Global collective action in health: The WDR+20 landscape of core and supportive functions

Working paper for The Lancet Commission on Investing in Health

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July 5, 2013

I. Introduction

The 1993 World Development Report helped launch an unprecedented era of growth and innovation in development assistance for health (DAH). Twenty years later, the global health landscape has changed dramatically, with many new actors spending far larger amounts of funding in novel ways. Following the United Nations (UN) Millennium Declaration in 2000, which established the Millennium Development Goals (MDGs), DAH almost tripled to reach around US$ 28 billion annually (IHME 2012).

Over the past decades there has also been a tremendous shift in the burden of disease away from causes associated with under-nutrition and infection to non-communicable, chronic diseases that require complex treatment and preventive interventions (Lozano, Naghavi et al. 2013). Health systems, especially in low- and middle-income countries, face a complex set of challenges as they try to meet the plethora of needs of accelerated, polarized, and protracted epidemiological transition (Frenk, Bobadilla et al. 1996). This is further compounded by the health challenges of globalization such as climate change (Frenk and Moon 2013). Despite the magnitude of these challenges, global financing in these areas remains a tiny proportion of DAH (Atun, Knaul et al. 2012).

The new, complex landscape of DAH has raised concerns about the efficiency and effectiveness of global collective action, or international cooperation, for health. These concerns are heightened as funding growth flattens, epidemiological profiles evolve, and the MDGs expire, triggering debate on how sovereign governments and international organizations should prioritize different global health objectives. However, there are likely some advantages to complexity as well, such as innovation from increased competition among international organizations and more options for leaders in low- and middle-income countries. Reflection on the current global health landscape and debate about the future role of global collective action is timely. One key question is how the new combination of funding, actors, and assistance mechanisms is prioritizing what have been termed the “essential functions” (Jamison, Frenk et al. 1998) of global health organizations.

As a contribution to The Lancet’s Commission on Investing in Health, this paper discusses shifts in DAH since 1990, analyzes the nature of the current distribution of funding, and reflects on the future. Drawing on recent work by the Institute for Health Metrics and Evaluation (IHME 2012); Ravishankar, Gubbins et al. (2009); Atun, Knaul et al. (2012); and others, Section II summarizes how DAH financing has grown since 1990 and shifted dramatically since 2000. Section III introduces an “essential functions” framework, based on Jamison, Frenk and Knaul (1998) and Frenk and Moon (2013), which provides a function-based taxonomy for global collective action in health. In Section IV, we discuss several prominent new actors and modalities for DAH, and attempt to map them onto the framework, in order to analyze trends in the prioritization among essential functions. Section V briefly reviews major critiques of the current DAH landscape but also identifies several potential advantages. Section VI concludes by discussing our findings and their implications for the future division of labor, investment strategies, and governance of global collective action for health.

II. Dramatic changes in funding for DAH (1990-2010)

Aggregate funding increases

The 1993 World Development Report (WDR), *Investing in Health*, urged the international community to devote more resources to health. Specifically, the report recommended immediately restoring health funding to 7% of official development assistance (ODA) (up from its decline to 6% in 1986-1990), and envisioned that an additional US$2 billion could "finance a quarter of the estimated additional costs of a basic package in low-income countries and of strengthened efforts to prevent AIDS." In many ways, the response of the global community surpassed even the most optimistic scenarios imagined twenty years ago. Since 1990, development assistance for health (DAH) has grown at an 8.7% compounded annual rate, nearly quintupling from US$ 5.7 billion in 1990 to US$28.2 billion in 2010 (in constant 2010 US$). DAH growth has since stagnated, plateauing after 2010 (IHME 2012).

There is suggestive evidence that DAH flows have increased relative to other development assistance flows as well. Although ODA figures do not capture all elements of DAH (for instance, they exclude the contributions of some emerging economies, and of NGOs and philanthropic foundations[1]), they still indicate the prioritization of health relative to other issues on the global agenda. Since falling from its historical average of 4.5% to a low of around 4% in the early 1990s, the health share of total ODA reached 6% in 2010 (OECD.Stat 2013).

Shifting distribution of funding: channels, regions, diseases, and sources

About one-fifth of DAH now originates from or is channeled through new private and public institutions that did not exist in the early 1990s, including UNAIDS, GAVI, the Global Fund to Fight AIDS, Tuberculosis and Malaria, and the Bill and Melinda Gates Foundation. Development banks such as the World Bank and the Inter-American Development Bank have also joined this new playing field and are taking on a more prominent role in supplying DAH than they did in the early 1990s. By contrast, the relative contributions of bilateral and UN agencies have diminished (Table **1**). Among the bilateral institutions, the United States accounts for one quarter of all DAH, up from one sixth in 1990, and the UK's share has also grown rapidly, from less than 1% in 1990 to more than 4% of the total DAH in 2010.[2]

[1] With the exception of the Bill and Melinda Gates Foundation.
[2] When tracking multi-laterals, IHME eliminates double-counting among channels that provide sufficient data.

Table 1: Gross DAH flows by channel of assistance in 2010 US$ millions

Channel	1990	% Total	2010	% Total
Bilateral Agencies	2,823.4	49.2	12,009.7	42.7
United States	927.2	16.2	7,119.5	25.3
United Kingdom	56.3	1.0	1,168.6	4.2
Development Banks	280.4	4.9	2,384.6	8.5
UN Agencies	1,967.3	34.3	4,507.9	16.0
U.S.-incorporated NGOs	499.8	8.7	2,960.0	10.5
U.S. Foundations (non-Gates)	118.6	2.1	454.2	1.6
European Commission	52.4	0.9	359.3	1.3
GAVI	0	0	1,068.0	3.8
Global Fund	0	0	3,292.9	11.7
Gates Foundation	0	0	1,123.3	4.0
Total	**5,741.9**	**100%**	**28,159.8**	**100%**

Source: IHME 2012 (estimates for bilateral DAH)

The aggregate quintupling of global DAH has occurred with considerable regional variation in DAH growth (Table 2). The high proportion of unallocable funds limits comparability across time, but some broad trends seem clear. Sub-Saharan Africa has witnessed rapid growth in assistance over the past two decades, with a 15-fold increase from US$ 0.57 billion in 1990 to US$ 8.1 billion in 2001, driven substantially by investments to address the high AIDS burden in the region. Since the collapse of the Soviet Union, DAH to Central Asia has also grown, increasing by a factor of almost 60, from very low levels in the early 1990s to US$ 896 million in 2010. The allocable share to South and Southeast Asia has increased less markedly. DAH flows to Latin America and the Caribbean and Middle East and North Africa have grown more slowly than overall DAH growth.

Table 2: DAH by recipient region in 2010 US$ millions

Region	1990	% Total	2010	% Total
Sub-Saharan Africa	566.3	9.9	8,074.1	28.7
South Asia	267.8	4.7	1,780.5	6.3
East Asia and the Pacific	298.7	5.2	1,551.2	5.5
Europe and Central Asia	15.4	0.3	896.0	3.2
Latin America and the Caribbean	364.1	6.3	1,618.5	5.8
Middle East and North Africa	120.6	2.1	521.4	1.9
Global*	45.2	0.8	3,476.9	12.4
Unallocable by region**	4,063.7	70.8	10,241.3	36.4
Total	**5,741.9**	**100%**	**28,159.8**	**100%**

* Contributions that donors categorize as “benefiting the entire world,” which includes research and other global public health goods.
** DAH for which IHME has no recipient country information is coded as “unallocable.”

Source: IHME 2012

The allocation of DAH by disease group has also changed over the past 20 years (Table 3). Again, the high proportion of unallocable funds makes comparisons across time difficult, particularly for the "Global" category, which appears to have been poorly tracked in 1990. Still, Table 3 is a reflection of how the disease profile of the world has evolved since 1990. The emergence of AIDS as a priority area is evident in the 34-fold increase in DAH for this disease over the two decades. Today, nearly a quarter of all DAH (and nearly a third of allocable DAH) is AIDS expenditure. The share of resources spent on malaria and tuberculosis has also increased substantially, while the share earmarked for non-communicable diseases has remained very low, at less than 1%, from 1990-2010 (IHME 2012).

Table 3: DAH by disease group in 2010 US$ millions

Disease group	1990	% Total	2010	% Total
HIV/AIDS	198.0	3.5	6,757.4	24.0
Maternal, newborn, and child health	1,217.5	21.2	5,166.8	18.4
Malaria	38.6	0.7	1,856.7	6.6
Health sector support	8.7	0.2	1,180.9	4.2
Tuberculosis	56.7	1.0	1,095.1	3.9
Noncommunicable diseases	30.8	0.5	185.1	0.7
Other*	1,950.5	34.0	5,945.7	21.1
Unallocable**	2,241.2	39.0	5,972.1	21.2
Total	**5,741.9**	**100%**	**28,159.8**	**100%**

*Represents DAH for other health focus areas not yet tracked by IHME.
** "Unallocable" corresponds to DAH for which IHME did not have project-level information on disease-focus.

Source: IHME 2012

New role of middle-income countries

Large middle-income countries (MICs) - Brazil, Russia, India, China, and South Africa (BRICS) - have also increased their DAH over the past twenty years.

Table 4: Foreign Aid from BRICS

	Launch of Foreign Assistance Program	Total Foreign Assistance, US$ millions, 2005	Compound Annual Growth Rate, 2005-2010	Total Foreign Assistance, US$ millions, 2010
Brazil	1960	158	20.4%	400
Russia	1955	101	36.1%	472
India	1964	463	10.8%	680
China	1950	1,300	23.9%	3,900
South Africa	1968	97	8.0%	143
Total		**2,000**	**22.9%**	**5,600**

Source: GHSi 2012

Table 4 shows the volume and growth of overall assistance (non-health specific) from the BRICS between 2005 and 2010, as estimated by GHSi (2012). The influence of these countries in the

global health arena has grown commensurately, as they have become more active and prominent in international organizations like the WHO and global forums such as the recent WTO rounds.

Evidence collected by the AidData initiative (AidData 2013) shows that assistance from Brazil flows primarily to Lusophone African countries and its South American neighbors. Russia's DAH is primarily to neighboring countries in Central Asia and the Commonwealth of Independent States, motivated in part by a desire to prevent infectious diseases from entering Russia. Although India's assistance for health is currently low relative to its assistance to other sectors, there are signs of growing involvement in global health. Since 2009, India has committed over US$ 100 million to bilateral health projects in South Asia, Southeast Asia, and Africa (GHSi 2012).

China's engagement is primarily in Africa and dates back to the 1960s. Its assistance to the continent has been expanding and intensifying since 2000 (Peilong 2011), and includes donation of medical equipment and drugs, health workforce training, and anti-malaria campaigns. China is also actively promoting health cooperation with its Southeast Asian neighbors. While South Africa has provided less financial assistance than the other BRICS, it has been forming South-South alliances, providing technical assistance to South African Development Community countries, and advocating for greater influence of African countries in setting the global health agenda (GHSi 2012). In addition to supporting other low- and lower middle-income countries, the BRICS are providing global health public goods by carrying out health R&D to produce lower-cost health technologies and pioneering innovating programming (GHSi 2012).

There is ongoing debate concerning the optimal role of middle-income countries within the DAH landscape. While they are expanding in their role as DAH donors and shapers of the global health agenda, they face significant domestic health challenges of their own, and their DAH receipts still outweigh their contributions. We briefly address this debate in Section V.

III. Conceptual framework: The distribution of DAH by function

Five years after the publication of the 1993 World Development Report, Jamison, Frenk, and Knaul (1998) proposed a framework that categorizes and provides a rationale for the essential functions of international health organizations. Their framework identifies two categories of activities for global health actors which nation states, either due to government or market failure, will not or cannot adequately produce in isolation, requiring action by international institutions to achieve efficient outcomes. These activities are termed "international collective action" by Jamison et al. Collective action is "an economically rational approach to the provision of public goods… and international collective action responds to opportunities of which benefits cover many nations" (Jamison, Frenk, and Knaul 1998). We adopt this definition, but use the more current term "global collective action" following others (Reich and Takemi 2009; Kickbusch and Kökény 2013).

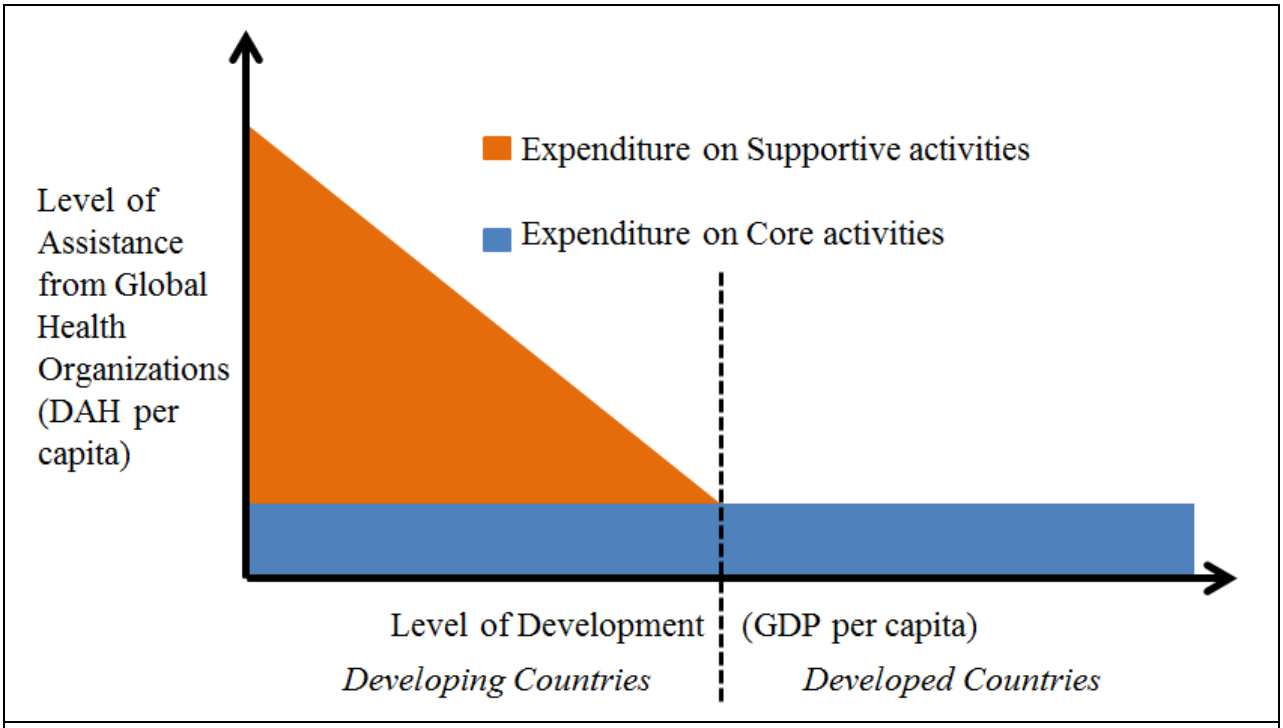
The first category of activities, ***core functions***, addresses market failures caused by the cross-national interdependence of the global health system. That interdependence is the source of global public goods and health externalities. Due to spillover effects, costs and benefits of health activities do not accrue to a single nation state, so global collective action is required to

encourage more efficient outcomes in health, the determinants of health, and health-determined outcomes of human, social and economic development. The authors view the administration of core functions as the key, invariable role of global health organizations.

The second category of activities is ***supportive functions***, required because of "government failures" rather than market failures. Supportive functions largely coincide with traditional development aid—for example, providing assistance to developing countries where national health systems are underdeveloped and lack the resources to address national health challenges. These functions also include emergency support in situations where capable governments are temporarily disabled by extenuating circumstances, such as natural disasters. Supportive functions tend to be temporary, ethics-based obligations undertaken in solidarity with populations in need. Global collective action in the supportive role should be increasingly limited and targeted as countries' basic needs are met and economic development continues, and should move toward facilitating or supplementing rather than wholly providing goods and services that are the responsibility of sovereign states.

Supportive functions tend to wane across the continuum of economic development from countries in crisis and the poorest countries to high-income market economies. Thus, the need for supportive activities, and hence the role of international actors in providing them, declines as the economies become stronger and income increases in an equitable manner (Figure 1). Still, support for certain groups may be lacking even in wealthy countries under conditions of political or humanitarian crisis, or if wealth is spread very unevenly across a population. Overall, international organizations should aim to channel their resources to core functions, intervening in supportive roles only when necessary.

Figure 1: Declining emphasis on supportive functions as countries develop



Importance of care and supportive functions varies with economic circumstances. Provision of core functions is required by all countries regardless of income level, and provision of supportive functions is need-based and inversely related to economic development. (Reproduced from Jamison, Frenk, and Knaul 1998).

More recently, Frenk and Moon (2013) employed a similar framework that includes several new functions and sub-functions. Since this framework is compatible with the core vs. supportive distinction made by Jamison et al., we merge the two frameworks to create a comprehensive, function-based taxonomy for global collective action in health. Table 5 summarizes the unified framework—from here on referred to as "the essential functions framework"—with recent examples offered for each category. In subsequent sections, we discuss several prominent new actors and modalities for DAH and attempt to map these into the framework, in order to analyze trends in the balance between core and supportive functions.

Table 5: Categories of essential functions for global health organizations, based on Jamison et al. (1998) and Frenk and Moon (2013). Boxes in italics are incorporated from Frenk and Moon.

Category	Rationale	Function	Sub-function	Example Organization	Example Activity
Core	Correction of market failures for improved global health	Production of *global* public goods	Research and development (especially for problems of global importance)	Bill and Melinda Gates Foundation	HIV Vaccine Research
			Information and databases for shared learning	IHME	Population health data collection
			Comparative evidence and analysis	Think tanks	Research studies, policy briefs
			Harmonised norms and standards for national use and international regulation	World Health Organization	Guidance on use of new vaccines
		Management (surveillance and control) *of externalities*	Surveillance and border control, especially during epidemic outbreaks	Center for Disease Control	Disease surveillance during avian flu outbreak
		Stewardship	*Convening for consensus building, priority setting, rule setting, and cross-sector health advocacy.*	United Nations	Declaration on non-communicable diseases
Supportive	Ethical obligations and correction of government failures	Act as agent for dispossessed, *mobilize global solidarity*	Provision of basic needs in failed states	Bilateral aid agencies	Provision of emergency healthcare during conflict in Syria
			Assistance in natural or artificial disasters	Bilateral aid agencies	Aid to Haiti after 2010 earthquake
			Protection of vulnerable groups	U.N. High Commissioner for Refugees	Response to disease outbreaks in refugee camps
		Support development	International technical cooperation	Nearly all "traditional" DAH has elements of this	
			Development financing	World Bank	Lending and grants to low-income country health sectors

IV. Not just more money: a changed landscape of essential functions amid new actors and modalities of DAH

As DAH quintupled in volume from the early 1990s to 2012, the number of new actors and modalities for mobilizing, channeling, and delivering DAH also multiplied at a remarkable rate. In this section, we apply the unified essential functions framework to today's DAH landscape. We begin with what can be gleaned from IHME data, then move to exploratory evidence across a sample of several prominent actors and modalities. It is beyond the scope of this study to account for every actor and modality that has emerged since 1993[3], so we focus on the WHO and World Bank, three institutions that Atun et al. (2012) argue have "truly innovative" financing mechanisms on a global scale (Global Fund, GAVI, and UNITAID), the largest new actor-donor in DAH (Gates Foundation), and the largest bilateral development assistance agency (USAID).

Core and supportive functions of large global health organizations

How has the distribution of DAH funding changed since 1993 vis-à-vis the core and supportive functions in the essential functions framework? The IHME statistics describe financing flows in many ways (e.g., in Table 2 and Table 3), but no available categories are directly linked to the essential functions that global health organizations should be striving to deliver, as put forth by Jamison et al. (1998) and Frenk and Moon (2013). The "Global" line-item in Table 2 does distinguish DAH that is not specific to a particular region, such as contributions to health research and the creation of public goods that benefit multiple regions or the entire world. But this comparison is confounded by the large proportion of DAH that is "unallocable by region," 71% in 1990 and 36% in 2010, preventing any solid conclusions about change over time by functions.

Since IHME data do not allow clear distinction between funds allocated to core and supportive functions, we explore evidence from publicly-available budgets of selected global health actors. There are clear limitations to this approach, since budgets and grant portfolio summaries are not standardized, and often are not explicit about what activities are included in specific line-items. Furthermore, focusing on specific line-items in budgets potentially misses linkages between various activities and broader impacts and externalities generated by the organization. Still, this analysis provides some preliminary indications of whether development financing for health has shifted between core and supportive functions since the early 1990s.

WHO

Despite widespread critiques and concerns about diminished status of the WHO in the new DAH landscape (Bloom 2011), the organization continues to lead in global health policy as a producer of global public goods and steward of knowledge and best practice. We highlight examples of three relatively new WHO activities: prequalification programs (PQP), vaccine position papers, and clinical practice guidelines.

[3] IHME only tracks private sector charitable funding that is channeled through a subset of US-based NGOs and foundations. DAH from private sector sources that are not currently accounted for by IHME are growing and significant. For example, the Wellcome Trust, a private U.K.-based research-funding charity, made US$42 million in international health grants in 2006, according to McCoy et al. (2009).

As the volume of medicines and vaccines purchased by low- and middle-income countries directed and through bulk purchasers like PEPFAR, UNICEF (which purchases on behalf of GAVI), and the Global Fund has grown rapidly in recent years, the need to establish global standards of quality for these commodities has become more pressing. To fill this gap, WHO runs *prequalification programs* (PQPs) for medicines, vaccines, and diagnostic tests. PQP started in 2001 with a focus on AIDS, tuberculosis, and malaria medicines. WHO currently allocates nearly US$ 16 million to the prequalification of medicines. PQP extends invitations to manufacturers to submit their products for a five-step procedure, including assessment and inspection. A similar process is in place for vaccines and diagnostic tests. By providing approval of medical products that meet safety, quality, and efficacy standards, WHO significantly reduces the need for purchasers to incur costs in seeking information about the drugs, vaccines and diagnostics (WHO 2013).

WHO's *vaccine position papers,* based on recommendations of the WHO Strategic Advisory Group of Experts on immunization, summarize key information on diseases and associated vaccines, providing national public health officials and immunization program managers with WHO guidance on their proper use. The central contribution of these papers is concise, analytical evaluation of the scientific evidence from clinical trials on the effectiveness of vaccines. The first paper, released in August 1998, was on Varicella. The most recent vaccine position paper (January 2013) is on Rotavirus. The papers are reviewed periodically and updated to reflect the latest evidence (WHO 2013).

A third global public good produced by the WHO are its *clinical practice guidelines*. The WHO releases publications to inform best practices on a range of topics, from breastfeeding to poison control. The Guidelines Review Committee, established in 2007, is responsible for ensuring that these global guidelines are developed transparently, based on evidence, and of high quality. Since 2008, the WHO has released 90 guidelines documents on: Child health, Chronic diseases, Environmental health, HIV/AIDS, Maternal health, Mental health, Nutrition, Patient safety, and Tuberculosis. When properly produced by consolidating reliable information developed using formal methods of review and consensus, WHO's guidelines save time and reduce information costs for all global health actors, particularly practitioners in resource-limited settings who might not have capacity to determine their own policies and practice guidelines (WHO 2013).

While WHO's role has been challenged as DAH funding, actors, and modalities have proliferated (IHME's Global Burden of Disease project is a prominent example), it continues to have a strong influence on how DAH is prioritized and implemented, and is the obvious and single agency able to produce many required public goods. The three WHO activities described above are examples of core activities.

However, there is some evidence that WHO may have experienced a shift toward more supportive activities since 1990. WHO's regular budget funds are raised from membership dues and are pooled to finance WHO's program budget. Its extra-budgetary income comes from voluntary contributions from donor countries and is earmarked for specific projects (often disease-specific programs). Extra-budgetary expenditure has increased as a share of WHO total expenditure, from 61% in 1990 to 82% in 2010.

Closer inspection of the WHO program budget 2010-2011 performance assessment (WHO 2012), which compares proposed commitments against actual expenditure, shows that 35% of all spending was for headquarter activities. The remaining expenditure was on regional and country offices. If we assume that spending at the regional and country level was largely for country-specific assistance, this has significant implications concerning the WHO's balance between core and supportive functions. 50% of WHO spending was both extra-budgetary and at the regional office level, raising the possibility that world's leading intergovernmental health organization spends the majority of its resources on supportive activities.

The World Bank

While WHO concentrates on core health functions, the World Bank focuses on mostly strengthening health systems and providing technical assistance (World Bank 2013) in a supportive role. While WHO's DAH has nearly doubled over the past decade, the World Bank's health aid has grown much faster and now equals that of WHO (see Table 6). This raises the question of whether, on top of the apparent shift in emphasis *within* the WHO, the balance of health assistance *between* these two international organizations has shifted in favor of supportive activities.

Table 6: WHO and World Bank as channels of DAH

	DAH (2010 US$ millions) 3-year running average		**Annual growth rate**
	1990-1992	2010-2012	1991-2011
World Health Organization	1,071.4	2,088.2	3.4%
World Bank	290.3	2,015.4	10.2%

Source: IHME 2012

The Global Fund

The Global Fund for AIDS, Tuberculosis, and Malaria (the Global Fund) was established in 2002 to provide grants to governments and civil society in low- and middle-income countries for prevention, treatment, and care and support of persons affected by the three diseases. Primarily funded by bilateral donors with some additional private sector contributions, the Global Fund is a financing mechanism, designed to mobilize, pool and distribute funds for programs rather than to implement programs itself.

This new actor in DAH is also a key recipient of funds from two new fundraising modalities for DAH: Debt2Health and (PRODUCT)RED. Debt2Health is one of several examples of "debt swaps," whereby donors forgive a portion of debt held by recipient countries in exchange for specific investments in Global Fund-financed projects (Hecht, Palriwala et al. 2010). (PRODUCT)RED is a brand licensed to several prominent multinational companies who donate half of their profits on select (PRODUCT)RED items to the Global Fund, generating US$ 162 million from January 2006 to June 2011 (Atun et al. 2012).

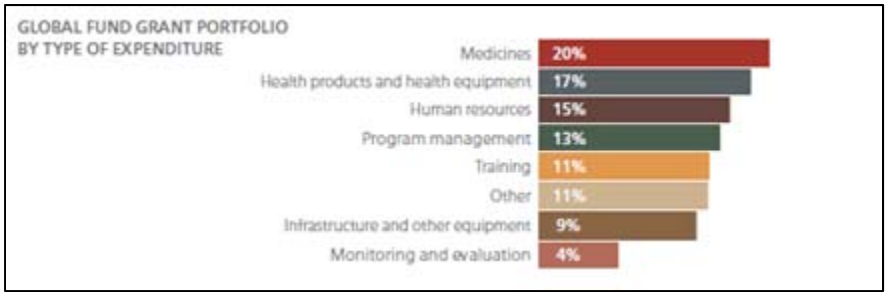
Atun, Knaul et al. (2012) list several of the Global Fund's innovations, which appear to cover mainly supportive functions. The Global Fund's grants are used for disease control activities in individual countries, mainly supportive functions of service delivery and improved program management. The Global Fund's grant portfolio by type of expenditure (Figure 2) suggests that it

plays a strongly supportive role as a global health organization that focuses resources on the poorest countries, and on diseases that are concentrated among the poor.

At the same time, the Fund has generated important public goods, for example by acting as a market shaper for AIDS drugs and malaria bed nets, effectively lowering prices for all low- and middle-income countries. Through its price and quality reporting system (PQR) launched in 2009, the Global Fund also makes the prices and terms for all the key medicines and health products it finances publicly available (Global Fund 2011). That information is a public good which is widely utilized by countries. In addition, one might argue that the pooled and standardized allocation of those funds (according to need, good governance, and performance) is itself a core function whose benefits (e.g., improved control of infectious diseases) accrue to the entire global community, and which would likely be undersupplied if left to individual states.

However, as shown in Figure 2, nearly all of the Global Fund's expenditure is recurring (medicines, labor, equipment) and falls under the "support development" activity of the essential functions framework.

Figure 2: Global Fund DAH by type of expenditure, 2010



Source: Global Fund Annual Report 2010

GAVI Alliance

The GAVI Alliance is a public-private partnership founded in 2000 to finance the provision of new and underused vaccines to children in developing countries. The alliance is made up the major global health actors in immunization: the WHO, the World Bank, UNICEF, and the Gates Foundation, as well as dozens of partners from governments, civil society organizations, and the pharmaceutical industry.

GAVI performs a mix of core and supportive functions for global health (Table 7). Like the Global Fund, it focuses resources on the poorest countries—specifically on vaccine preventable diseases that overwhelmingly affect the poor (with the exception of Human papillomavirus). Its primary purpose is thus arguably supportive, as it aims to improve access to immunizations for children in mostly low-income countries, a basic public health task that normally falls under the responsibility of sovereign governments. From 2000 to 2010, nearly three-quarters of the approved expenditure went to accelerating the introduction of new and underused vaccines (e.g. rotavirus, pneumococcal, pentavalent, measles second dose, and meningitis A vaccines) in eligible low- and lower middle-income countries. The other major expenditures—health systems strengthening (increasing access to immunization by improving health service delivery, financing, and leadership) and Immunization Services Support (improving immunization

performance via flexible, performance-based funding)—also focus on delivery in low-income countries, and thus GAVI financing may be considered heavily supportive.

Table 7: GAVI DAH by program, 2000-2011

Program	US$ millions	% total
Civil Society Organizations	20.4	0.6%
Health Systems Strengthening	403.2	11.4%
Injection Safety Support	113.5	3.2%
Immunization Services Support	351.3	9.9%
Vaccine Introduction Grant	26.6	0.7%
New/underused vaccine support	2,619.3	74.1%
Total	**3534.3**	**100.0%**

Source: GAVI Alliance Progress Report 2011

Similar to the Global Fund, GAVI is both a new actor (organization) and a channel for new modalities of DAH, notably the International Financing Facility for Immunisations (IFFIm) and Advance Market Commitments (AMCs) for vaccines. The IFFIm transforms long-term pledges of up to twenty years from donor governments into 'vaccine bonds' sold on capital markets, generating large volumes of funds that are then immediately available for GAVI's immunization programs, greatly improving both upfront budgets and long-term budget predictability (IFFIm 2013). AMCs are commitments global health donors make to purchase newly-developed health products (e.g., a pneumococcal vaccine in GAVI's case), spurring research and development investments by the private sector that otherwise would likely not have occurred due to insufficient market demand. In addition to incentivizing initial production, GAVI has negotiated discounted prices for the pneumococcal vaccine and has introduced the vaccine in 24 countries since 2010, with an additional 26 countries approved for introduction. GAVI estimates that as many as 1.5 million child deaths may be averted by 2020 by the pneumococcal AMC (GAVI Alliance 2013).

Also like the Global Fund, GAVI serves its supportive functions in ways that could be interpreted as core activities, such as pooling resources that would otherwise be fragmented to improve the predictability of global funding for immunizations globally through the IFFIm and incentivizing research and development through the pneumococcal AMC. Even its primary purpose, supporting vaccines for poor children, arguably has a core feature: eliminating negative global health externalities by slowing the spread of vaccine-preventable diseases. Most importantly, GAVI acts as the dominant funder of vaccines for low-income countries (through its procurement agent – the UNICEF Supply Division), shaping the market for a wide range of vaccines, maintaining contracts with a diverse set of manufacturers, and keeping prices low.

UNITAID

Founded in 2006 by the governments of Brazil, Chile, France, Norway and the United Kingdom, UNITAID is a global health financing and purchasing facility. Based in Geneva and hosted by the WHO, the organization uses a levy on airfares and other innovative financing mechanisms to improve access to treatment and diagnostics for AIDS, malaria, and tuberculosis in low-income

countries. In addition to contributions from its founding members, UNITAID receives funding from the upper-income countries of Cyprus, Korea, Luxembourg, Spain; the Gates Foundation; and the low-income countries of Cameroon, Congo, Guinea, Madagascar, Mali, Mauritius, and Niger. Civil society groups are represented in UNITAID's governance structures (UNITAID 2013).

UNITAID claims to be "the first global health organization to use buy-side market leverage to make life-saving health products better and more affordable for developing countries." The leverage is substantial, backed by about US$ 1.3 billion in funds raised as of the end of 2010, and successful, as the organization has secured reductions of 25% to 50% in the price of second-line AIDS treatments and pediatric antiretroviral medicines in partnership with the Clinton Foundation (Atun et al. 2012).

The mapping of UNITAID's functions to the essential functions framework follows a similar pattern to the Global Fund and GAVI (Table 8). The organization's primary purpose is supportive and targeted to populations in low-income countries whose governments could not otherwise afford or manage to deliver life-saving drugs for conditions with high disease burdens.

Table 8: UNITAID Project Funding Commitments*, 2010

Project	US$ millions	% total
HIV: Procurement and supply of pediatric ARVs	380.1	25.7%
HIV: Procurement and supply of second-line ARVs	305.8	20.6%
HIV: PMTCT	104.5	7.1%
HIV: Safeguarding availability of ARV treatment (ESTHERAID)	16.0	1.1%
Malaria: ACT scale-up initiative	78.9	5.3%
Malaria: ACT Liberia and Burundi	1.3	0.1%
Malaria: Affordable Medicines Facility for malaria	130.0	8.8%
Malaria: Assure artemisinin supply system	9.3	0.6%
Accelerating scale-up of long-lasting insecticide treated nets	109.3	7.4%
TB: Increased access to first-line TB drugs	26.8	1.8%
TB: UNITAID project support for pediatric TB	37.3	2.5%
TB: UNITAID project support for Multi-drug resistant TB (MDR) scale-up initiative	54.0	3.7%
TB: MDR-TB acceleration of access initiative	11.5	0.8%
TB: MDR-TB Strategic Revolving Fund	22.2	1.5%
TB: MDR-TB diagnostics	87.6	5.9%
Cross-cutting: Program project support for WHO quality assurance of medicines and diagnostics	54.5	3.7%
Cross-cutting: Global Fund Round 6 for funding Multi drug resistant TB medicines	52.5	3.5%
Total for 16 project areas	**1,481.5**	**100.0%**

Source: UNITAID Financial Report 2010
*Note that this table reflects commitments, not DAH.

At the same time, UNITAID's activities also have a core element because UNITAID creates markets by mobilizing funds and reduces prices through its procurement process, much like GAVI. Along with the Global Fund, its financial support to WHO's Pre-Qualification of Medicines and Quality Assurance of Diagnostics also contribute to global health public goods, and its efforts to eliminate market inefficiencies and make drugs more affordable through projects like ESTHERAID (ESTHERAID 2013) constitute a global public good.

Gates Foundation

The Bill and Melinda Gates Foundation is the largest private grant-making foundation in the world (McCoy, Kembhavi et al. 2009). Since its inception in 1994, it has invested over US$ 13 billion in global health (Gates Foundation 2010). In 2010, the Gates Foundation contributed over US$ 1 billion in DAH through its Global Health program, equivalent to 4% of total DAH. Its activities cover a wide range of disease areas and over 100 countries, including the United States. The Global Health Division's stated purpose is "to harness advances in science and technology to save lives in developing countries" (Gates Foundation 2013). Its focus areas include Discovery and Translational Sciences, Enteric and Diarrheal Diseases, HIV, Malaria, Neglected Infectious Diseases, Pneumonia, and Tuberculosis. While the Gates Foundation Global Programs Division invests in delivery (i.e., supportive functions), the Global Health Division is mainly focused on research and development (core).

Relative to the mandates of the three new actors discussed above, The Gates Foundation's mission places the most emphasis on scientific research, a core function. From 1998 to 2007, over a third of the value of its grants went to research and development or basic research (McCoy, Kembhavi et al. 2009). It has taken on a similar core function in the global health system by providing grants to WHO for core activities, and also by funding IHME, which works to improve the world's health monitoring infrastructure. At the same time, the Foundation disburses large grants to developing countries for health services delivery, playing a supportive role. Examples include the HIV prevention project Avahan in India, and the MACEPA malaria project in Zambia.

The Gates Foundation's grant portfolio thus includes funding for both core and supportive functions. The information provided on its web site and in its annual report only categorizes grants by disease area as shown in Table 9, making it difficult to estimate the funding allocated to each function. "Delivery" of vaccines, which occurs via grants to GAVI, is a supportive activity. "Discovery" includes vaccine and drug discovery and vector control, and is thus mostly in the domain of core activities such as research and development. "HIV" includes both research and development and service delivery (mostly through the Global Fund), and hence includes both core and supportive functions. "Infectious Diseases" covers both delivery to populations in need of support and research of improved treatment and delivery methods. "Policy and Advocacy" consists mostly of core activities, as it entails promoting awareness of urgent global public health issues and conducting policy analysis. "Family Health" has elements of a global good, including funding for research on maternal nutrition and fetal development, birth outcomes, and child development; but also includes large country-based projects in India,

Nigeria, and Ethiopia. Due to its multiple emphases on research, information, policy analysis[4], and delivery, the Gates Foundation provides mixed financing with respect to the essential functions framework.

Table 9: Gates Foundation Global Health Commitments*, 2010

	US$ millions	% total
Infectious Diseases (ID): Malaria	158.0	10.6%
ID: Tuberculosis	118.2	8.0%
ID: Pneumonia	83.2	5.6%
ID: Enteric and Diarrheal Diseases	83.0	5.6%
ID: Neglected and Other Infectious Diseases	79.5	5.4%
Delivery: Polio	278.5	18.8%
Delivery: Vaccines	114.7	7.7%
HIV/AIDS	212.0	14.3%
Family Health (FH): Family Planning	32.8	2.2%
FH: Maternal, Newborn, & Child Health	118.1	8.0%
FH: Nutrition	18.1	1.2%
Policy & Advocacy	105.1	7.1%
Discovery Cross-cutting	56.6	3.8%
Special Initiatives	27.7	1.9%
Total	**1,485.4**	**100.0%**

Source: Gates Foundation Annual Report 2010.
*Table reflects commitments, not disbursements.

USAID

USAID's 2010-2011 Progress Report to Congress disaggregates USAID's health budget by both region and program (see Table 10), but—similar to the IHME categories or budget line-items of organizations like the Gates Foundation—it is still difficult to definitively distinguish funding for core and supportive activities. Each program category does have a Global Health bureau component that is not region-specific, but the activities funded in these programs are functionally quite varied. As described on the Agency's website, the Global Health bureau "supports field health programs, advances research and innovation in selected areas relevant to overall Agency health objectives, and transfers new technologies the field through its own staff's work, coordination with other donors, and a portfolio of grants" (USAID 2013).

Global Health bureau activities include some core functions. For example, USAID's longstanding support of Demographic and Health Surveys (DHS) produces a key global public good (knowledge) used to analyze trends in population, disease, and service delivery; and shape policies at national and global levels. USAID funds scientific research across a large number of its health programs, but this represent a relatively small share of funding. USAID also plays a core role through its "Antimicrobial, Surveillance, & Other Infectious Diseases" and "Pandemic

[4] Policy analysis could fall under core or supportive functions in the framework—much policy analysis is country-specific and therefore more supportive, but policy analysis of global relevance may be included under core research or norm-harmonization activities.

Influenza" programs. The investments in these areas are focused on mapping and containing pandemic threats, an activity with large international externalities.

Table 10: USAID Health Budget*, FY 2010 (US$ millions)

	Bureaus							
Program Category	**Global Health**	**Democracy, Conflict, and Humanitarian Assistance**	**Africa**	**Asia & Middle East**	**Europe & Eurasia**	**Latin America & Caribbean**	**International Partnership**	**Grand Total**
Child Survival & Maternal Health	51.9		170.3	274.8	10.7	63.0	78.0	648.7
Nutrition	17.0		34.6	19.3		34.4	2.0	107.3
Vulnerable Children		13.0			3.3		2.0	18.3
HIV/AIDS	246.9		2,091.4	143.3	14.5	128.1	1,167.4	3,791.6
Malaria	55.0		519.0	6.0		5.0		585.0
Tuberculosis	34.5		77.3	86.5	17.5	18.2	15.0	249.0
Antimicrobial, Surveillance, & Infectious Diseases				37.3	5.4		65.0	107.6
Pandemic Influenza							201.0	201.0
Family Planning & Repro. Health	104.1		249.6	211.1	8.0	80.1	10.0	663.7
Grand Total	**509.4**	**13.0**	**3,142.2**	**778.3**	**59.4**	**329.5**	**1,540.4**	**6,372.2**

*Note that this table reflects budgeted funds, not expenditures, and does not include other USG agencies that provide DAH (e.g., CDC).

Beyond these areas, the majority of expenditure under the Global Health bureau falls into the international technical cooperation and development financing activities under the essential functions framework. Humanitarian Assistance is purely supportive, since USAID protects vulnerable groups and is "acting as an agent for the dispossessed." All health issue line-items (e.g., Child Survival and Maternal Health) include some research, but are mostly focused on delivery and are thus supportive - such as providing vitamin A supplements to infants, scaling-up malaria diagnosis and treatment interventions in priority countries, and delivering TB diagnostics and treatment.

In order to make a conservative estimate of the percentage of USAID funding that goes to core functions, it was assumed that 50% of "Global Health" expenditure and 80% of all regional expenditure is supportive. Excluding USAID funding that is allocated to international partnerships, these assumptions imply that at least 77% of its budget is spent on supportive functions and less than 23% on core functions.

Summary mapping of current DAH functions and selected actors vs. 1993

Table 11 maps core and supportive functions and activities to selected prominent actors in DAH. The table highlights several key findings. First, there has been growth in the number of actors carrying out essential functions in global health. Both number and breadth of sphere of action have increased, beyond the "traditional" actors that dominated in 1993.[5] Second, there was already overlap between functions provided by traditional actors in 1993, and there is even more overlap today. The row highlighted in red shows that every actor listed in the table plays a significant role in the core function activity of "consensus building on health policy," a role that may have formerly been expected to be the clear domain of the WHO. Thus, this is likely partly a response to a vacuum that needed to be filled, and a new richness of debate among different actors.

Finally, no actor or group of actors is solely focused on core or supportive functions, challenging any expectation or hypothesis that the essential functions may be distributed in accordance with actors' comparative advantages. Only three activities are limited to fewer than half of the actors listed here: harmonized norms, surveillance/border control, and provision of basic needs in failed state. This highlights the need for careful examination to assess whether there is inefficient duplication of activities in ways that do not add positively and significantly to global health outcomes.

[5] The table focuses on funding actors. There has also been tremendous growth in service delivery organizations, including a proliferation of NGOs. As early as 2003, for example, one-third of the Global Fund's funds were committed to NGOs (Copson and Salaam 2005).

Table 11: Global health organizations and essential functions, 1993 and 2013

Main functions of global collective action	Objective	Activities	Substantial role in the activity today?									
			Selected Actors (1993) (not exhaustive)				Selected New Actors Since 1993					
			WHO	World Bank	HIC Bilaterals	Foundations (non-Gates)	MIC Bilaterals	Global Fund	GAVI	UNITAID	Gates	Academics & Think Tanks
Core	Promotion of international public goods	Research and development (especially for problems of global importance)	✓		✓	✓					✓	✓
		Sharing information and databases for learning	✓	✓	✓	✓		✓	✓	✓	✓	✓
		Harmonising norms and standards for national use and international regulation	✓					✓	✓	✓		
		Consensus-building on health policy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Surveillance and control of international externalities	Border control, especially during epidemic outbreaks.	✓		✓							✓
Supportive	Act as agent for dispossessed or out of national self-interest	Provision of basic needs in failed states		✓	✓							
		Assistance in natural or artificial disasters	✓	✓	✓		✓				✓	
		Protection of vulnerable groups		✓	✓	✓	✓	✓	✓	✓		
	Support development	International technical cooperation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Development financing		✓	✓	✓	✓	✓	✓	✓	✓	

V. Reflections on a more complex DAH landscape

Section II of this paper reviewed IHME data on the increase in overall DAH and shifts along regional and disease-based lines, and Section IV showed suggestive evidence of a shift toward (or at least large current emphasis on) supportive functions relative to core functions by several large global health organizations. Before concluding and pointing to implications and questions for the future, this section briefly reviews some better-known critiques of the DAH landscape, and counters with some less-familiar potential advantages, all of which are important considerations in shaping future DAH.

Critiques of the new landscape

Alongside the impressive expansion in DAH since 1990, there have been many critiques of the new DAH landscape, including seven major criticisms described in a forthcoming review by Moon and Omole (2013). The first of these is that, despite remarkable increases, flows of DAH are still inadequate. A 2009 report by the Taskforce on Innovative International Financing for Health Systems estimated a US$10 billion per year shortfall just for MDG-related health areas. While there is widespread consensus that financial resources are insufficient in poor countries, there is far less consensus about whether funding gaps in middle-income countries should be a priority for DAH—a distinct issue we address in Box 1.

Moon and Omole then detail additional criticisms, as follows. First, volatility of financing flows debases the value of aid, interrupting health services and interfering with planning (Kharas 2008). Second, DAH may displace domestic spending for health, but empirical evidence is inconclusive and must in any case account for how displaced funds are invested (Pettersson 2007; Farag, Nandakumar et al. 2009; Garg, Evans et al. 2012). Third, priority-setting in DAH often favors donors over recipient countries (Ollila 2005; OECD 2011), and should be better-informed by disease-burden analysis (e.g., leading to greater investment in non-communicable diseases) (Sridhar 2010). Fourth, a lack of coordination among the rising number of DAH actors results in inefficiency, duplication, policy confusion, inequalities in assistance, and infringement of recipient sovereignty. Fifth, accountability is undermined by the vast number of actors, which makes it difficult to identify who is responsible for health outcomes.

Box 1: The "grand convergence" and the middle-income country dilemma

The "grand convergence" is a recently-articulated goal among global health leaders to close the gap in preventable mortality and infection between the top and bottom quintiles of the world's population. A key challenge is that achieving the grand convergence will require substantial progress in middle-income countries (MICs), but without large amounts of DAH, which is largely directed to low-income countries and has plateaued since 2010.

While the supportive activities of many global health organizations (e.g. PEPFAR) target low-income countries, MICs bear the brunt of mortality, as shown below. More than half of all under-5 deaths in 2010 occurred in lower middle income countries, and over three-quarters of all tuberculosis deaths were in upper and lower middle-income countries. Overall, middle-income countries are home to 74% of the world's poor and bear over half of the global burden of disease. MICs are unable to access large amounts of DAH. India, for example, accounts for 22% of global DALYs lost, but received less than 3% of total DAH in 2010.

% of global deaths by World Bank country income category					
	HIC	*UMIC*	*LMIC*	LIC	All
Under-5 (all causes)	1	*10*	*55*	34	100
Tuberculosis	1	*11*	*65*	23	100
Malaria	0	*1*	*46*	53	100
HIV/AIDS	1	*28*	*36*	35	100

Note: Calculations based on IHME Global Burden of Disease data, 2010

Using DAH to MICs strategically and mobilizing domestic financing for health in MICs are thus critical challenges. Both core and supportive activities could be part of the response. Core activities (and examples) such as setting norms and standards (WHO vaccine position papers), generating and transferring knowledge (protocols on LLIN procurement), promoting intellectual property sharing (patent pools), and shaping markets (UNITAID procurement pools) can all boost the efficiency and effectiveness of domestic health spending in MICs. Targeted supportive activities can facilitate technology transfer (vaccine technology), help build sustainable institutions (South Africa Public Health Institute), and use innovative financing to incentivize MIC-led results (World Bank interest rate buy-downs for polio results in Nigeria).

The successes and advantages of the new landscape

Given the many critiques of the increasingly complex DAH landscape, it is easy to overlook some major advantages of today's system relative to landscape observed by the authors of the World Development Report in 1993.

In the capstone article of a four-article series on the global health system, Moon, Szlezák et al. (2010) note successes across their five "core functions" of the global health system. Under the first function, agenda-setting, they point to the crucial role WHO played in launching the Roll-Back Malaria Partnership and coordinating the 2008 Global Malaria Action Plan. For financing and resource allocation, they cite the Global Fund's role in enhancing coherence and streamlining oversight of funding for its priority diseases (e.g., lightening reporting requirements for national health systems overloaded by multiple funding streams). The third function, research and development, is benefiting from investments made in human resources for health in the 1970s in the form of increased participation by scientists from the global South in the development of health technologies, and Product Development Partnerships offer new ways of organizing and financing R&D to accelerate the creation of more affordable and suitable drugs, vaccines, and diagnostics for low and middle income countries. Moon, Szlezák et al. (2010) are more circumspect about successes in the fourth function, implementation and delivery, given large remaining challenges in strengthening national health systems, but even here point to remarkable progress (for example, in malaria reduction in Eritrea, Ethiopia, and Rwanda) and one could also cite many instances of national health finance and system strengthening in the past decade following policy promotion by scholars, donors, WHO, and the World Bank.

There is the least positive assessment of the fifth function, monitoring and evaluation, due to longstanding lack of consensus, funding, and effective global management for operational research. Here, positive innovations include the Institute for Health Metrics and Evaluation's (IHME) databases, the WHO's Health Metrics Network, International Initiative for Impact Evaluation, and several South-based epidemiological networks.

Beyond these specific successes, the WDR+20 DAH landscape and its many new actors and modalities discussed in this paper may convey a number of advantages over the simpler landscape of 1993, including competition in provision of core and supportive functions, which generates innovation and choice. First, DAH has arguably been one of the most innovative sectors of international development over the past twenty years, both in terms of financing (including mobilization, pooling, and allocation) and in development and delivery of health best practices and technologies. The four new financing modalities discussed here (Debt2Health, AMCs, IFFIm, and (PRODUCT)RED) are just a few of a wide array of new ways to raise, coordinate, and target funding. See the Taskforce on Innovative International Financing for Health Systems report (Fryatt and Mills 2010) for more relevant examples.

Second, the new, more diverse landscape offers more choices for nearly all stakeholders in pursuing health goals and influencing the global health agenda. DAH recipients have gained new possibilities for seeking solutions to pressing health problems, such as GAVI's IFFIm for essential vaccine technologies, and a host of new agenda-setting forums beyond the World Health Assembly (e.g., WTO rounds, international health conferences). Indeed, low-income

countries can now turn to a much wider range of public and private donors for funding than was available in 1993, more external institutions for policy advice, and many more providers of technical assistance. There are also new regional alliances among BRICS and other middle-income countries, giving less developed countries an opportunity to exert greater influence over global health policy and on how donor assistance is spent within their borders (CSIS 2010).

A third feature of the new DAH landscape, shown here by the mapping of new actors and modalities to core and supportive functions in Table 11, is often interpreted as disadvantageous "duplication" of functions; but may be advantageous competition in the production and delivery of vital goods and services for global health. Especially with a proliferation of think tanks and academic institutions joining the research efforts of the large global health organizations (Bennett, Corluka et al. 2012), there is increased capacity to detect and share lessons learned from multiple organizations working on similar problems. These think tanks and policy research organizations, including many located in developing countries, are generating a wide range of data, analysis, and recommendations for global and national health policies and programs.

VI. Conclusions

This paper explores the changes in DAH since 1993 using a framework for global collective action in health. Several key findings emerge. First, there has been a dramatic increase and shift in the distribution of DAH. DAH funding has nearly quintupled since 1990, is channeled through several large new organizations, has shifted regionally (especially toward sub-Saharan Africa), has adjusted to a changing global disease burden (most notably in response to the AIDS epidemic), and is being sourced from new donors and modalities of revenue generation.

We unified frameworks from Jamison et al. (1998) and Frenk and Moon (2013) to strategically assess how DAH is allocated to essential functions for global health. While the assessment is preliminary and has clear limitations, we find the financial resources of most of the largest and most prominent DAH actors today seem to be allocated mainly to supportive functions. This is contrary to the expectation that DAH would be increasingly devoted to core functions as low-income countries' economies grow over time. Perhaps the clearest symbols of this trend are the substantial increase in World Bank funding for health contrasted against much slower growth in the WHO budget, the increase in funding from PEPFAR, and the creation and expansion of the Global Fund, GAVI, and UNITAID, which perform mostly supportive functions.

Qualitatively, as illustrated in Table 11, there are clear overlaps in core and supportive functions across a large number of actors in DAH today, and the overall landscape of functions and actors is much more diverse than in 1993. This intra-organization mix of core and supportive functions runs contrary to the idea that organizations should specialize exclusively and focus on activities within a specific domain of global health.

This new, more complex landscape has generated criticisms of DAH. These focus on continued funding gaps (especially for emerging chronic diseases) and problems of volatility, coordination, accountability, and priority-setting, leading to calls for reform. However, there may also be less well-documented advantages to the growing diversity and competition among global health

actors, such as the innovation they generate and the quality of choices they offer to funders and to low- and middle-income governments.

It is difficult to say whether the advantages of the new DAH landscape outweigh the disadvantages, partly due to the lack of any credible counterfactual for such a complex system. We cannot know, for example, what the state of global health would have been had the WHO and World Bank retained funding and managerial control over activities that the Gates Foundation, IHME, Global Fund, and others now provide. Acknowledging the more widely accepted criticisms of complexity, we suggest that a simpler, less diverse landscape may not have yielded so many innovations in financing and technical solutions, increases in choice and voice for recipient countries and civil society, and protection against potential failure of a single organization to provide vital functions.

Finally, this assessment raises some key challenges and questions for the future agenda of development assistance for health. First is a call for a different kind of DAH tracking. There have been impressive and useful improvements in the global health community's ability to track DAH funding since the early 1990s. More detailed, regular, and higher quality tracking of funds by channel, disease group, geographic region, and source is now accessible and continually being improved. But these categories cannot inform assessments of whether DAH is performing the essential functions of global collection action for health, and whether the distribution of funding across essential functions is appropriate. There is a need to develop ways of tracking DAH according to a functional framework like the one presented here, which links funding to essential functions to desired end results. Going forward, we recommend analysis of trends in expenditure on core and supportive functions, the efficiency of such spending, and the trade-offs between investing in various functions.

Beyond tracking funds by function, strategic planning is needed to ensure the provision of essential functions by global health organizations in the future. As the 2015 endpoint for the MDGs nears, a consensus is emerging in the global health community around a "convergence" agenda that aims for the near elimination of preventable health disparities between high-income countries and low-income countries by 2035. This is spurring the creation of investment agendas for priority conditions such as maternal and child health, AIDS, malaria, and tuberculosis, as well as calls for DAH to focus more on the non-communicable disease burden in low and middle-income countries—all of which have a heavy emphasis on delivery and other supportive functions. Given the importance of core functions, and the expectation that DAH should increase emphasis on core functions with economic development, it is also necessary to develop a post-2015 investment agenda for core functions.

Questions that must be addressed in such a strategy include: 1) What should the targets and time horizon for increasing core functions be? 2) Which organizations should take lead roles in certain functions? 3) What levels of funding are required to ensure key core function goals (e.g., pandemic surveillance, research milestones for global priority diseases, etc.) are accomplished? And 4) What kinds of supportive activities are most likely to build national health systems' capacity and reduce dependence on external assistance?

The role of the WHO is another key question in guiding future global collective action in health. Table 11 shows that WHO competes in a crowded market for the production of global public goods, and raises questions of whether a centralized coordinator or steward is needed to harmonize the actions of the many actors currently involved in core functions. Bloom (2011) is one proponent of such an approach, writing that "the world urgently needs an organization that can convene the best expertise and provide a centralized resource for health-related knowledge." Others have stressed the uniqueness of the WHO as the only international organization whose rulemaking powers can carry the weight of international law (Sridhar and Gostin 2011), which they see as a critical ingredient in ensuring global collective action. Many have called for WHO reforms to improve collective action for global health. Perhaps the clearest change necessary from our findings is reversing the trend toward voluntary, extra-budgetary support, which tends to focus on country and disease-tailored supportive activities, rather than core functions.

The unified framework of essential functions for global collective action for health is useful in assessing functional shifts in DAH since 1990, but it does not provide a way to benchmark the efficiency or effectiveness of one distribution of core and supportive functions against counterfactual distributions. Our final conclusion is that the global health community needs new ways to assess the trade-offs between investing in supportive versus core functions, and whether one institutional division of labor for global health is superior to another.

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