by their boards, shareholders, funding sources, and voters), national actors must negotiate conflicting signals about where they should prioritise their limited resources.<sup>4</sup>

We believe that it is now time for the international nutrition system to be strengthened. This reform should lead to the following improvements.

#### **A new global governance structure**

All those interested in working to eliminate maternal and child undernutrition need to come together to review the current international architecture for nutrition. Such a meeting should identify options for a structure that would more effectively represent supranational organisations, the private sector, and civil society, as well as facilitating dialogue with national actors from high-burden countries. Once specific options have been laid out, they could be evaluated against the problem tree (webfigure 1) to establish whether they have potential to alleviate the most pressing problems. This review should be undertaken within the next 6 months.

#### **A more effective UN**

In the short term, the UN Standing Committee on Nutrition<sup>92</sup> needs to become a forum that makes individual UN agencies accountable for results. In advance of the 2008 annual session, all member agencies

need to publicly state that they are interested in allowing the Committee to exercise this function, and the Chair and Secretary should explain how results-based facilitation of the working groups will be managed.

#### Less parallel organisations, but fewer mandate gaps

Donors should immediately clarify how they plan to contribute to the simplification of the current system, ending such anomalies, for example, as USAID's A2Z programme coexisting with the Micronutrient Initiative, or parallel nutrition strategies being implemented by the African Union and the New Partnership for Africa's Development. Organisations should identify themselves as prepared to take forward crucial work on approaches to scaling up effective interventions, the linkages between undernutrition and global change processes, and the role of international trade policy in securing better nutritional outcomes.

#### More investment in capacity strengthening in high-burden countries

The challenge of building strategic and operational capacity at country level was highlighted in the fourth paper in this Series.<sup>4</sup> New funding should be committed in 2008, representing an appropriate balance between needs-based training for talented individuals, budget support for key organisations, and flexible, demand-led technical assistance for sectoral or cross-sectoral institutional reform. Strengthening of regional and sub-regional networks should be treated as a priority, because of its potential to reach a larger number of beneficiary countries.

#### Research leadership in areas that matter

The editors of academic journals with an interest in maternal and child undernutrition should meet in 2008 to develop a strategy to increase the profile and programmatic relevance of the topic and to reduce fragmentation. Major donors should immediately clarify how their funding will reduce the imbalances noted in our analysis, and research and training groups in high-income countries should review how they could contribute new theoretical and practical knowledge in the area of scaling up of successful nutrition projects, programmes, and policy initiatives. Other priority topics for research are identified in panel 2

The moment is ripe for these reforms. Their implementation would transform the political salience of undernutrition, and offer the chance of a better, more productive life to the 67 million children born each year in the countries most severely afflicted by undernutrition.

#### Contributors

SM conceptualised and coordinated the analyses and preparation of the paper, and had primary responsibility for the sections on stewardship and financing. BC had primary responsibility for the section on direct service provision by international organisations, and RU had primary responsibility for the section on strengthening human and institutional resources. All three authors contributed to the final draft.

#### Other contributors

Analysis of the status of nutrition in international human rights law: Wenche Barth Eide (University of Oslo); review and analysis of monitoring and evaluation documents relating to nutrition in the World Bank project portfolio document centre: Cristina Cardemil (Johns Hopkins University Bloomberg School of Public Health); analysis of research on nutrition and global change processes, and coverage of these topics in global media: Natalia Smith and James Garrett (International Food Policy Research Institute); analysis of issues relating to the provision of nutrition services in emergencies: Arabella Duffield (Save the Children UK); interviews and analysis regarding the state of international training and research in nutrition: David Pelletier and Renee Hill (Cornell University); analysis 2005 nutrition research output: Abigail Perry (London School of Hygiene & Tropical Medicine).

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#### Acknowledgments

We thank: the Bill & Melinda Gates Foundation for financial support for the preparation of this series, and the UNICEF Innocenti Research Centre and the Rockefeller Foundation Bellagio Conference Center for hosting meetings; all those who took part in semi-structured interviews/online surveys about the role of their institutions in the international nutrition system; Roger Shrimpton (UN Standing Committee on Nutrition) and Anna Taylor (Save the Children UK) for invaluable comments on earlier versions of this paper; Barbara Ewing (Johns Hopkins University) for logistic support throughout the development of the Series.

#### Conflict of interest statement

SM has worked for the Bill & Melinda Gates Foundation, the UK Department for International Development, and the London School of Hygiene & Tropical Medicine. This paper was prepared outside of official time, and no financial support was received with the exception of reimbursement of expenses incurred during meetings. RU works for the London School of Hygiene & Tropical Medicine, the Nutrition and Food Technology Institute (INTA), Chile, and the International Union of Nutrition Sciences. Currently the principal investigator in grants from: the Ellison Medical Foundation, the Food Standards Agency of the United Kingdom, the Science and Technology Fund of Chile, and the Wellcome Trust. No financial support was received for the preparation of this paper, with the exception of reimbursement of expenses incurred during meetings. BC works for UNICEF, and was working for the USAID-supported Food and Nutrition Technical Assistance Project at the Academy for Educational Development while working on this paper. This paper was prepared outside of official time, and no financial support was received with the exception of reimbursement of expenses incurred during meetings.

**Role of the funding source**

Representatives of the Bill & Melinda Gates Foundation took part in series preparation meetings and occasionally discussed the progress of this paper. The Foundation had no role in the conceptualisation of the analysis, data collection, quantitative analysis, or drafting.

**References**

- 1 Black RE, Allen LH, Bhutta ZA, et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet* 2008; **371**: xxx–x.
- 2 Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: long-term consequences for adult health and human capital. *Lancet* 2008; **371**: xxx–x.
- 3 Maternal and Child Undernutrition Study Group. Global review of nutrition interventions and programmes: what works? *Lancet* 2008; **371**: xxx–x.
- 4 Maternal and Child Undernutrition Study Group. What needs to be done at national level to address maternal and child undernutrition? *Lancet* 2008; **371**: xxx–x.
- 5 WHO. The World Health Report 2000—health systems: improving performance. Geneva: World Health Organization, 2000.
- 6 Food and Agriculture Organization/World Food Programme. Food supply and nutrition assessment mission to Iraq. Rome: Food and Agriculture Organization, 1997. Report no: TCP/IRQ/6713.
- 7 McMichael AJ, Campbell-Lendrum DH, Corvalán CF, et al, eds. Climate change and human health: risks and responses. Geneva: World Health Organization, 2003.
- 8 Smith LC, Haddad L. Explaining child malnutrition in developing countries: a cross-country analysis. Washington: International Food Policy Research Institute, 2000.
- 9 Saltman RB, Ferroussier-Davis O. The concept of stewardship in health policy. *Bull World Health Organ* 2000; **78**: 732–39.
- 10 Llanos A, Oyarzún MT, Bonvecchio A, Rivera JA, Uauy R. Are research priorities in Latin America in line with the nutritional problems of the population? *Public Health Nutr* 2007; published online Aug 22. DOI: 10.1017/S1368980007000730.
- 11 Heaver R. Good work—but not enough of it: a review of the World Bank's experience in nutrition. Washington DC: The World Bank, June, 2006.
- 12 Agble R, Bagriansky J, Marshall C, Tagwirei J. The Pan-African nutrition initiative: a provisional concept note. Midrand, South Africa: New Partnership for Africa's Development (NEPAD), 2005.
- 13 Mestor Associates Canada. Stakeholder perceptions analysis: ten year strategy for the reduction of vitamin mineral deficiencies. Geneva: Global Alliance for Improved Nutrition, 2006.
- 14 Pelletier DL. Nutrition and politics. In: United Nations Administrative Committee on Coordination Sub-Committee on Nutrition, ed. Nutrition: a foundation for development. Geneva: UN Administrative Committee on Coordination/Standing Committee on Nutrition, 2002.
- 15 Pelletier DL, Kraak V, McCullum C, Uusitalo U, Rich R. Community food security: salience and participation at community level. *Agric Human Values* 1999; **16**: 401–19.
- 16 Weise Prinzo Z, de Benoist B. Meeting the challenges of micronutrient deficiencies in emergency-affected populations. *Proc Nutr Soc* 2002; **61**: 251–57.
- 17 Berrios R. Contracting for development: the role of for-profit contractors in US foreign development assistance. Westport, Connecticut: Praeger, 2000.
- 18 Hoogendoorn A, Klaver W, Toonen J, et al. Thematic review of WFP food aid for nutrition: mother and child nutrition (MCN) interventions—full report. Rome: World Food Programme, December, 2005. Report no: OEDE/2006/4.
- 19 Shrimpton R, Macleod-Omawale J, Metz P, Belbase K. UNICEF nutrition portfolio review (1980–99): a contribution to the World Bank/UNICEF nutrition assessment. New York: UNICEF, 2002.
- 20 Bryce J, El Arifeen S, Bhutta ZA, et al. Getting it right for children: a review of UNICEF joint health and nutrition strategy for 2006–15. *Lancet* 2006; **268**: 817–19.
- 21 Dixit A. Incentives and organizations in the public sector: an interpretive review. *J Human Resources* 2002; **37**: 696–727.
- 22 Kennedy E. Mid-term performance review of the SCN Secretariat. Geneva: UN Standing Committee on Nutrition, 2002.
- 23 Stoddard A, Jones B. External review of the Inter-Agency Standing Committee on Humanitarian Affairs. New York: New York University Center on International Cooperation, December, 2003.
- 24 Jacobstein R, Kennedy E, Kusin J. Midterm review of the MOST project. Washington DC: The Monitoring, Evaluation and Design Support Project, September, 2001.
- 25 Copeland R, Frankenberger T, Kennedy E. Food and Nutrition Technical Assistance project assessment. Washington DC: The Monitoring, Evaluation and Design Support Project, March, 2002.
- 26 Pielemeier J, Ballou S, Foose A, Quick T, Reynolds J. Assessment of the Basic Support for Institutionalizing Child Survival (BASICS II) project. Washington DC: The Population Technical Assistance Project, April 2003.
- 27 Bonnard P, Haggerty P, Swindale A, Bergeron G, Dempsey J. Report of the food aid and food security assessment: a review of the Title II development food aid program. Washington DC: Food and Nutrition Technical Assistance Project, March, 2002.
- 28 DRN/ADE/Baastel/ECO/NCG. Joint evaluation of effectiveness and impact of the Enabling Development Policy (EDP) of the WFP. Bonn: Federal Ministry for Economic Cooperation and Development, May, 2005.
- 29 Bate R. The trouble with USAID. *Am Interest* 2006; **1**: 113–21.
- 30 Easterly W. The cartel of good intentions: the problem of bureaucracy in foreign aid. *J Econ Policy Reform* 2002; **5**: 223–50.
- 31 AusAID. AusGuideline 3-3: the logical framework approach. Canberra (Australia): Australian Agency for International Development, 2005.
- 32 UNICEF. Goals for children and development in the 1990s. New York: United Nations Children's Fund. <http://www.unicef.org/wsc/goals.htm> (accessed May 7, 2007).
- 33 World Food Summit Plan of Action. Rome: Food and Agriculture Organization of the United Nations. <http://www.fao.org/docrep/003/w3613e/w3613e00.htm> (accessed May 7, 2007)
- 34 United Nations. Roadmap towards the implementation of the United Nations millennium declaration: report of the Secretary General. New York: United Nations General Assembly, Sept 6, 2001. Report no: A/56/326.
- 35 Convention on the rights of the child, United Nations General Assembly resolution 44/25, November 20, 1989.
- 36 International covenant on economic, social and cultural rights, United Nations General Assembly resolution 2200A/XXI, Dec 16, 1966.
- 37 Convention on the elimination of all forms of discrimination against women, United Nations General Assembly resolution 34/180, Dec 18, 1979.
- 38 International code of marketing of breastmilk substitutes, World Health Assembly resolution 34.22, May 21, 1981.
- 39 International Babyfood Action Network. Breaking the rules, stretching the rules 2004: evidence of violations of the international code of marketing of breastmilk substitutes and subsequent resolutions. Penang: International Code Documentation Centre, 2004.
- 40 Voluntary guidelines to support the progressive realization of the right to adequate food in the context of national food security, FAO council resolution 127/10-Sup.1, 22–27 November, 2004.
- 41 UNICEF and WHO. Global strategy for infant and young child feeding. Geneva: World Health Organization, 2003.
- 42 WHO. Infant and young child feeding: a tool for assessing national practices, policies and programmes. Geneva: World Health Organization, 2003.
- 43 Allen L, de Benoist B, Dary O, Hurrell R. Guidelines on food fortification with micronutrients. Geneva and Rome: World Health Organization and Food and Agriculture Organization, 2006.
- 44 WHO vaccine position papers. World Health Organization Department of Immunization, Vaccines and Biologicals, 2007. [http://www.who.int/immunization/documents/positionpapers\\_intro/en/index.html](http://www.who.int/immunization/documents/positionpapers_intro/en/index.html) (accessed May 7, 2007)
- 45 WHO/Food and Agriculture Organization of the UN. Understanding the Codex Alimentarius. Rome: Food and Agriculture Organization of the United Nations, 2005.
- 46 Skoufias E. PROGRESA and its impacts on the welfare of rural households in Mexico. IFPRI research report no 139. Washington DC: International Food Policy Research Institute, 2005.

- 47 Maluccio JA, Flores R. Impact evaluation of a conditional cash transfer program: the Nicaraguan Red de Protección Social. IFPRI research report no 141. Washington DC: International Food Policy Research Institute, 2005.
- 48 Leading Edge Group. International Initiative for Impact Evaluation (3IE): proposed founding document. [http://www.cgdev.org/doc/eval%20gap/3IEfound\\_doc.pdf](http://www.cgdev.org/doc/eval%20gap/3IEfound_doc.pdf). (accessed Oct 6, 2007).
- 49 UNICEF. Progress for children. a report card on nutrition. New York: United Nations Children's Fund, 2006.
- 50 WHO. Global database on body mass index. <http://www.who.int/bmi/index.jsp> (accessed May 7, 2007).
- 51 WHO. Micronutrient deficiency information system. <http://www.who.int/nutrition/databases/micronutrients/en/index.html> (accessed May 7, 2007).
- 52 Mukuria AG, Kothari MT, Abderrahim M. Infant and young child feeding update. Calverton, Maryland: ORC Macro, Sept, 2006.
- 53 Laxminarayan R, Mills AJ, Breman JG, et al. Advancement of global health: key messages from the disease control priorities project. *Lancet* 2006; **367**: 1193–208.
- 54 OECD Development Assistance Committee and UNAIDS. Analysis of aid in support of HIV/AIDS control, 2000–2002. Paris: DAC Secretariat, June, 2004.
- 55 Diao X, Diaz-Bonilla E, Robinson S. Tell me where it hurts, and I'll tell you who to call: industrialized countries' agricultural policies and developing countries. MTID discussion paper no 84. Washington DC: International Food Policy Research Institute, April, 2005.
- 56 Barrett CB, Maxwell DG. Food aid after fifty years: recasting its role. London and New York: Routledge, 2005.
- 57 United States Government Accountability Office. Food assistance: various challenges impede the efficiency and effectiveness of US food aid. Report to the committee on agriculture, nutrition, and forestry, US Senate. Washington DC: US Government Accountability Office, April, 2007.
- 58 Barrett CB. Food aid effectiveness: "it's the targeting , stupid!". Department of Applied Economics and Management working paper no 2002–43. Ithaca NY: Cornell University; 2002.
- 59 The World Bank. World Development Indicators and Global Development Finance databases. <http://www.worldbank.org/data/onlinebases/onlinebases.html> (accessed May 7, 2007).
- 60 Maxwell D, Watkins B. Humanitarian information systems and emergencies in the Greater Horn of Africa: logical components and logical linkages. *Disasters* 2003; **27**: 72–90.
- 61 Salama P, Spiegel P, Talley L, Waldman R. Lessons learned from complex emergencies over past decade. *Lancet* 2004; **364**: 1801–13.
- 62 Young H, Borrel A, Holland D, Salama P. Public nutrition in complex emergencies. *Lancet* 2004; **364**: 1899–909.
- 63 UN Inter-Agency Secretariat of the International Strategy for Disaster Reduction. Global survey of early warning systems: an assessment of capacities, gaps and opportunities toward building a comprehensive global early warning system for all natural hazards. New York: United Nations, 2006.
- 64 Emergency preparedness and response. World Health Assembly report A59/20. Geneva: World Health Organization, May 24, 2006.
- 65 The Sphere Project. Humanitarian charter and minimum standards in disaster response. <http://www.sphereproject.org/> (accessed May 7, 2007).
- 66 Mason F, Taylor A. A review of the advances and challenges in nutrition in conflicts and crises over the last 20 years. Washington DC: Food and Nutrition Technical Assistance Project (FANTA), October, 2003.
- 67 Emergency Nutrition Network. Improving the effectiveness of emergency food and nutrition. <http://www.enonline.net/> (accessed May 7, 2007).
- 68 Adinolfi C, Bassiouni DS, Lauritzen HF, Williams HR. Humanitarian response review. New York and Geneva: United Nations Office for the Coordination of Humanitarian Affairs, August 2005.
- 69 Spiegel PB, Salama P, Maloney S, van der Veen A. Quality of malnutrition assessment surveys conducted during famine in Ethiopia. *JAMA* 2004; **292**: 613–18.
- 70 Deitchler M, Valadez JJ, Egge K, Fernandez S, Hennigan M. A field test of three LQAS designs to assess the prevalence of acute malnutrition. *Int J Epidemiol* 2007; published online May 21. DOI: 10.1093/ije/dym092.
- 71 Robertson SE, Valadez JJ. Global review of health care surveys using lot quality assurance sampling (LQAS), 1984–2004. *Soc Sci Med* 2006; **63**: 1648–60.
- 72 Myatt M, Feleke T, Sadler K, Collins S. A field trial of a survey method for estimating the coverage of selective feeding programmes. *Bull World Health Organ*. 2005; **83**: 20–6.
- 73 Marchione TJ. Foods provided through US. Government emergency food aid programs: policies and customs governing their formulation, selection and distribution. *J Nutr* 2002; **132**: 2104S–11S.
- 74 Organisation of Economic Cooperation and Development. The development effectiveness of food aid: does tying matter? Paris: Organisation of Economic Cooperation and Development, 2006.
- 75 Duffield A, Reid G, Walker D, Shoham J. Review of the published literature for the impact and cost-effectiveness of six nutrition related emergency interventions. <http://www.enonline.net/pool/files/research/ENNCIDASFPREPORT.pdf> (accessed May 7, 2007).
- 76 Simondon KB, Gartner A, Berger J, et al. Effect of early, short-term supplementation on weight and linear growth of 4–7-month-old infants in developing countries: a four-country randomized trial. *Am J Clin Nutr* 1996; **64**: 537–45.
- 77 Vautier F, Hildebrand K, Dedeurwaeder M, Herp M. Dry supplementary feeding programmes: an effective short-term strategy in food crisis situations. *Trop Med Int Health* 1999; **4**: 875–79.
- 78 Maleta K, Kuittinen J, Duggan MB, Briand A, Manary M, Wales J, et al. Supplementary feeding of underweight, stunted Malawian children with a ready-to-use food. *J Pediatr Gastroenterol Nutr* 2004; **38**: 143–45.
- 79 Nielsen J, Valentiner-Branth P, Martins C, Cabral F, Aaby P. Malnourished children and supplementary feeding during the war emergency in Guinea-Bissau in 1998–1999. *Am J Clin Nutr* 2004; **80**: 1036–42.
- 80 Hofmann C-A, Roberts L, Shoham J, Harvey P. Measuring the impact of humanitarian aid: a review of current practice. London: Overseas Development Institute, June, 2004. HPG Report no: 17.
- 81 United Nations Inter-Agency Standing Committee. Nutrition Cluster. <http://ocha.unog.ch/humanitarianreform/Default.aspx?tabid=74> (accessed May 7, 2007).
- 82 Standardized monitoring and assessment of relief and transitions (SMART). <http://www.smartindicators.org/> (accessed May 7, 2007).
- 83 ReliefWeb. ReliefWeb, 2007. <http://www.reliefweb.int/> (accessed May 7, 2007).
- 84 Special issue on institutional building for research and advanced training in food and nutrition in developing countries, based on a workshop held by the United Nations University and the International Union of Nutrition Sciences in Manila, Philippines, 18–23 August 1996. *Food Nutr Bull* 1997; **18**: 4–131.
- 85 Slaughter S, Rhoades G. Academic capitalism and the new economy: markets, state, and the new economy. Baltimore MD: Johns Hopkins University Press, 2004.
- 86 National Academies Committee on Facilitating Interdisciplinary Research. Facilitating interdisciplinary research. Washington DC: the National Academies Press, 2005.
- 87 Leroy JL, Habicht JP, Peltó G, Bertozzi SM. Current priorities in health research funding and lack of impact on the number of child deaths per year. *Am J Public Health* 2007; **97**: 219–23.
- 88 Bouis H, editor. Current research by the Consultative Group on International Agricultural Research (CGIAR) related to human nutrition. *Food Nutr Bull* 2000; **21**: 374–444.
- 89 Berg EJ. Rethinking technical cooperation: reforms for capacity building in Africa. New York: United Nations Development Programme, 1993.
- 90 Organisation of Economic Cooperation and Development. Peer reviews of DAC members. <http://www.oecd.org/dac/peerreviews/> (accessed May 7, 2007).
- 91 International Health Partnership: a global compact for achieving the health millennium development goals. <http://www.dfid.gov.uk/news/files/ihp/compact.pdf> (accessed Sept 5, 2007).
- 92 United Nations System Standing Committee on Nutrition. [www.unsystem.org/scn/](http://www.unsystem.org/scn/) (accessed June 18, 2007).