3 Health systems research and infectious diseases of poverty: from the margins to the mainstream
Successful control of infectious diseases of poverty requires a positive interrelation between programmes for disease control and the rest of the health system. Research can help to develop a better understanding of the relationships between disease control interventions and health system components, other sectors and the broader contexts of living in poor communities. We explore this relationship in this chapter and outline how research can help.
In an ideal world, wherever he or she lives, every individual should have access to quality health care whenever they need it. The goal of all health systems is to attain this ideal of universal coverage by providing primary health care services that are accessible, equitable and responsive to the needs of their target communities. While many country health systems struggle to attain universal coverage, low-income countries face particularly complex challenges. Health systems research has great potential to address health systems strengthening for effective infectious disease control.

Poor countries of Africa, Asia and Latin America carry the greatest global burden of disease and their population health needs exceed the capacity of health services and providers. Prevalence rates of infectious diseases of poverty are high; multiple conditions co-exist in the same geographical location; and large numbers of individuals live with multiple infectious diseases, often of chronic duration (1, 2). Poverty and wider socioeconomic and sociopolitical factors increase the disease burden of these countries. Prevalence rates of infectious diseases of poverty and neglected tropical diseases (NTDs) are highest in countries that have political instability, authoritarian rule, suppression of human rights and conflict (7). Global economic forces and donor activities have been shown to challenge the ability of weak governments to invest in health systems and quality health care for their populations in a way that reflects national priorities.

In the 1980s, structural adjustment policies imposed on African, Asian and Latin American countries by the International Monetary Fund (IMF) and the World Bank led to economic reforms that had a negative impact on public institutions, including health systems (3). Following the establishment of the Millennium Development Goals (MDGs) in 2000, increased resources for infectious disease control have become available through innovative channels of development assistance termed Global Health Initiatives (4). The better known of these include the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), GAVI Alliance, UNITAID and the African Programme for Onchocerciasis Control (APOC). Global Health Initiatives have contributed to the creation of complex health systems, with an increasing number of actors entering the field of infectious disease control and implementing diverse health systems strategies through vertical, often fragmented, programmes that conflict within countries.

There is a consensus that strong, well-integrated and effective health systems are essential to reducing the disease burden and to achieving the health MDGs. Strong health systems typically consist of the seven building blocks shown in Fig. 3.1: service delivery; governance structures; financing mechanisms; human resources; medicines and technology supply systems; health information systems; and participatory community mechanisms (people). Ideally, these seven components must exist and work in concert to produce quality (accessible, equitable, responsive) health care.

Health research and policies are needed to strengthen health systems serving the poor and to integrate disease control programmes in a sustainable way. Health systems research has been defined as:

“the production of knowledge and applications to improve how societies organize themselves to achieve health goals, including how they plan, manage and finance activities to improve health, as well as the roles, perspectives and interests of different actors in this effort” (7).
Health systems research is concerned with health policies, organizations and programmes on which health ministers, policymakers and service managers draw to make critical decisions about organizing and changing health systems (8). The field therefore focuses on how research can better examine the interrelationship between health systems and disease control programmes in order to improve health service delivery (7). This interrelationship is addressed by focusing on the demand side and the supply side of health systems. The demand side refers to population health needs: here, health systems research addresses the relationship between health systems and communities or health service users. The supply side refers to health services and other structures, such as those provided by modern health teams, traditional healers, community delivery mechanisms and patient groups. In this case, health systems research examines the broader socioeconomic and political context in which health systems are situated through its focus on the roles, perspectives and interests of the diverse actors engaged in health systems development and strengthening at local, national and international levels.

This chapter examines how health systems research sheds light on the complex relationship between infectious disease control programmes and health systems and offers opportunities for strengthening health systems to improve healthcare for the global poor.

In the first section of this chapter we provide a review of health systems research insights that help our understanding of the complex way in which health systems and disease control programmes (particularly those
funded by Global Health Initiatives) intersect in the delivery of health care. We focus on the seven health system components and, for each, explore this relationship by asking a number of questions: What is the ideal structure and goal for the health system component? What are the existing challenges and problems with respect to the building block? How might the challenges and problems be addressed? How can health systems research help this process?

In the second section, we address future approaches for health systems research by proposing three cross-cutting issues that need to inform how positive synergies between health system components and infectious disease control programmes are developed: (i) advocacy for values; (ii) systemic approaches; and (iii) capacity strengthening in health systems research. We conclude by offering a synthesis of the key research questions that must guide health systems research approaches towards strengthening the relationship between health systems and infectious disease control programmes for universal coverage.

Understanding the relationship between health systems and disease control programmes and the role of health systems research

In this section, we present an overview of health systems research insights on the seven building blocks and identify one key research question for each block. Some building blocks have received more attention than others, therefore the scope of available information and the implications for further research vary. We conclude this section by summarizing what existing research on the health systems components means for the future conceptual and methodological development of health systems research, particularly in terms of addressing the mutual inter-relationship between infectious diseases and poverty in low-income countries.

SERVICE DELIVERY – FINDING THE RIGHT MIX

The main goal of health systems is to provide health services that are accessible, equitable and responsive to the needs of their target communities. This goal can be achieved when all the other health systems components work in concert at optimal levels. As we will see in the following sections, many low-income countries lack appropriate infrastructure; the right mix of health workers; and the systems to make medicines and medical technologies available at point of community need. As a result, service delivery is severely compromised. The challenges that service delivery face and the strategies to address them must therefore be understood within the context of the challenges faced by other health systems components, as well as of the support they can lend for infectious diseases control.

It is useful to outline important successes and challenges in efforts to improve service delivery in low-income countries as a backdrop for the discussions that follow. Health sector reforms instituted by some governments in the 1990s led to improvements in health...
service delivery and other health system components (Case study 3.1) (9). In other countries results have been more mixed. For instance Colombia’s health sector reform recorded positive impacts on disease control and equity but led to a weakened national programme for TB case detection and control (Case study 3.2) (10–12).

Since 2000, improvements in service delivery have occurred through Global Health Initiative investments (4). An increased access to HIV/AIDS services and insecticide-treated bednets has been reported in some African countries. There have been various efforts to integrate health interventions, the two main approaches being integration of (i) HIV and TB control; and (ii) onchocerciasis control with malaria case management, insecticide-treated bednet distribution, Vitamin A distribution and monitoring of directly observed treatment for TB. In the Democratic Republic of the Congo and in Zambia, the extension of TB services to scale up HIV/AIDS care led to increased service coverage and access to HIV/AIDS care for individuals with co-infections. In African countries where multiple health interventions were incorporated into community-directed interventions for onchocerciasis, treatment coverage with ivermectin was high and good results were obtained for coverage of additional interventions.

CASE STUDY 3.1
Integration of lymphatic filariasis through decentralization and primary health care reform

Integration of the lymphatic filariasis programme in the Dominican Republic has improved both the programme and primary health care. Geographicalal coverage of mass drug administration increased and the number of municipalities achieving the target coverage rate of 80% rose by 21%. Benefits for primary health care included improved information systems and strengthened relationships between health services and the community. Best practices documented were: professional development of disease-specific programme staff as their roles changed; strengthening of specific weaknesses in the general health system; active engagement of senior management at an early stage; and continual evaluation of the impact of integration.

Source: Reference (9).

CASE STUDY 3.2
The Colombian health sector reform

The Colombian health sector reform implemented in the early 1990s has had some positive impacts on disease control and, more generally, on health equity. However, problems have also arisen due to rapid implementation and the nature of some reform features.

In the case of malaria, research showed positive signs including: the strengthening of central control staff when transferred from the Ministry of Health to the National Institute of Health; improved opportunities for planning initiatives and intersectoral cooperation; and the reduction of malaria mortality (due to diagnosis and treatment being integrated into general health services). On the negative side, the reform did not solve the shortcomings of the old vertical control system, such as the negative aspects of trade union activity. Meanwhile, some positive aspects of the old system – such as capacity building, operational planning and supervision – were lost through the decentralization of scarce resources to the provincial level (10).

In the case of TB, the Colombian reform also led to a weakening of the national programme’s capacity for case detection and control, leading to a decrease in critical indicators (11). It has been argued, based on the evidence, that the reform’s reliance on private for profit providers and insurers led to a loss in the capacity to target public goods for TB control (12).
Service delivery in terms of equity has also improved in some countries. Strategies – such as provision of free access to care and outreach programmes – have been established to benefit the poorest, most marginalized and stigmatized groups in poor countries (such as commercial sex workers and men who have sex with men) (13). The quality of services has improved through a number of strategies – including the development of standardized guidelines of care (for example for HIV/AIDS) and global procurement systems that led to universal standards of care. Service delivery strengthening has led to improved health outcomes and to positive ripple effects in other areas, such as higher demand for a wider array of health services. Other examples are significant correlation between HIV intervention and improved family planning and antenatal care services in Rwanda. In Haiti, HIV intervention has improved a range of services including family planning; vaccination; case detection and cure of TB; and health promotion. In Botswana and Uganda reduced disease-related disability and mortality has meant household support of infants has improved. In some instances the reduced infectious disease burden has made resources available to tackle other essential services, such as infrastructure, laboratory support and health worker training. For example, in Mexico the programme to scale up immune-preventable disease control towards universal coverage invested in the establishment of regional surveillance laboratories designed to support other, lower priority, disease control programmes (14).

Despite these service delivery improvements major challenges remain. The bulk of Global Health Initiative investments and activities focus on the “big three” diseases: HIV/AIDS, TB and malaria. There are limited to no investments in improving access to treatment of other infectious diseases of poverty. The focus on equity often reflects the priorities of Global Health Initiatives and not the priorities of countries.

For example, Global Health Initiatives often disburse HIV or TB funding to countries with a low burden of these conditions, or neglect marginalized communities such as urban slum communities. Finally, standardized care guidelines often have an imperative to meet numerical targets and local health providers’ quest to meet these goals can sometimes undermine quality of care.

LEADERSHIP AND GOVERNANCE – GETTING A GRIP ON THINGS

Leadership and governance are central to the development and strengthening of all the health systems components. The United Nations Development Programme (UNDP) has defined governance as “the exercise of political, economic and administrative authority to manage a nation’s affairs” (15). Governance for the health sector has been defined as the effort to rationalize “the role of government (reducing its dominance and sharing roles with non-state actors); empowering citizens, civil society, and the private sector to assume new health sector roles and responsibilities; and creating synergies between government and these actors” (16). Several indicators have been developed to evaluate the quality of governance. These include effectiveness in the delivery of quality public services; regulatory quality in relation to private sector development; voice and accountability of citizens and civil society; the control of corruption; and the maintenance of political stability. Many low and middle-income countries score poorly on some or all of these indicators.
Global Health Initiatives have created a new challenge for health leadership and governance in terms of the way their priorities sometimes intersect unfavourably with the priorities of governments. Therefore, a recurrent and urgent research issue concerns the need to understand the changing relationship between Global Health Initiatives and governments and how this shapes the future development of health systems. It is generally recognized that political leaders and health policy-makers lack the power to set national health agendas. This lack of power is strongly associated with the power of development partners and international funders to shape global and local priorities. Research suggests that Global Health Initiatives distort recipient countries’ national policies and priorities, by forcing governments to focus on global priorities and distracting them from coordinating efforts to strengthen health systems. This leads to fragmented planning, management, and monitoring and evaluation systems. For example, a campaign in Mali to treat the five most neglected tropical diseases led to disruption of basic health services as staff were diverted from their routine duties to run, report on and evaluate the campaign (Case study 3.3) (17).

International initiatives – such as the 2005 Paris Declaration on Aid Effectiveness, the 2007 International Health Partnership and the 2008 Accra Agenda for Action – have called for the strengthening of country ownership of health aid, whereby governments are self-empowered to exercise effective leadership over policy development, strategy, coordination, implementation and evaluation.

**CASE STUDY 3.3**

Health system impact of the Neglected Tropical Disease Control Initiative

In 2007, an integrated control programme was initiated in 24 districts across 3 regions in Mali. Funded by the United States Agency for International Development (USAID) through two international nongovernmental organizations (NGOs) – the International Trachoma Initiative and Helen Keller International – the programme involved mass drug administration for the five most neglected tropical diseases (lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminths and trachoma). The programme yielded both positive and negative results across the six health systems building blocks outlined in Fig. 3.1. However, overall effects undermined health systems performance. At point of delivery, campaign-related workload severely interfered with routine care, which was cut down or totally interrupted during the campaign. Importantly, only 2 out of 16 health centres with better-qualified, stable and motivated workforces were able to keep routine services running and to use the campaign as an opportunity for quality improvement. Staff income was significantly improved by allowances, but sustainability beyond the funded programme was questionable. Parallel systems established for drug supply and evaluation demanded extra efforts, thereby burdening local health systems. The campaign budget barely financed institutional strengthening and the mediating role of the international agencies involved undercut the decision-making processes of the Ministry of Health. Pressures to absorb donated drugs and reach short-term coverage results helped distract energies from other priorities. The programme evaluators underscored a common argument that “positive effects of GHIs are more likely to occur when the health system is robust” (17).
It is worth noting that the economic fortunes of some emerging economies have improved over the last decade. Of the ten fastest growing economies in the last decade, six were in sub-Saharan Africa (Angola, Chad, Ethiopia, Mozambique, Nigeria, Rwanda); three were in Asia (Cambodia, China, Myanmar); and one in eastern Europe (Kazakhstan). This is likely to impact on governance and aid effectiveness. The private sector plays a significant role in strengthening the macro-economy of African countries. It has invested around US$ 11.5 billion (an average of 3% of Africa’s gross domestic product) in the region and is driving the expansion of technology access. This has implications for wider social determinants on health (e.g. job creation, trade, communication, access to knowledge) and on health systems strengthening (through inter-sectoral collaboration e.g. on information technology (IT) and health information systems, production of health products and improved access to medicines).

FINANCING – THE RIGHT LEVEL AT THE RIGHT TIME AND PLACE

Financing involves mobilizing, pooling and allocating money to sustain health delivery programmes and to cover the health needs of the people. Health systems research has focused on three aspects of financing in relation to infectious disease control: (i) the amount and effectiveness of global funding and its relationship to national funding; (ii) the coordination of funding by health systems across diverse priorities and programmes, and (iii) the extent to which financing lowers financial barriers to health service users and protects them from ill-conceived and impoverishing expenditures.

Substantial financial investments have been made in health systems strengthening and disease control programmes in low and middle-income countries. Estimates of global funding needs to meet the MDGs from 2009 to 2015 diverge widely (ranging from US$ 111 billion to US$ 251 billion) – demonstrating a limited knowledge of what would be the most rational strategies for service delivery and capacity strengthening, always a key problem in global funding.

One particularly worrying example of this problem is a skewed approach to funding the control of prevalent diseases. Currently there are over 100 Global Health Initiatives focusing on at least 26 disease areas. However, focus has usually been on single diseases, with HIV/AIDS attracting the majority of funding over the last 20 years. In 2007, out of approximately US$ 14.5 billion of development assistance for health (for which...
US$ 5.1 billion was allocated to HIV/AIDS. This compared with US$ 0.7 billion for TB, US$ 0.8 billion for malaria and US$ 0.9 billion for health sector support (21). Research has pointed to a discrepancy between global and national priorities, with the dominant focus on HIV/AIDS being more the product of donor values and interest, rather than of national health needs. For example, actual funding for HIV/AIDS increased more than twelvefold between 1992 and 2005, yet during the same period adult prevalence of HIV rose approximately fourfold. The case has been made for a more equitable channelling of resources for infectious disease control (22). This can be done by moving beyond the over-focus on the “big three” diseases, to tackling the diseases of the majority of the poor which represent “low-hanging fruit” that can be addressed through available preventive interventions.

A second problem with global funding is the challenge of determining whether and when funding should focus on short, medium or long-term goals (23). On one hand, short-term Global Health Investment funding cycles have been criticized for inducing vertical demand-side programmes that seek fast disease control and elimination targets, fragmenting health system governance in the process. On the other hand, horizontal, supply-side programmes funded by governments have also proven inadequate to provide quality and effective disease control. A middle ground, termed the “diagonal approach”, has been proposed to scale up disease control in ways that strengthen the capacity of the wider health system (14, 23, 24). As discussed above concerning governance, evidence suggests that the diagonal approach can protect critical vertical programmes from redistributive claims by other programmes. At the same time, the diagonal approach can enhance local and country ownership and align the goals and policies of local, national and global actors (23, 24). A critical challenge for health systems research is to examine and establish when global finance should be planned for the short to medium term to achieve urgent disease control or elimination targets (for instance, within the context of civil war and population displacement), and when funding is planned for the long term to help strengthen health systems as a whole.

Health systems in most low-income countries find it difficult to coordinate funding from the many sources that have now become available (4, 23). Their budgeting procedures are not suited to identifying disease control programme funding gaps. There is also limited or no capacity to track how money is spent or to link financial inputs to health-related outputs. Responses to these difficulties now include the adoption of sector-wide approaches (SWAs) and/or general budget support (GBS) which have helped some countries to coordinate the flow of resource between donors and government agencies (25, 26). SWAs involve donors pooling their funds based on strategic health sector plans jointly developed with the health ministries, to be disbursed against specific expenses such as salaries or infrastructure development. GBS involves channelling donor funds to the ministry of finance in the host country, rather than directly to the ministry of health. Some countries have introduced pay-for-performance schemes in order to provide incentives for health workers and health service users that extend access to essential services (27). The potential and limitations of these innovative tools need to be researched to ensure they complement non-financial incentives.

Over 100 million people are pushed into poverty every year due to health care expenses. The poorest people experience the most ruinous costs of health care. As much as 60% of total health spending in low-income countries is estimated to come from out-of-pocket expenditure (the comparable figure in high-income countries is 20%) (4). Poor people need to pay for this out-of-pocket expenditure from their meagre income or by selling personal possessions and borrowing money. This deepens financial and social insecurity and emphasizes the urgent need for social health insurance and other financial protection interventions for the poor. The ideal route to providing quality health care in an equitable, efficient and...
sustainable manner is probably through a mix of financing sources, taxation and, to a much lesser extent, out-of-pocket expenditure (28). Poor countries have typically faced enormous obstacles in offering this mix of financial interventions to their citizens. Social insurance schemes are based on strong equity principles, but their success depends on how they identify and target vulnerable social groups; how they structure the range of services and diseases covered by the scheme; and how they develop cost containment mechanisms while protecting the poor (29, 30).

Locally based community health insurance schemes have provided financial security for primary health care and basic hospital care in some poor African and Asian countries although, so far, there has been modest capacity for collecting revenue, pooling resources and purchasing services through these schemes. However, such schemes have been found effective in modifying the demand for, and the supply of, health care in the community (31) and thus could play an as yet unexplored role for disease control. Microfinance schemes have proven particularly effective in supporting health provision. Research suggests that microfinance schemes improve knowledge and facilitate positive health behavioural change in both maternal and child health and infectious disease programmes (32–40). Careful design, implementation and evaluation of intersectoral programmes are required to link microfinance and health as an innovative response to the ongoing challenges of poverty, social exclusion and chronic disease (32, 34).

Global Health Initiatives have increased public financing and may have contributed to reduce out-of-pocket expenditures for specific diseases such as HIV/AIDS. However, they have not yet invested systematically in the development (or extension) of pre-payment or insurance mechanisms.

**RESEARCH QUESTION:**
What is the best mix of infectious disease control funding mechanisms to strengthen health system financing, and in what contexts?

**HUMAN RESOURCES FOR HEALTH – CARING COMES FROM PEOPLE**

The health workforce, or human resources for health (HRH), encompasses a broad range of actors, including public and private-sector doctors, nurses and midwives, as well as informal health providers such as “family caregivers, patient-provider partners, part-time workers (especially women), health volunteers and community workers” (41). However, health systems research has focused largely on workers formally employed by public health sectors. Research consistently shows that low-income countries face some major HRH constraints (4, 42–46). There is shortage, attrition and maldistribution of health workers. Attitudinal factors such as a lack of motivation have also been highlighted. The importance of research on human resource problems is critical not only to improve health system effectiveness, but also to implement health research findings in general:

“Health service providers are the personification of a system’s core values – they heal and care for people, ease pain and suffering, prevent disease and mitigate risk – the human link that connects knowledge to health action. At the heart of each and every health system, the workforce is central to advancing health.” (41)

Including doctors, nurses and midwives, 23 health workers per 10 000 people has been set as the minimum number required to achieve 80% coverage for measles immunization or for deliveries by skilled birth attendants. Most low-income countries have a shortage of health workers according to this criterion. In 2006, WHO reported a worldwide shortage of almost 4.3 million doctors, midwives, nurses and support work-
ers (41). Of the 57 low-income countries that faced severe shortages (averaging 2 or fewer health workers per 10,000 people), 37 were in Africa. HRH shortage has been attributed to limited capacity for training health workers in low-income countries. For example, some African countries lack the capacity to train doctors locally, leading to necessary (but financially crippling) investment in expensive foreign training. HRH shortage has also been attributed to poor forecasting of health workforce needs. This problem is linked to weak health information systems. Without adequate information on the prevalence and impact of diseases, health ministries are unable to develop and strengthen health systems capacities to meet future needs.

Attrition has already been addressed when discussing brain drain as a governance issue. The loss of personnel from disease endemic countries to wealthier countries undermines the capacity of their health systems to provide comprehensive services, thus increasing the necessity to implement vertical approaches for specific diseases (45–48). In some countries, attrition also occurs when health workers take up administrative work or work outside the health sector within the country (46, 49, 50). In parts of Africa high mortality among health sector workers, due to diseases such as AIDS, compounds attrition. Forty-three percent of health worker deaths in Ethiopia, Kenya, Malawi, Mozambique and Zimbabwe are known or suspected to have been caused by HIV/AIDS, while over one third of deaths are known or suspected to have been caused by TB (4).

The effectiveness of disease control programmes is also affected by the skewed distribution of health workers across geographical location, professional category and gender (42, 50, 51). Often, health workers prefer to work in urban rather than rural areas, and in more affluent, urban areas rather than poor areas such as slums (51). A lack of adequate amenities in rural areas (such as quality housing and good schools) and lack of security in urban slums and other poor areas have been highlighted as key factors in health workers’ reluctance to work in these poorer areas.

In the 1990s, health sector reforms included capacity building interventions for HRH. Some countries invested in training health workers, increasing salaries and providing relocation incentives to address the maldistribution problem. Results have been mixed. For example, Ghana developed a health human resource policy in 2002 to address its health worker crisis. A “deprived-area incentive” initiative failed to get workers to move from urban areas due to lack of infrastructure and amenities for families of health workers. Task-shifting has been also tried as a solution to the maldistribution problem. This involves transferring responsibilities from highly trained health workers to community health workers (CHWs) in order to increase access to disease control services. BRAC, an NGO, provides a good case on how its 70,000 CHWs in Bangladesh continue to work and are connected to a functioning health system (see Case study 3.4) (52–54).

Over the last decade Global Health Initiatives have made investments in HRH, with mixed outcomes (4). These investments have included funding salary increases and offering relocation and other incentives to address the problem of attrition and maldistribution, with the focus primarily on the delivery of disease programmes. However, in some countries, Global Health Initiative interventions have not been enough to prevent attrition within the public sector or to improve health outcomes through provision of health services.

**RESEARCH QUESTION:**

*How do we determine the optimal balance between health workforce options and requirements to attain disease control targets in the context of broader health systems strengthening?*
Sick people need not only medicines to treat their conditions but also medical technologies that help with diagnosis and treatment. However, in many poor countries the procurement and distribution systems for medicines and medical technologies and equipment are weak, erratic and dysfunctional. Health workers may also lack relevant training in basic pharmacology (such as dosage and administration of medicines) and in the use of available technologies. In some countries, a combination of weaknesses in the supply chain and a lack of training has reportedly led to delays in drug administration or dose reductions for malaria, causing subsequent shortfalls in the agreed Abuja Declaration and Roll Back Malaria (RBM) targets (Fig. 3.2). These problems obviously affect the quality and effectiveness of disease control programmes – particularly as traditional medicines are popular and often cheaper sources of treatment for a broad range of conditions (especially in rural areas underserved by formal health services in Africa, Asia and Latin America).

The BRAC programme has been replicated in other countries including Afghanistan and Uganda. Health systems research has played an important role in the development and scaling-up of such programmes – studies identified issues with programme implementation relating to incentives, supervision, drop-out, training retention, equity focus and roles in society. A recent study compared the implementation of the BRAC model in Bangladesh, Afghanistan and Uganda and reported on what works in different settings and how programmes in each country evolved according to local realities.

**Source:** References (82–84)

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**MEDICINES AND TECHNOLOGY – AN ESSENTIAL COMBINATION**

Sick people need not only medicines to treat their conditions but also medical technologies that help with diagnosis and treatment. However, in many poor countries the procurement and distribution systems for medicines and medical technologies and equipment are weak, erratic and dysfunctional. Health workers may also lack relevant training in basic pharmacology (such as dosage and administration of medicines) and in the use of available technologies. In some countries, a combination of weaknesses in the supply chain and a lack of training has reportedly led to delays in drug administration or dose reductions for malaria, causing subsequent shortfalls in the agreed Abuja Declaration and Roll Back Malaria (RBM) targets (Fig. 3.2).

The problems with procurement and distribution are compounded by the production, supply and inadvertent use of counterfeit medicines. It is estimated that about 15% of drugs sold worldwide are fake. In some parts of Africa (such as Nigeria and the United Republic of Tanzania), up to 30% of drugs on sale can be fake. These problems obviously affect the quality and effectiveness of disease control programmes – particularly as traditional medicines are popular and often cheaper sources of treatment for a broad range of conditions (especially in rural areas underserved by formal health services in Africa, Asia and Latin America).

**RESEARCH QUESTION:**

How can we improve access and appropriate use of quality medical technologies for infectious disease control?
HEALTH INFORMATION AND HEALTH INFRASTRUCTURE – GOOD DATA CLEAR THE PATH

Health systems need information on trends in incidence and prevalence of health risks, diseases and fatalities and on the availability and utilization of resources so that the structure, scope and delivery of health services can be planned. They also need monitoring and evaluation data on health outcomes and service outputs. In addition, health systems need appropriate facilities, technologies and equipment to function effectively. However, facilities in low-income countries are often run-down, over-crowded and ill-equipped. This undermines both quality of care and the occupational health of health workers. For example, in sub-Saharan Africa “50% of sites dedicated to the provision of antiretroviral treatment do not have basic infrastructure and supplies, such as soap, running water, gloves and post-exposure prophylaxis for HIV prevention” (4).

Research from Uganda, Rwanda, Mozambique, Mexico and the United Republic of Tanzania on the strengthening of institutional data collection provides important models for developing robust health information systems (59–64). Some countries have already started experimenting with wider use of electronic information technologies, which has led to improved provider-patient interactions (e.g. in Rwanda, Zambia); the ability to track pharmaceutical and other essential supplies (thereby reducing stockouts); and increased information sharing between different stakeholders (4).

Global Health Initiatives have invested in improving the availability and accuracy of data on specific diseases. Such investments strengthen monitoring and evaluation and improve access to information for users, programmers and implementers. Countries such as Burkina Faso, Nigeria, and Indonesia have yielded important results. For example, The US President’s Emergency Fund for AIDS Relief (PEPFAR) investment in household surveys of seroprevalence led to a global downward adjustment in the total number of HIV/AIDS infections. Global Health Initiative investments in health information...
systems have also produced negative outcomes. They often establish parallel systems that duplicate national surveillance efforts and they limit their focus to the “big three diseases”, prioritizing national surveillance at the expense of surveillance systems for primary prevention at community levels.

Research suggests that the relationship between Global Health Initiatives and communities has had positive effects on governance through increasing the participation of communities (Case study 3.5 & Case study 3.6), traditional healers and medicine sellers (Case study 3.7) and community health workers (Case study 3.4) in the planning, implementation and evaluation of community-based interventions (66–77). Community-based dengue control activities suggest that behaviour change is only temporary when prevention tools are deployed “top-down”, without the active involvement of communities. Insights from community participation interventions in onchocerciasis control suggest that, while the acts of volunteering and participation are important, community knowledge and decision-making are the central factors underpinning successful interventions. Cultural factors and gender also

**RESEARCH QUESTION:**

*How can stand-alone disease control information systems be integrated into existing national health information systems and into general health decision-making processes?*

**COMMUNITIES AND HEALTH SYSTEMS – PEOPLE MAKE THE DIFFERENCE**

Communities are beneficiaries of health care in their various capacities as patients, consumers, financiers and citizens entitled to health care. Communities interact with health care through their health seeking, caregiving and health promoting behaviours (4). Community beliefs, knowledge, norms and capacity for collective action are therefore recognized as part of an active and dynamic component of working health systems (1, 4, 65). The need to prioritize community ownership and participation in decision-making has been underscored by researchers and policy-makers because of the unique human resource challenges faced by disease endemic countries.

**CASE STUDY 3.5**

**Lessons from the community-directed treatment with ivermectin strategy in west Africa**

The African Programme for Onchocerciasis Control (APoC) uses community-directed treatment with ivermectin (CDTI) as the sole strategy for onchocerciasis control. Based on a successful programme implemented in 11 west African countries – Benin, Burkina Faso, Côte d’Ivoire, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Senegal, Sierra Leone and Togo – in the 1980s and 1990s, the strategy relies on active structural community participation (66, 67). Communities are empowered to decide on how, when and by whom ivermectin treatment should be administered, communities also monitor the CDTI process.

In rural areas of sub-Saharan Africa, the CDTI strategy is proving to be very successful for onchocerciasis control. Over the years, over 56.7 million people living in 16 African countries have received regular ivermectin treatment (68), and more than 700,000 community drug distributors and 60,000 health staff have been trained. They are also available for other interventions, such as providing insecticide-treated nets for malaria at a relatively low cost.

The CDTI process has underscored the importance of harnessing local support in delivering disease interventions, and has also emphasized the importance of community decision-making in participatory health projects.
Case studies in community integration of dengue control

In Honduras, neighbourhood health committees took on the task of controlling the breeding of mosquitoes at both community and household level (69). As a result, neighbourhoods showed significantly reduced numbers of mosquito breeding in containers in comparison to the control areas. Control of Aedes aegypti breeding in Vietnam also adopted a community approach with health agents, school children and community members involved in delivery of biological control agents to prioritized breeding locations. Over three years there were reduced numbers of the vector in most communities under study and actual elimination in a few. Returning to the study site some years after the project concluded, the researchers found that some communities had maintained their role in vector control to prevent dengue (70). In Cuba, a community participation strategy was designed to supplement routine vector control activities. In selected communities local stakeholders formed steering committees and coordinated the work of grassroots working groups that focused on behaviour change related to local water storage containers. The community intervention reduced levels of Aedes infestation by as much as 50% to 75% compared to the control (72).

Research on dengue control has identified models for successful community participation (72, 73). Top-down deployment of technical tools without active involvement of the community has a temporary effect and does not lead to the behavioural changes necessary for sustainable A. aegypti control (74). However, based on published studies, the evidence that community-based dengue control programmes alone and in combination with other control activities can enhance the effectiveness of dengue control programmes is weak (75). A multilevel approach is clearly needed and a framework has been proposed for evaluating the sustainability of community-based dengue control projects (76).

Research has revealed that the control of infectious diseases of poverty is more complex than previously thought. For instance, the epidemiology of infectious disease is changing with the emergence of new infectious diseases and re-emergence of old infectious diseases while the biological, ecological and social determinants of infectious diseases need to be understood and addressed.
Health systems are also complex, context-specific and dynamic; operating within three interdependent sets of relationships (see Fig. 3.1) (4–6). First, the relationships between the seven building blocks are interdependent – changes in any one building block affects the others. For example, weak health governance and financing systems in many poor countries have led to extensive health systems weaknesses ranging from poor training and retention of health workers to an erratic supply of medicines to communities in need.

Second, relationships between health systems and the communities they serve are also interdependent (5, 6). Diseases infect and affect individuals, households and communities differently. Understanding how different social and interest groups within disease endemic communities respond to general and individual risk, or to their disease experiences, is therefore essential for understanding how they demand, access and use health services. Often, poor communities possess the capacity and will to engage in the solutions to their health care problems. Thus community ownership, participation and decision-making must constitute an active and dynamic component of working health systems (1, 4, 65).

Finally, relationships between health systems and broader country contexts are interdependent. A useful definition of the broader country context is the “demographic, economic, political, legal, ecological, socio-cultural (including historical legacies) and technological factors in the environment” (6). The success or failure of health systems and health interventions depend on these complex and dynamic contextual factors. Sectors and public institutions that deal with the wider social determinants of health – such as finance, education and labour – can enhance or undermine the capabilities of health systems. Conflict or ecological disasters can derail national governance and public services for decades and create long-term challenges for health services. In other contexts they can create opportunities for the development and sustainability of required health interventions. Global policies, such as economic reform and food and agricultural policies, can support fragile or struggling states; but they can also undermine governance and priority setting with implications for health, the wider socioeconomic determinants of health and health systems capabilities.

The complex nature of infectious diseases of poverty and health systems demand multidisciplinary research approaches. Health systems research has different frameworks for addressing health systems strengthening; for instance implementation research and operational research. While this offers a multidisciplinary approach to conduct health systems research, there is a need for an overarching framework that coherently integrates concepts and methods. Furthermore, as health systems research is predominantly carried out by institutions in high-income countries, divergent value systems create a power imbalance within the health systems research community (similar to the power imbalance between Global Health Initiatives and governments of developing countries) (81). The research challenge is to...
develop integrated approaches for health systems strengthening that actively draw on equitable partnerships between high and low-income research communities.

**Developing the interface between health system components and infectious disease control programmes – the missing link**

Successful control of infectious diseases of poverty requires a positive interrelation between disease control programmes and the rest of the health system. Such a relationship can be built on the basis of values, approaches and health systems strengthening (see Fig. 3.3). Health systems research can contribute to the setting of priorities and to the identification of solutions for these three areas.

**BROAD HEALTH SYSTEM VALUES**

Each health system is driven by a range of stakeholders with varied interests, values and power status in relation to socially defined health problems, priorities and solutions. There are at least three areas which need to be in broad agreement if an effective interrelationship between infectious diseases of poverty and health systems is to be attained: (i) the right to health and equity through universal coverage; (ii) community involvement; and (iii) sustainability.

Given that infectious diseases of poverty disproportionately affect the poor, health systems and disease control programmes need to operate with the shared value of equity, where the critical needs of the poor are addressed first (82). There must also be an understanding that communities are both beneficiaries and deliverers of health care, so that community beliefs, knowledge, values,
norms and capacities are integral to health systems and health service delivery. Meanwhile, sustainability should deliver a balanced approach to meeting short, medium and long-term needs of health systems and the people they serve.

Research needs to focus on leadership strategies and on the development of mechanisms to share these common values across diverse actors. It needs to become outcome-oriented so that a positive interrelationship is developed between interventions for infectious diseases of poverty and the rest of the health system.

DEVELOPING SYSTEMIC APPROACHES

In theory, infectious disease programmes and interventions are part of the overall health system operating within a given country. In practice, they often operate in parallel to, and even at cross-purposes with, the health system. The governance of this relationship needs to be strengthened through specific approaches that allow policy-makers to interpret the manner in which disease control interventions can be best incorporated into country health systems, to implement governance solutions and to monitor their success. Such approaches must rely on systems thinking. By placing the interdependency of the components of the health system at the forefront of analysis, systems thinking leads to a fuller understanding of how changes in one component can lead to intended and unintended effects in other components, or in the system as a whole; and of how these processes can be modelled and evaluated. A key research concern here is the ability to work through the impact of changes as they are designed and implemented; for example, understanding the impact of decentralization on disease control interventions (Case study 3.2), or how the introduction of pay-for-performance schemes impacts on the rest of the health system.

Systems thinking also aids analysis of the interdependent relationships between health systems and the communities they serve, as well as between health systems and the broader country context. A wide range of stakeholders at local, national and global levels play a role in the development and evolution of health systems. Changes in health systems affect the interests and actions of these stakeholders, therefore any interventions and changes require the collaboration of, and work with, these stakeholders. Research needs to address how stakeholder analysis can be developed in such a way as to develop positive relations between infectious diseases of poverty interventions and the rest of the health system.

The wider social determinants of health are as important as the direct causes of disease and illness. Hence, there is an important relationship between health systems and other sectors (such as nutrition, sanitation, education, labour). Research has to examine those aspects in the environment that have a significant impact on the health system (and vice versa) in order to develop robust and sustainable intersectoral collaboration. Likewise, health systems are in a dynamic interaction with their environment. The changing epidemiology of disease; governance and political systems; culture; and globalization forces can impact on the structure and functions of health systems. Research on how health systems interact with the wider social system and institutions is therefore critical.
Scaling-up has been defined as the deliberate effort to increase the impact of health innovations successfully tested in pilot or experimental projects, in order to benefit more people and foster the development of sustainable policies and programmes (83). The importance of scaling-up rests on the depth and breadth of the challenges facing disease control and the need to improve the quality of disease control and expand its coverage (84). To scale up a programme, decisions have to be made about different degrees of health system integration, such as how to deal with human resource scarcity; how interventions can be expanded through public–private relations; and how advocacy can be incorporated into community participation and ownership or buy-in by international donors. The process can be accelerated through approaches that consider how programme development, monitoring and evaluation interface with the broader health system. A good example of this approach is the Oral Therapy Extension Programme (OTEP) carried out in Bangladesh in the 1980s (Case study 3.8) (85).

Health franchising is an example of scaling-up through systemic integration of interventions within an unstructured private sector. Franchising “incorporates into one system all of the interventions that have been shown to have some effect individually, for example training, performance-based incentives, accreditation and certification, vouchers or other external payment schemes, ongoing support relationships and monitoring” (86). Franchising can provide an attractive addition to the available tools for leveraging existing human resources. Successful health franchising programmes on family planning in Africa and Asia, and on voluntary counselling and testing for HIV in Africa, suggest that health franchising can ensure that diverse groups of practitioners in the private sector increase their quality to an agreed public standard through improving drug supplies and providing training and support (87).

Research into the scaling-up of successful interventions should address bottlenecks from the health systems strengthening perspective: the characteristics of the health system, particularly the strength of primary health care, will have an important effect on how the scaling-up is done. Some basic questions must guide the development of research. What is the opportunity cost of scaling-up a specific innovation on other forms of health care and disease control? How does it relate to equity and efficiency? What are the contextual determinants for success? What information is available to assess scaling-up strategies? (84, 87, 88).

**CASE STUDY 3.8**

**Scaling-up of oral therapy extension in Bangladesh**

OTEP was implemented during the 1980s to reduce dehydration and death from diarrhoea. Thirteen million rural households were reached to demonstrate to mothers how a simple solution of a fistful of molasses (local brown sugar), a pinch of salt and a half litre of water can be mixed at home and used to treat diarrhoea. A year-long pilot programme was implemented to test and develop a home-based sugar salt solution. Once the intervention components were standardized through the pilot, OTEP was launched in 1980 and continued for ten years in three phases. Each scaling-up phase was analysed and modified based on evaluative research.

The studies provided answers to a number of problems – including improving the retention, reinforcement and use of ORT – oral rehydration therapy – and increased the accuracy of the home-based formula. Regular impact assessments of the programme were also conducted at different phases. This case illustrates how research can play a strategic and useful role in programme development and its scaling-up.

Source: reference (85).
STRENGTHENING RESEARCH CAPACITY FOR A POSITIVE INTERRELATION BETWEEN DISEASE CONTROL PROGRAMMES AND THE REST OF THE HEALTH SYSTEM

Health systems research has great potential to address health systems strengthening for infectious diseases control. However, this field of research has a number of challenges and limitations.

- As a new and growing field, health systems research receives significantly less funding than other areas of health research. It was estimated that, around 2002, national health systems in low and middle-income countries devoted only some 0.007% of total health expenditure to this research (89).

- Despite a growing interest and focus on health systems strengthening in poor countries, health systems research has been confined largely to research institutions and activities based in high-income countries; few developing countries have the capacity required (90).

- Health systems research draws heavily on diverse frameworks and disciplines to address context-specific problems. This challenges the growth of a well-structured body of theory and therefore often is not prioritized for funding. Finally, health systems research has focused mostly on a limited number of building blocks, namely financing, human resources for health and medicines and technology. These challenges should be addressed as integral components of health systems strengthening.

The Bamako Call to Action on Research for Health paid particular attention to implementing research on promising innovative tools and strategies as a way of ensuring rapid adoption and scaling-up as well as broader health systems strengthening (91). Implementation research aims to develop the critical evidence base that makes the case for the effective, sustained and embedded adoption of interventions by health systems and communities. It deals with the knowledge gap between efficacy, effectiveness and current practice to produce the greatest gains in disease control (92). Implementation research asks: “What is happening in the design, implementation, administration, operation, services and outcomes of social programmes? Is it what is expected or desired? And why is it happening as it is?” (93). In this way the research can provide evidence to support close engagement with policy-makers and public providers as well as with civil society organizations engaged in service delivery. Implementation research for infectious diseases of poverty is a rapidly growing field, although it lacks adequate definitions and an understanding of its strategic value by researchers, donors and governments (94).

Knowledge translation platforms are being encouraged at country and regional levels to strengthen health systems through the judicious use of evidence (Case study 3.9) (95).

The Canadian Institutes of Health Research define knowledge translation as “…a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge, through sustainable partnerships to improve the health of citizens, provide more effective
CASE STUDY 3.9

Strengthening knowledge translation for malaria scaling-up

The Evidence-Informed Policy Network (EVIPI) team in Burkina Faso focused on strengthening its capacity for knowledge translation and research use. A workshop aimed at producing a research brief for policy-makers and engaging in a deliberative dialogue, both targeting access to artemisinin-based combination therapies (ACTs) for uncomplicated malaria. The process aimed to reach consensus to:

- engage the private sector in adhering to national guidelines about subsidized drugs in all settings;
- motivate and retain community health workers involved in the home management of malaria;
- ban monotherapies after ensuring that ACT is fully deployed across the country and that pharmacies are informed about the policy.

The knowledge translation process was also helpful to reach agreement across stakeholders participating in the proposal tendered to Round 7 of the Global Fund for HIV/AIDS, TB and Malaria (Global Fund). The implementation of the project was therefore able to make an early start with the implementation of the CHW option, through a pilot in three districts of the country, aiming for full-scale implementation for Round 8. An implementation research protocol (mostly a rapid ethnographic assessment) applied to each participating district helps to monitor and evaluate the advantages, disadvantages, costs, barriers and facilitators in the execution of the policy option at the very specific district level. The other two options proposed in the policy brief are also being implemented through additional activities.

Source: Reference (95)

Conclusions – from dependence to ownership

Low and middle-income countries are characterized by complex disease burdens, fragile political systems, national poverty and an unfavourable international economic context. This mix of problems has led to governments of low-income countries becoming overdependent on development partners, donors and philanthropic organizations. In turn, ideological battles have ensued within this complex group of stakeholders on issues concerning the developmental and health needs of poor countries and poor people, and the inability of health systems to control infectious diseases of poverty. Health sector reforms in the 1990s yielded mixed results for infectious disease control in a number of countries. Global Health Initiatives have provided a significant amount of funding for the development of disease control programmes since 2000. However, their bias towards the “big three diseases” – HIV/AIDS, malaria and TB – has left other infectious diseases of poverty and emerging public health challenges underfunded, under-researched, and poorly controlled and treated. Furthermore, like the health sector reforms, Global Health Initiatives have yielded mixed results in terms of the impact of disease control programmes on health systems strengthening.

Much of the complexity underlying the relationship between health systems and the control of infectious diseases of poverty in endemic countries can be explained by
health systems research. It can become a powerful ally by acting as a foundation for capacity strengthening and integration during the design, implementation and scaling-up of disease control programme innovations. Research has demonstrated how care and control programmes for major diseases such as TB have become integrated successfully into health systems, and how they have helped to innovate systems through complementary and mutually reinforcing efforts. Research has also demonstrated the importance of ensuring minimum primary health care capacity if global health initiatives are to have a positive impact, as well as the critical role that communities can play for integration and scaling-up of disease programmes.

Health systems research capacity needs to be strengthened through institutional development, training, project funding and publications to enable countries to identify optimum solutions that systematically address health system bottlenecks. Low-income countries must own their health systems research agendas and the gap between these research communities in high-income and low/middle-income countries needs to be bridged. Some existing approaches within health systems research, such as operational and implementation research, can yield great benefits by exploring the success of capacity strengthening, integration and scaling-up strategies at local, national and regional levels. Implementation research is particularly important now that a host of product development partnerships are developing a rich pipeline of innovations. However, conceptual and methodological challenges need to be addressed in order to achieve successful scaling-up of interventions.

Further research on the demands of health systems and the effects of community delivery approaches is needed to strengthen scaling-up, as well as health systems in general.

There is undoubtedly a growing global interest in health systems research. Health research funding bodies (such as USAID and the National Institutes of Health) have made recent investments in implementation research platforms and translational research, suggesting that health systems research has increased in credibility. This is important. Committed future investments in health systems research are essential if the field is to move fully and convincingly from the margins to the mainstream of intellectual efforts to attain universal coverage for health through robust health systems.

“Committed future investments in health systems research are essential if the field is to move fully and convincingly from the margins to the mainstream of intellectual efforts to attain universal coverage for health through robust health systems.”
References – Chapter three


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