

KEY FEATURES

- Health care delivery is constrained by a lack of overall resources in low-income countries.
- In these settings, the entire health system is under-resourced, leading to multiple challenges in addressing the burden of disease.
- Understanding the key components of a health system helps clinicians working in low-resource settings to better manage barriers to health care delivery and to strengthen the overall health system.
- There has been significant progress in the past decade in bolstering health systems in low-income countries.
- Ensuring health equity and universal health coverage are pressing issues on the global health agenda.

INTRODUCTION

Despite many tropical nations' abundance of natural resources, for historical, political, and economic reasons too numerous to adequately discuss here, many of these nations rank among the world's poorest, and consequentially their health systems are significantly constrained by a lack of resources. When working in high-income settings, health care providers are often unaware of the many inputs necessary to create the service delivery platforms that facilitate their clinical work because all of those inputs are present, often in abundance. In low- and lower-middle-income countries, this is not the case. Clinicians working in these settings benefit from a system-level understanding of how health systems are structured so that they are better able to effectively deliver care despite severe resource limitations.

The World Health Organization (WHO) defines a health system as all organizations, people, and actions whose *primary intent is* to promote, restore, or maintain health.¹ The WHO also provides a helpful framework for understanding health systems based on six essential building blocks (Fig. 28.1): (1) leadership and governance, (2) health care financing, (3) health workforce, (4) medical products and technologies, (5) information and research, and (6) service delivery. We will examine each of these in more depth.

LEADERSHIP AND GOVERNANCE

Governance of the health system involves ensuring that actors and organizations within the system are accountable to the populace. To do this, governments create policies, regulations, and enforcement mechanisms that guide and control how organizations interact and function within the health system. Ideally, the government creates a policy and regulatory environment that facilitates and ensures the health system is achieving its primary goals, which are generally agreed to be (1) improved population health and health equity, (2) responsiveness to the needs of the population, (3) financial risk protection, and (4) improved efficiency. In many nations, the Ministry of Health (MOH) is the primary governmental agency responsible for the governance of the health system. The MOH is often responsible for regulating health professionals,

health facilities, pharmaceuticals, health insurers, and health-related research and information.

In many low-income nations, where donor agencies and non-governmental organizations (NGOs) have key roles in financing and providing health care, the MOH also plays a key role in donor coordination and strategic management of NGOs' efforts. For example, for disease control programs in HIV and malaria that are funded by a number of external donors and implemented by both the MOH and international and domestic NGOs, "the principle of the three ones" is used almost universally. This concept was first developed in 2004 by UNAIDS to guide HIV/AIDS program scale-up.² It refers to three key coordinating mechanisms for program implementation:

- One national strategic and operational plan
- One national coordinating mechanism/authority
- One national monitoring and evaluation system

These guiding principles have facilitated scale-up of disease control efforts globally by allowing coordination of multiple actors in the health system and providing a framework for collaboration among them. By supporting these principles, international donor organizations have strengthened the role of the MOH as the central governing body within national health systems.

Although policy setting and national strategic planning remain core functions of the MOH, a key issue in health system governance is the degree of centralization versus decentralization of strategic, managerial, and financial decision making. As a remnant of the colonial history of many low-income nations in the tropics, these functions were traditionally highly centralized within national offices located in capital cities. These central offices would dictate how resources would be allocated in detail at the local level. Although this system allowed for tight control of decision making and resource allocation by central authorities, it is generally regarded as inefficient and unresponsive to local needs. For years, many policy experts have been advocating for decentralization of these functions to the local level to improve efficiency, accountability, and quality.^{3,4} Most countries have attempted to implement decentralization with varying degrees of success. In well-functioning decentralized systems, local officials are given the authority to allocate resources in response to local needs, and they have been taught the skills and capacities to do this effectively.

HEALTH CARE FINANCING

Health systems require financial resources to accomplish their goals. The major expenses of most health care systems are human resources, care at hospitals, and medications. In most tropical nations, health care financing is supplied by a mix of governmental spending, private (mostly out-of-pocket) spending, and external aid.

For the low- and lower-middle-income nations, health care financing remains a significant challenge. Many upper-middle-income nations across Latin America, Africa, and Asia have been able to provide financing mechanisms for health that cover significant portions of their populations. These mechanisms both ensure access to health care and protect individuals against catastrophic debt for accessing health services. However, in low-income nations (the majority of which are in sub-Saharan Africa), financing is a major barrier to health care delivery. In 2015 over 50 nations spent less than US\$100 total per capita on health.⁵ Among the

THE WHO HEALTH SYSTEM FRAMEWORK

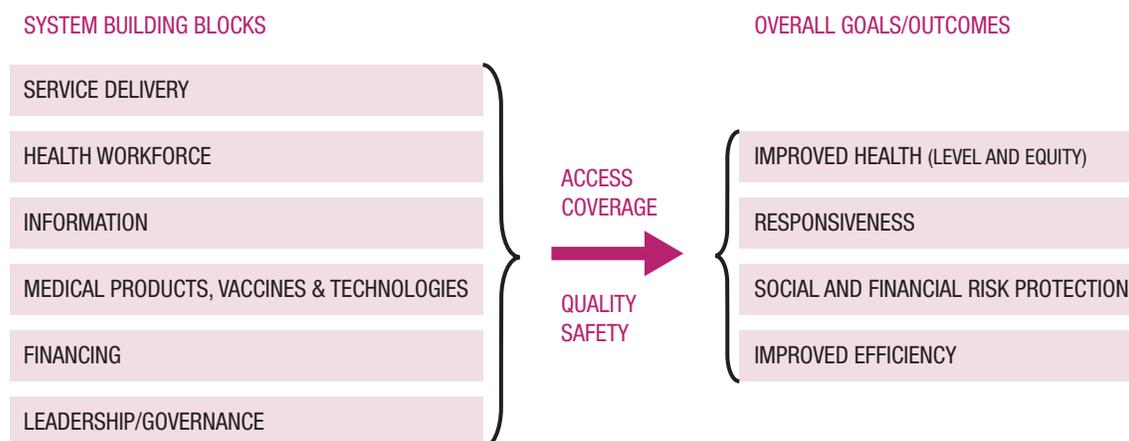


Fig. 28.1 The WHO health system framework. (Reprinted by permission from the WHO from Everybody's business: strengthening health systems to improve health outcomes: WHO's framework for action. Geneva, World Health Organization, 2007, p3.)

TABLE 28.1 Expenditures on Health

World Bank Country Classification	Average GDP per Capita (2014 US\$)	Average Health Expenditure per Capita (2016 US\$)	Average Out-of-Pocket Health Expenditures (% of Total Health Expenditure)	Average Health Expenditure, Public (% of Total Health Expenditure)
Low-income	615	37	37%	42%
Lower middle-income	2075	92	36%	37%
Middle-income	4781	290	36%	52%
Upper middle-income	7937	519	32%	55%
High-income	40,677	5,266	13%	62%

Data compiled from World Bank database, available at <https://data.worldbank.org/>.

31 World Bank–classified, low-income countries, the average per capita spending on health was only US\$37 in 2015.⁵ This is compared with middle-income countries that spent on average US\$290 per capita and high-income countries that spend an average of US\$5266 per capita. The major reason for this discrepancy is the lack of financial resources in low-income countries. The 31 World Bank–classified, low-income nations have an average per capita gross domestic product of US\$615—a fact that underscores that these economies simply do not have sufficient resources available to devote to health care (Table 28.1).

This is particularly distressing given the large burden of disease in low-income nations. Low-income countries account for almost half of overall global disease burden but spend only about 5% of total worldwide health spending.⁶ Despite the predicted growth of the overall global economy, these disparities in income are likely to persist. One recent estimate predicted that by 2040 all but one low-income country will still not be able to spend the US\$86 per capita widely seen as a threshold for providing a basic package of health services.⁷

Health care financing in upper-middle- and high-income countries is generally provided through health insurance schemes (often employment or union based) or governmental financing that is funded by general taxation. Governmental financing is severely limited in low-income nations due to lack of a significant tax base. Health insurance is difficult to implement in these nations due to the high burden of disease, lack of sufficient disposable income among the population, and difficulty creating large, diverse risk pools.⁸ Almost all currently implemented health insurance schemes in these countries require government subsidization to sustain them.⁹

Out-of-pocket expenses (i.e., private spending that is not pre-paid as part of an insurance program) for health comprise a large portion of health financing in most low-income countries.¹⁰ This is especially burdensome to many segments of the population who do not have reliable sources of cash income and have little savings. These expenses often drive families into poverty or are an insurmountable barrier to accessing needed health care services. Higher-income countries tend to have fewer out-of-pocket expenses, as more of the population is covered by pre-paid health insurance plans.

Over the past 15 years, there has been a significant increase in external funding for health in low-income countries with high disease burdens. Development Assistance for Health (DAH)—commonly referred to as *foreign aid*—makes up a significant portion of health spending in low-income countries accounting for, on average, 40% of total health care spending. Globally, DAH increased rapidly during the first decade of this century driven by funding programs such as The U.S. President's Plan for Emergency AIDS Relief (PEPFAR), The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), and foundations and bilateral aid programs. Total DAH likely peaked in 2013 and has been at fairly constant levels for the past few years; however, the focus of these funds has been moving from HIV/AIDS, tuberculosis (TB), and malaria to maternal, newborn, and child health.^{11–12}

HEALTH WORKFORCE

Health professionals and allied health workers (including community health workers [CHWs]) are essential to the functioning of the health system. Health systems need to provide training and

educational programs to develop these human resources, as well as certification and regulatory mechanisms to guide their functioning within the system.

Few low-income economies have the minimum threshold of 23 doctors, nurses, and midwives per 10,000 population that is recommended by the WHO as necessary to deliver essential health services.¹³ The average number of physicians per 10,000 people in low-income countries is between 2 and 3, and the average number of nurses and midwives is ≈ 12 per 10,000,¹⁴ giving most low-income nations slightly more than half the number of health workers that they need to deliver the most basic set of services.

Health worker shortage in low-income nations has many causes, including past investment shortfalls in education, international migration driven by higher compensation in more advanced economies, and premature mortality (in nations with lower life expectancy). In addition, many nations' health workforces are severely unevenly distributed, with many health professionals concentrated in urban areas despite significant portions of the population living rurally. The reasons for this include better jobs and higher compensation in cities and access to a better standard of living.¹⁵

To remedy these significant shortages, nations have been increasing investments in professional training in an effort to graduate more local physicians and nurses and redoubling retention efforts, such as improving working conditions and requiring physicians and nurses to practice in-country for a few years after graduation. To improve the retention of health professionals in rural areas, some nations have created financial incentives for professionals working in the public sector at rural facilities.¹⁶

Another strategy that has seen widespread adoption to deal with human resource shortfalls is "task shifting" or "task sharing." This involves redistributing work among health care workers so that the task is performed by the lowest-skilled worker who is sufficiently trained and supervised to accomplish the task effectively. In practice this often involves moving decision making that can be done via algorithms or clinical pathways away from physicians and nurses and allowing technicians and CHWs to make them. For instance, initiation of HIV treatment was traditionally the role of physicians only, but now across most of sub-Saharan Africa nurses and medical officers initiate and manage antiretroviral therapy. Similarly, in many nations, CHWs, using rapid diagnostic tests, can diagnose and treat malaria and childhood pneumonia.¹⁷

MEDICAL PRODUCTS AND TECHNOLOGIES

Medical products and technologies comprise all the medications, medical equipment, and diagnostic tests that are used to deliver health care. Health systems in low-income countries are also constrained by shortages and stockouts of these essential medications and diagnostic tests. The WHO maintains a list of essential medications that "are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality, and at a price the individual and the community can afford."¹⁸ This list was updated in 2015 to include oral hepatitis C treatments, an expanded set of cancer treatments, and new multi-drug-resistant TB medications and most recently in March 2017 with an emphasis on improving antimicrobial stewardship.¹⁹ Although the WHO essential medicines list provides a helpful normative guide for MOHs, in practice, there is little access to many of the medications on the list at front-line facilities across low-income countries due to stockouts. In most low-income nations, outside of urban centers, there are under-developed private-sector supply chains for medicines because large segments of the populations cannot afford prices that would generate enough profits to make these private-sector enterprises profitable. Therefore the government often needs to be the major procurer and distributor of medications

through public-sector facilities, which are invariably under-resourced. This leads to severe challenges in ensuring a well-functioning supply chain that can effectively distribute these medications.

The concomitant lack of availability of diagnostic testing in these countries impedes not only the treatment of individual patients, but also public health surveillance and epidemiology. Outside of major referral hospitals located in large cities, "routine" tests such as blood cultures, basic microbiology, and basic pathology tests are rarely available. There currently is no WHO list for essential diagnostic tests despite recent calls to create one.²⁰

Despite these significant challenges, the situation has improved greatly over the past 15 years as donor funding for essential medications has skyrocketed. The Global Fund, PEPFAR, and multiple bilateral aid programs, such as the U.S. Agency for International Development (USAID) and the UK's Department for International Development (DFID), have earmarked significant funding for essential medications and diagnostic tests to treat HIV/AIDS, TB, and malaria. The Clinton Health Access Initiative (CHAI) has also worked to drive down the prices of many of these essential medications, resulting in much greater access across low-income countries.²¹

Another bright spot is the greatly expanded access to and delivery of vaccines over the past 15 years due in large part to the work of the Global Alliance for Vaccines and Immunization (Gavi) and significant funding from the Bill & Melinda Gates Foundation.²² Gavi has not only helped finance vaccine procurement and delivery; they have worked with national governments to improve vaccination programs and have driven down the prices of essential vaccines.

HEALTH INFORMATION AND RESEARCH

Weak health information systems hobble many low-income countries' ability to distribute their resources to match the burden of disease. Health information at the primary level is commonly paper based and of poor quality. Central reporting to the MOH often takes place electronically, but MOHs routinely lack sufficient personnel to adequately collate, analyze, and act on this data. Given the lack of effective diagnostic testing, assessments of disease burden are often inaccurate and unreliable.

This situation is improving as more robust electronic health information systems are rolled out in these countries and diagnostic testing is made more available. In addition, mobile communications technology and increasing access to the Internet has allowed the rise of "e-health," a term used to refer to "a broad range of tools such as electronic medical records (EMRs), telemedicine, health information systems, mobile devices, online or e-learning tools, and decision support systems."²³ Early evaluations of many of these systems have shown that many are effective in improving health system performance.²⁴

Surveillance efforts around diseases such as polio and Ebola have also strengthened public health information in many nations. The Centers for Disease Control (CDC) has worked to develop laboratory infrastructure and personnel across many low-income countries and has bolstered efforts to improve epidemiologic information. In addition, the CDC has worked to train field epidemiologists through a program that has reached over 70 countries.²⁵

HEALTH CARE SERVICE DELIVERY

Health care service delivery is the point where the health system most clearly interacts with the population it serves to improve and maintain health. It involves the management and delivery of quality health services that include health promotion, disease prevention, diagnosis, treatment, illness management, rehabilitation, and palliative care services. All the other health system building

blocks discussed earlier are key inputs in creating effective health service delivery platforms.

Facilities

In many tropical low-income nations, health services are organized in a hierarchical fashion with primary (i.e., first point of contact) health posts and health centers distributed widely and fewer secondary and tertiary facilities that cover larger catchment areas. In some countries, there are national-level specifications about what health services should be offered at each level of the health system, whereas in others these decisions are more decentralized and vary by region (Fig. 28.2).

Health posts often are staffed by nurses only and provide basic services such as immunizations, treatment of acute childhood illnesses, treatment of malaria, well-child and infant care, and routine antenatal care. Health centers are typically larger facilities that serve bigger populations than health posts and are staffed by either nurses only or nurses and clinical officers (who are similar to physician assistants in the United States).

Health centers provide a larger package of essential services, including being able to attend uncomplicated deliveries, perform minor surgical procedures (but usually not cesarean sections), and provide basic HIV and TB treatment. Health centers may have 5 to 10 beds available for women in labor and for patients requiring straightforward medical admissions. Patients requiring more complicated services are usually referred to a district hospital (sometimes called a *primary-level hospital*). This generally has between 50 and 100 beds and is staffed by generalist physicians, clinical officers, and nurses (Fig. 28.3).

A district hospital usually provides more surgical services (such as appendectomy and C-sections, uncomplicated orthopedic care,

and expanded obstetric services), basic radiographic imaging, pediatric services, in-patient medical services, and basic rehabilitative services.²⁶ Higher-level care is provided at referral hospitals. In some nations, tertiary-level referral hospitals exist at the provincial or regional level, whereas in others, all care beyond the district hospital is provided by national-level tertiary care hospitals.

Knowledge Management

Knowledge is a key input for service delivery. All health systems have guidelines and care algorithms that guide providers in decision making, testing, and treatment. For primary-level care, the WHO has developed sets of clinical guidelines that allow providers to rapidly assess adults and children for high-burden health conditions and effectively treat these conditions. These guidelines, called the *Integrated Management of Childhood Illness (IMCI)* and the *Integrated Management of Adolescent and Adult Illness (IMAI)*, are a set of clinical algorithms that are adapted and widely used across many tropical nations.²⁷ IMCI and IMAI provide a syndromic approach to treating commonly occurring conditions. The WHO has produced training materials to accompany these guidelines, as well as recommendations for ways to strengthen health systems to improve the uptake and effectiveness of this approach.²⁸

With increasing evidence available to guide diagnosis and treatment of commonly occurring high-burden conditions such as malaria, CHWs are often the primary providers for acute treatment of many of these conditions. For instance, a CHW, using a clinical algorithm, can evaluate a febrile child in his or her village, administer a rapid diagnostic test for malaria, and then, if positive, prescribe and dispense a blister pack course of artemisinin combination therapy. In addition, the CHW can use text messaging to send identifying information about the child to a central database so the encounter is recorded. In this way, conditions such as diarrhea, pneumonia, and malaria can be treated rapidly and effectively in or near people’s homes by CHWs. These CHWs are most effective when linked to the rest of the health system by being supervised; being supplied with the proper training, diagnostic tests, and therapies; and being linked to health information systems.

Linking Community and Facility-Based Care

Effective health care delivery requires integration across all levels of the health system. Community-based delivery via CHWs (as described earlier) is a highly effective way of delivering primary-level health services for targeted conditions at or very near patients’

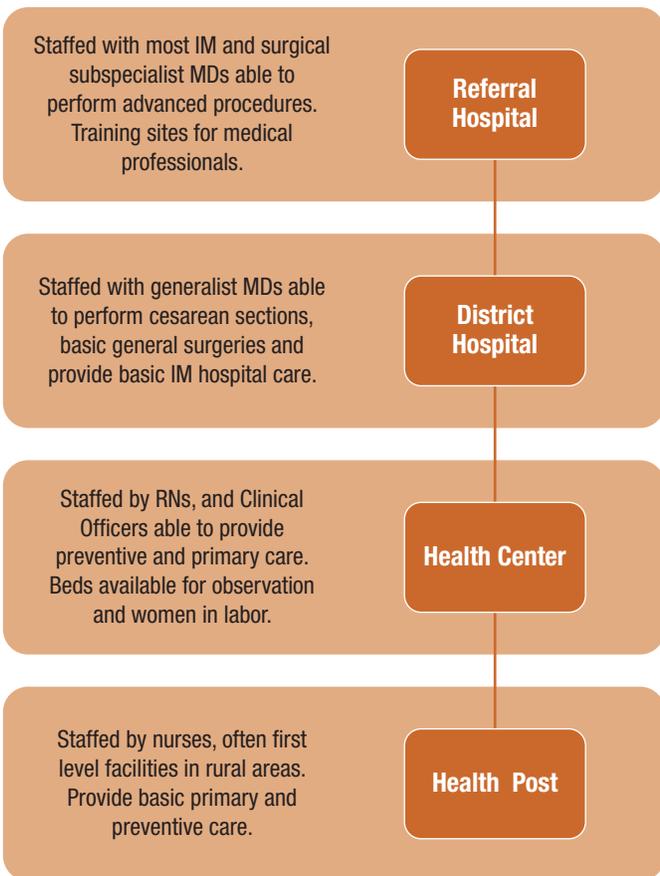


Fig. 28.2 Health facility organization.



Fig. 28.3 District hospital in Haiti.

homes. Linking these efforts to facility-based care at health centers and district hospitals creates a robust delivery system that, if properly designed and managed, will be patient centered and responsive to the needs of the communities served.

The large rural populations living in many low-income, tropical nations will only be adequately served by a system that links community-based care with facility-based care. In the short term it will be exceedingly difficult to build enough facilities and engage enough health professionals to provide ready access to the health system for rural and dispersed communities. CHWs can provide the key link between these populations and static health centers and hospitals that can deliver more extensive facility-based health services. CHWs can refer and accompany patients who need to access these services to the health facility and use widely available telecommunications technology such as Short Message Service (SMS) to transfer identifying information.

Quality

Ensuring quality in health care service delivery is a key function of the health system. To do this, health systems must record and measure the outcomes of service delivery. Although these outcomes are often difficult and sometimes costly to measure, they provide the only clear evidence of the effectiveness of health care service delivery. Process measures (such as visit volume, amount of medications dispensed, number of diagnostic tests performed, etc.) are useful in helping manage the care delivery process, but are not sufficient data to assess the actual effect that health interventions have on health status.²⁹

Equity

Health equity is a key goal of all health systems, and equitable health care service delivery is central to achieving that goal. Different groups within a nation may have vastly different burdens of disease and burdens of disease risk factors due to social and economic disparities. A health system that ignored the underlying epidemiology of disease and social determinants of health would have little impact on these inequalities. However, a system that is responsive to these factors and accounts for their influence can work to provide targeted services to groups with higher disease burden and to intensify prevention efforts for groups that have the greatest risk factors. In this way, health service delivery can help remediate underlying health disparities within nations.³⁰

REFERENCES

- World Health Organization (WHO). Everybody's business: strengthening health systems to improve health outcomes: WHO's framework for action. Geneva: World Health Organization; 2007. p. 2.
- UNAIDS. "Three Ones" Key Principles. http://data.unaids.org/una-docs/three-ones_keyprinciples_en.pdf.
- Bossert T. Analyzing the decentralization of health systems in developing countries: decision space, innovation and performance. *Soc Sci Med* 1998;47:1513–27.
- Leadership, Management and Governance Project. Five Smart Strategies to Govern Decentralized Health Systems. United States Agency for International Development. June 2013.
- The World Bank: <https://data.worldbank.org/indicator/SH.XPD.CHEX.PC.CD>.
- WHO. Global health expenditure atlas. Geneva, World Health Organization; 2014.
- Dieleman JL, Templin T, Sadat N, et al. National spending on health by source for 184 countries between 2013 and 2040. *Lancet* 2016;387(10037):2521–35.
- Mills A. Health Care Systems in Low-and Middle-Income Countries. *N Engl J Med* 2014;370:552–7.
- Sachs JD. Achieving universal health coverage in low-income settings. *Lancet* 2012;380:944–7.
- Global Burden of Disease Health Financing Collaborator Network. Evolution and patterns of global health financing 1995–2014: development assistance for health, and government, prepaid private, and out-of-pocket health spending in 184 countries. *Lancet* 2017;389:1981–2004.
- Dieleman JL, Schneider MT, Haakenstad A, et al. Development assistance for health: past trends, associations, and the future of international financial flows for health. *Lancet* 2016;387(10037):2536–44.
- Institute for Health Metrics and Evaluation (IHME). Financing Global Health 2015: development assistance steady on the path to new Global Goals. Seattle, WA: IHME; 2016.
- WHO. Density of doctors, nurses and midwives in the 49 priority countries. Geneva: World Health Organization; 2010. http://www.who.int/hrh/fig_density.pdf?ua=1.
- WHO. Global Health Observatory data repository. <http://apps.who.int/gho/data/node.main.A1444>.
- WHO. Global strategy on human resources for health: workforce 2030. Geneva: World Health Organization; 2016.
- Dolea C, Stormont L, Braichet J. Evaluated strategies to increase attraction and retention of health workers in remote and rural areas. *Bull World Health Organ* 2010;88:379–85.
- WHO. Task shifting: global recommendations and guidelines. Geneva: World Health Organization; 2008.
- WHO. Essential medicines and health products. http://www.who.int/medicines/services/essmedicines_def/en/. [Accessed 6 July 2017].
- WHO. WHO model lists of essential medicines. 20th ed. Geneva: World Health Organization; 2017. <http://www.who.int/medicines/publications/essentialmedicines/en/>.
- Schroeder LF, et al. Time for a model list of essential diagnostics. *N Engl J Med* 2016;374(26):2511–14.
- Clinton Health Access Initiative. ARV Market Report: The State of the Antiretroviral Drug Market in Low- and Middle-Income Countries, 2015–2020. Issue 7, October 2016. <https://clintonhealthaccess.org/content/uploads/2016/10/CHAI-ARV-Market-Report-2016-.pdf>.
- Lee LA, Franzel L, Atwell J, et al. The estimated mortality impact of vaccinations forecast to be administered during 2011–2020 in 73 countries supported by the GAVI Alliance. *Vaccine* 2013;31:B61–72.
- Gerber T, Olazabal V, Brown K, Pablos-Mendez A. An agenda for action on global e-health. *Health Aff (Millwood)* 2010;29(2):233–6.
- Blaya JA, Fraser HS, Holt B. E-health technologies show promise in developing countries. *Health Aff (Millwood)* 2010;29(2):244–51.
- CDC. Field Epidemiology Training Program (FETP). <https://www.cdc.gov/globalhealth/healthprotection/fetp/index.htm>. [Accessed 15 July 2017].
- English M, Lanata CF, Ngugi I, Smith PC. The district hospital. In: Jamison DT, Breman JG, Measham AR, et al, editors. Disease control priorities in developing countries. 2nd ed. New York: Oxford University Press; 2006. p. 1211–28.
- WHO. Integrated Management of Childhood Illness (IMCI). http://www.who.int/maternal_child_adolescent/topics/child/imci/en/. [Accessed 15 July 2017].
- WHO. Documents on the Integrated Management of Childhood Illness (IMCI). http://www.who.int/maternal_child_adolescent/documents/imci/en/. [Accessed 15 July 2017].
- Smits HL, Leatherman S, Berwick DM. Quality improvement in the developing world. *Int J Qual Health Care* 2002;14(6):439–40.
- Farmer PE. Chronic infectious disease and the future of health care delivery. *N Engl J Med* 2013;369:2435–47.