WHO and the future of disease control programmes

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Huge increases in funding for international health over the past two decades have led to a proliferation of donors, partnerships, and health organisations. Over the same period, the global burden of non-communicable diseases has increased absolutely and relative to communicable diseases. In this changing landscape, national programmes for the control of HIV/AIDS, tuberculosis, malaria, and neglected tropical diseases must be reinforced and adapted for three reasons: the global burden of these communicable diseases remains enormous, disease control programmes have an integral and supporting role in developing health systems, and the health benefits of these control programmes go beyond the containment of specific infections. WHO's traditional role in promoting communicable disease control programmes must also adapt to new circumstances. Among a multiplicity of actors, WHO's task is to enhance its normative role as convenor, coordinator, monitor, and standard-setter, fostering greater coherence in global health.

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Introduction

The international health business is bigger than ever. Over the past 20 years, and particularly in the past 10 years, development assistance for health has increased nearly five times, reaching at least US$27 billion in 2010.[1] This huge increase has supported all areas of health, especially control of HIV/AIDS, malaria, and tuberculosis. Within the past decade, domestic expenditure on health per head has increased in almost all countries.[2] International health spending has also increased, made possible by a huge proliferation in donors, global funds and partnerships, non-governmental and civil society organisations, philanthropists, commercial investors, and the engagement of the pharmaceutical industry. Economic recession has stalled this expansion in global health spending, but a return to the funding patterns of the 1990s is unlikely. Today, channelling available resources through a multitude of organisations aimed at tackling selected health problems raises profound questions about the focus of health spending and the role of WHO.

Surveying this crowded landscape, and bearing in mind the growing importance of non-communicable diseases, we spell out the reasons for maintaining and expanding effort in the control of HIV/AIDS, tuberculosis, malaria, and neglected tropical diseases. First, the global burden of these chronic infectious diseases is still enormous. Second, although established control programmes are reducing the burden of disease, these programmes need to be maintained, expanded, and adapted as an integral part of national health systems. Third, the health benefits of these control programmes go beyond the containment of specific infections.

Underpinning efforts to tackle these major communicable diseases, WHO has an established role in devising, sustaining, and scaling up interventions. WHO has never operated in isolation, but there is now an even greater need to work as part of a growing family of collaborators. Within this family, WHO needs to expand its role as convenor, coordinator, and monitor, pursuing better outcomes in the control of communicable and non-communicable diseases, and promoting greater coherence in international health.[3]

The double burden

Through expert consensus based on scientific evidence, WHO has had a leading role in formulating strategies and setting standards for the control of AIDS, tuberculosis, malaria, and neglected tropical diseases (figure 1). These strategies have demonstrably improved health, yet the double burden of communicable and non-communicable diseases will continue to be a global health challenge for many decades.[9–11] WHO projects that the annual death toll from non-communicable diseases will roughly double from 43 million in 2010 to 83 million in 2050, whereas deaths from communicable diseases are expected to fall very slowly (from 15 million to 13 million).[2]

AIDS, tuberculosis, and malaria are together responsible for 4 million deaths annually. AIDS and tuberculosis are, respectively, the first and third leading killers of women of reproductive age. The incidence of HIV infection and AIDS-related deaths have peaked in many countries,[4] but it is not clear how rapidly infection and death rates will fall in the coming years. About half of all HIV-positive people who are eligible for antiretroviral therapy do not receive it.

Millions of lives have been saved through appropriate tuberculosis care, and the number of people developing tuberculosis probably peaked in the mid-2000s, but the decline in case load is much slower than the expected 5–10% per year.[6] Antibiotic-resistant forms of tuberculosis (multidrug resistant and extensively drug resistant strains) jeopardise control programmes in settings where first-line and second-line drugs are misused.[12] Most patients with multidrug resistant tuberculosis are not given appropriate treatment.

Malaria cases and deaths have begun to fall in parts of Africa, Asia, and the Americas,[13] partly as a result of scaling up vector control, diagnostic testing, and effective treatment with artemisinin-based combination therapy; however, conservative calculations suggest that there were still 216 (149–274) million malaria cases and 655 000 (537 000–907 000) deaths in 2010.[14] Malaria interventions are effective when population coverage is high, but resurgence is a threat when coverage falls.

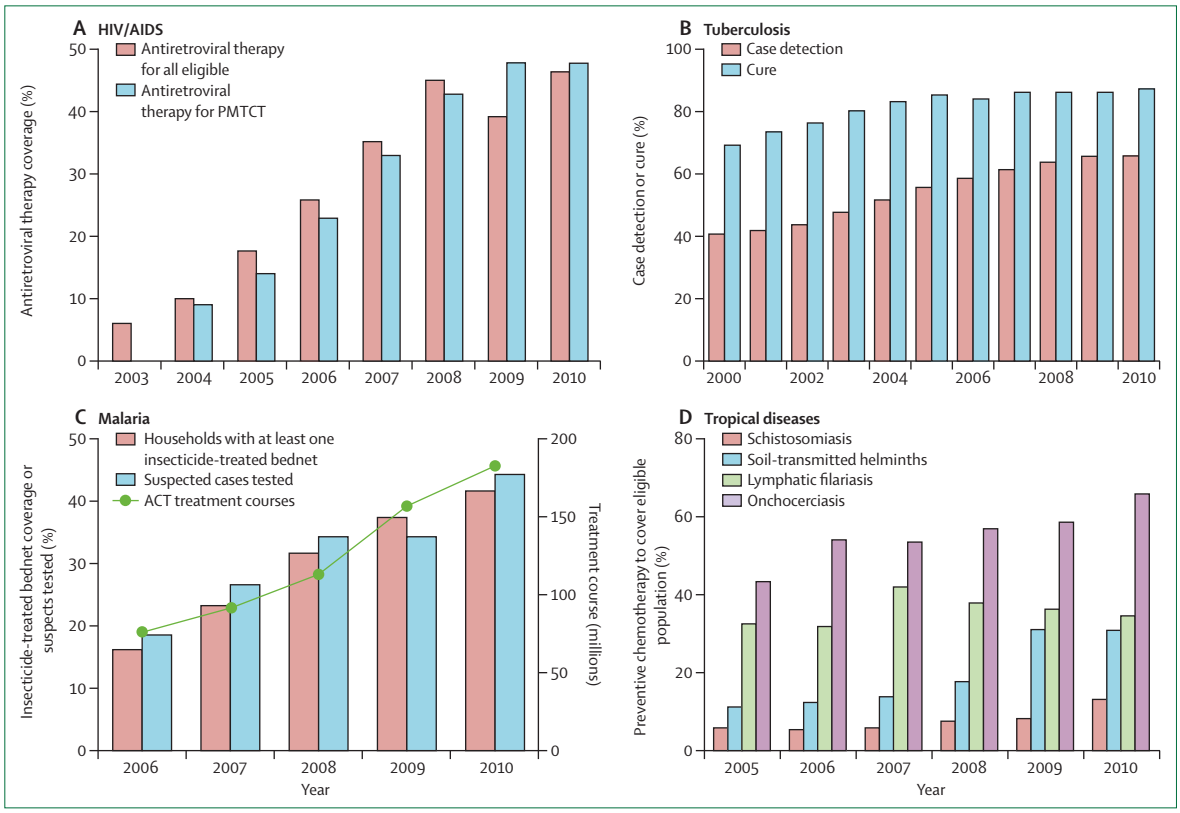

Figure 1: **WHO interventions for the control of HIV/AIDS, tuberculosis, malaria, and neglected tropical diseases**
(A) Since the beginning of the HIV/AIDS pandemic, WHO and partners have established requirements for prevention and care, defined standard drug treatment regimens, monitored progress, and had a key role in reducing drug prices. WHO's 3 by 5 initiative (getting 3 million people on treatment by 2005) provided the first push towards large-scale treatment with antiretroviral drugs in low-income countries. The target was achieved in 2007, and the momentum behind 3 by 5 led to more than 5 million people receiving treatment by the end of 2009, substantially cutting the death rates of people living with HIV infection.[4,5] For antiretroviral therapy for all eligible individuals, the denominator was all infected people with CD4 cell counts of 200 cells per μL or lower in 2003–08, and 350 cells per μL or lower in 2009–10, hence the apparent fall in coverage between 2008 and 2009. For PMTCT with antiretroviral therapy, the numerator in 2010 excludes treatment with single-dose nevirapine. (B) In the early 1990s, WHO and the International Union Against Tuberculosis and Lung Disease set out the essential components of drug treatment for tuberculosis in the five-point DOTS strategy that has since been adopted worldwide, averting an estimated 7 million tuberculosis deaths between 1995 and 2010.[6] (C) For malaria, WHO has helped build consensus around the best procedures for containing resistance to artemisinin, including the need for accurate diagnostic testing and treatment of confirmed infections with ACT.[7] Malaria vector control has been enhanced by recommending that insecticide-treated bednets to be used by adults and children; 280 million long-lasting insecticide-treated bednets were distributed in Africa from 2008–10, enough to protect 73% of the population at risk. Data on household coverage with insecticide-treated bednets and on suspected cases tested are for WHO's African region. Data on ACT treatment are for the world. (D) For highly-prevalent helminth infections, early presumptive treatment is much better than attempting to cure advanced disease. WHO has helped broker the donation of broad-spectrum anthelmintics by pharmaceutical companies, which are now used in mass treatment campaigns against lymphatic filariasis, onchocerciasis, schistosomiasis intestinal nematodes, and trachoma. Building relationships between industry donors and UN agencies catalysed the provision of treatment to 705 million people in 2009.[8] PMTCT=prevention of mother-to-child transmission. ACT=artemisinin-based combination therapies.

In 2009, 705 million of all the people estimated to require treatment had been reached with medicines for at least one of the four diseases—lymphatic filariasis, onchocerciasis, schistosomiasis, and soil-transmitted helminthiases.[8] In spite of this achievement, hundreds of millions of people remain at risk of acquiring other parasitic infections, and hundreds of millions are already infected.[15,16] Donations of medicines, particularly praziquantel, will rise to 250 million tablets annually by 2016. This will be sufficient to regularly treat all school age children in sub-Saharan Africa.[8] Despite this generosity from donors, we are still a long way from reaching WHO's target of deworming at least 75% of all children at risk (figure 1).

In summary, disease control programmes resulting from collaboration of national and international agencies, including WHO, are reducing the burden of communicable diseases; however, these efforts need to be reinforced, adapted, and expanded to have still greater impact. As evidence emerges on the repurposing of old methods and the efficacy of new interventions, WHO guidance is needed on issues such as use of malaria vaccines, use of antimalarials for transmission blocking, new antimalarial regimens for preventing malaria during pregnancy, seasonal malaria chemoprevention, antiretroviral treatment for prevention of HIV infection, rapid diagnostics and drug combinations for treatment of drug-resistant tuberculosis, and

monitoring and evaluation across the spectrum of communicable diseases.

Disease control programmes within national health services

Effective national health services embrace disease control programmes in low-income and high-income countries. In 1966, Halfdan Mahler (later Director General of WHO) proposed that tuberculosis programmes should be integrated within health services, each strengthening the other.[17] In China, tuberculosis control is the responsibility of the National Center for Tuberculosis Control and Prevention, but the success of the programme depends on links with the rest of the health system. Increases in tuberculosis case notifications from 2003 onwards were associated with foreign and domestic funding for tuberculosis control, and with wider improvements in health services; as a result, China met WHO implementation targets by 2005. Novel health financing mechanisms have greatly extended health-care coverage in China, to the benefit of patients with tuberculosis.[18] The persistently high burden of tuberculosis in China has been a focus for investment in health and, in turn, new health financing mechanisms have strengthened tuberculosis control.

For malaria, the scale-up of intermittent preventive treatment in pregnancy has strengthened a package of services known as focused antenatal care. Additionally, the drive for universal diagnostic testing of suspected malaria has reinforced management of all febrile illnesses at the facility level, and the acceleration of community-based diagnosis and treatment of malaria at the periphery of health services has helped tackle two other childhood killers—pneumonia and diarrhoeal disease.

With the recognition that stronger health systems can enhance the effectiveness of disease control programmes, and vice versa, the next step is to investigate pragmatic ways to maximise the mutual benefits. Not all integration attempts have been immediately productive,[19,20] but the progressive approach is to test, evaluate, and adopt or adapt. An example of success is the incorporation of HIV interventions into maternal and child health services. These services include HIV testing and counselling for pregnant women and for those considering pregnancy, and the provision of antiretroviral treatment and counselling on infant feeding to reduce the risk of vertical transmission. Such interventions have the potential to eliminate HIV transmission to infants in low-income and middle-income countries, as in high-income countries.[21] There is increasing evidence that prophylactic triple antiretroviral therapy during pregnancy and breastfeeding safely reduces mother-to-child HIV transmission.[22] However, in low resource settings, care of HIV-infected mothers and their babies beyond pregnancy and delivery is still inadequate. More evidence on how best to integrate communicable disease control programmes within health services will be presented in WHO's 2013 world health report on universal health coverage.

WHO supports the building of stronger and more resilient national health systems that provide equitable access to essential services with financial risk protection.[23] WHO also provides practical guidance for integrating and strengthening disease control programmes and health services. New evidence is available in the following areas: combining interventions against AIDS, tuberculosis, malaria, and neglected tropical diseases;[24,25] comanaging tuberculosis and HIV infection[26] and tuberculosis and diabetes;[27] controlling communicable disease through private and public health facilities;[28] integrating HIV and malaria diagnosis and treatment within the management of childhood illness at facility and community levels,[29] generating new public policies in intersectoral prevention work; and using disease control to promote social equality and educational development.[30] The large-scale delivery of single-administration medicines by non-medical personnel (teachers, volunteers, or community drug distributors) for the control of neglected tropical diseases[31] is an innovative approach in primary health care, which is based on practical and socially acceptable methods and is universally accessible through community participation.[32]

The sharing of decades of experience among experts on communicable and non-communicable diseases is leading to new policies that combine the prevention and treatment of both—for example, in expanding existing services for HIV care to cervical cancer prevention.[10,33] The implementation of these novel, joint strategies requires adjustments to health systems,[19] but there is mounting political impetus to make the necessary changes.[34]

Better health beyond the control of specific diseases

Communicable disease control programmes have gained from general improvements in health and health services. Reciprocally, interventions against specific infections have returned wider benefits for health. UN Millennium Development Goal (MDG) 6 is to combat HIV/AIDS, malaria, and other diseases, meeting specific targets by 2015. Progress towards this goal accelerates progress towards other MDGs.[35] The control of human African trypanosomiasis and onchocerciasis has prevented death and chronic illness attributable to these diseases, and has also contributed to agricultural productivity (MDG 1). For children potentially infected with schistosomes and intestinal worms, drug treatment eliminates infection, improves nutrition, helps alleviate hunger (MDG 1), and boosts educational attainment (MDG 2). More than 100 million infants are vaccinated with BCG each year, markedly reducing meningeal and disseminated tuberculosis as causes of child mortality (MDG 4). Antiretroviral therapy offers the possibility of eliminating new HIV infections among children within a few years (MDG 4). Insecticide-treated bednets not only kill and repel mosquito vectors of malaria, but also seem to prevent child deaths

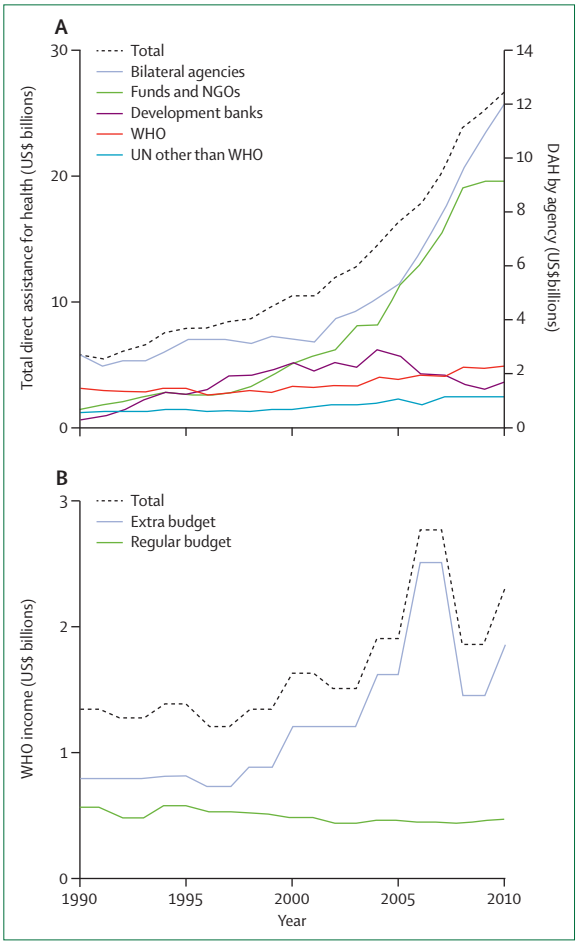

Figure 2: **International health financing, 1990–2010**
(A) Direct assistance for health totalling US$27 billion in 2010 (left axis; dashed line), was delivered through five groups of agencies (right axis; solid lines). Resources at the disposal of WHO increased 60% over the 20-year period (red line), but were a diminishing fraction of the total. (B) Income to WHO, showing a decline in the regular budget (unconditional subscriptions from member states) and a growing dependency on unstable, extrabudgetary funding (voluntary contributions from donors, often earmarked for specific projects). Recent fluctuations are due to a surge in income for partnerships hosted by WHO in 2006–07, followed by closure of major initiatives, including 3 by 5, in 2008–09.[1,41] NGO=non-governmental organisations.

beyond those directly attributable to malaria (MDG 4).[36] Intermittent preventive therapy for malaria during pregnancy is a key element in malaria control, and in improving maternal health (MDG 5), although the extent of this intervention has remained disappointingly low; the same is true of HIV testing and antiretroviral therapy delivered through antenatal clinics. Control of neglected tropical diseases contributes to reducing child mortality (MDG 4) and improved maternal health (MDG 5). Additionally, better health for women promotes gender equality and female empowerment (MDG 3).

Seeking a more inclusive approach to public health, WHO has collaborated with a range of stakeholders to support the development of new agencies and partnerships

Panel: **Role of WHO in public health; six core functions**

- Providing leadership on crucial health matters and engaging in partnerships where joint action is needed
- Shaping the research agenda and stimulating the generation, translation, and dissemination of valuable knowledge
- Setting norms and standards, and promoting and monitoring their implementation
- Articulating ethical and evidence-based policy options
- Providing technical support, catalysing change, and building sustainable institutional capacity
- Monitoring the health situation and assessing health trends

(MDG 8), including UNAIDS, the Stop TB Partnership, the Roll Back Malaria Partnership, the Medicines for Malaria Venture (MMV), UNITAID, the Global Fund to Fight AIDS, Tuberculosis, and Malaria, the African Program for Onchocerciasis Control (APOC), and the Global Alliance for the Elimination of Lymphatic Filariasis (GAELF). These new alliances are a result of greater awareness and funding for global health; the objective policy guidance and technical advice they receive from WHO remains fundamental to their success.

In 2010, the first WHO report on neglected tropical diseases highlighted the gains and challenges in preventing, controlling, eliminating, and ultimately eradicating 17 neglected tropical diseases, triggering a wave of additional pledges from the private sector.[20] Despite a global financial crisis, almost all of these pledges have been met, enabling member states, WHO, and its partners to accelerate the implementation of control programmes. Additional commitments from the public sector, bilateral donors, and major foundations are needed to strike the right balance in achieving the targets for control and elimination of several neglected tropical diseases.

WHO among partners

National governments, civil society, financial donors, private foundations, the corporate sector, and technical agencies turn to WHO for impartial, authoritative guidance on all aspects of health. Accountable to member states and to its donors, WHO is the principal agency charged with convening interested parties, in a disinterested way, to determine the best possible approaches to improving health, and with monitoring success as an independent scorekeeper.

WHO must adapt to changing times. To maintain and enhance its normative role, WHO is strengthening partnerships with member states and traditional partners, such as UNICEF and the World Bank, and also with foundations, organisations, and corporations that serve a wide range of functions in public health.[3] For example, the Global Alliance for Vaccines and Immunisations (GAVI) is a collaboration among public and private health agencies to improve access to immunisations in

developing countries. WHO's role is to carry out the normative work that underpins successful immunisation programmes, including facilitating research and development, setting standards and regulating vaccine quality, and marshalling the evidence to guide vaccine use and maximise access. Funding for WHO's work on immunisation is not exclusively provided by GAVI, and the cost of WHO's work as part of the alliance is only 3–5% of GAVI's annual expenditure on immunisation. WHO is building similar strategic partnerships to further develop and advance strategies for control of AIDS, tuberculosis, malaria, and neglected tropical diseases.[15,37–40]

As with any other organisation, WHO needs proportionate and predictable resources to do its work. Between 1990 and 2010, development assistance for health increased by 475% overall, whereas funds channelled through WHO increased by only 62%.[1,41] Thus, WHO has commanded a diminishing fraction of health resources, falling from 25% to 9% over this 20-year period (figure 2A). As an added constraint, the increased income received by WHO over these two decades was entirely based on voluntary grants and donations, and it has been unpredictable (figure 2B). These voluntary funds are often earmarked by donors to address topical health issues, such as emerging pathogens and new technologies. As a result, WHO's core budget to carry out key functions (panel) has slowly decreased since 1990 (figure 2B), even though demand for the organisation's expertise is at an all-time high.

The diversity of funding sources and current economic austerity are challenges for WHO and for all health organisations. However, WHO's role in devising, promoting, and monitoring disease control programmes needs to be shaped, not around temporarily reduced budgets of donors, but according to the vastly expanded landscape of international health. In this new terrain, WHO's task is to enhance its role as convenor, coordinator, and monitor in the assault on communicable diseases—setting standards and norms for control programmes, helping to build the health services that encompass these programmes, and amplifying their wider benefits for health and development.[3]

Contributors

All authors conceived the report, discussed and agreed on the content, and approved the final version. CD wrote the first draft. CD, TM, GH, WM-S, RDN, MCR, and LS collated and analysed data and prepared the figures.

Conflicts of interest

All authors are employees of WHO.

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