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Strengthening Health Systems to Improve Maternal, Neonatal and Child Health Outcomes: A Framework

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The Maternal and Child Health Integrated Program (MCHIP) is the USAID Bureau for Global Health flagship maternal, neonatal and child health (MNCH) program. MCHIP supports programming in maternal, newborn and child health, immunization, family planning, malaria and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health and health systems strengthening.

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Abbreviations and Acronyms

AMTSL	Active management of the third stage of labor
CBO	Community-based organization
DHMT	District health management team
EHRP	Emergency Human Resource Program
HSS	Health systems strengthening
MCHIP	Maternal and Child Integrated Program
MNCH	Maternal, neonatal and child health
MOH	Ministry of Health
NGO	Nongovernmental organization
SBM-R	Standards-Based Management and Recognition
SWAp	System-Wide Approach
TBA	Traditional birth attendant
USAID	U.S. Agency for International Development
WHO	World Health Organization

Introduction

There is global agreement that well-functioning health systems are needed to reduce maternal, newborn and child mortality and to increase health (McDonagh and Goodburn, 2001; WHO, 2005; WHO, 2007). As for most interventions in the health sector, the success of maternal, neonatal and child health (MNCH) interventions and programs¹ is to a large extent determined by the performance of the overall health system in which they are implemented (Walt, 2004; WHO, 2003; WHO, 2005). There is less agreement on the priority elements of health systems and on what initiatives contribute to strengthening systems to deliver MNCH results.

In response to a request by the Maternal and Child Health Integrated Program (MCHIP), funded by the U.S. Agency for International Development, and building on existing health systems frameworks, this paper proposes a framework that positions MNCH interventions within the broader health system. The framework presents a structure to organize information and assess how various health systems strengthening (HSS) initiatives might operate within a health system to cause changes that result in improved MNCH. It complements other work undertaken by MCHIP on the promotion of approaches to the scaling-up of high-impact MNCH interventions (Hodgins, forthcoming).

This introductory section is followed by a brief review of important concepts and definitions, which is meant to ensure a common understanding from the outset. The next section provides an overview of existing health systems frameworks, which focuses on those that have helped shape the framework proposed in this paper. Next follows a presentation of the proposed framework with a description of its elements and a discussion of its potential applications. Both the different elements and the potential applications are illustrated using the example of a case study conducted in Malawi, which used the framework to investigate how HSS efforts have affected maternal health (Ergo, Shah, Rashidi and Rozario, 2011).

Concepts and Definitions

Health systems

Health systems have been defined in many different ways (Atun and Menabde, 2008; Shakarishvili et al., 2010). Evans (1981) identified the main actors in the health care system and the market and non-market relationships between them. Roemer (1991) defined health systems as the combination of resources, organization, financing and management that culminates in the delivery of health services to the population. Hurst (1991), in his definition of health systems, focused on financial flows and payment methods between population groups and institutions. Cassels and Jonovsky defined health systems in terms of the economic relationship between demand, supply and intermediary agencies influencing the demand-supply relationship (Cassels, 1995; Jonovsky and Cassels, 1996). Hsiao (2003) proposed to conceptualize a health system as “...a set of relationships in which the structural components (means) and their interactions are associated and connected to the goals the system desires to achieve (ends).” He limited the boundaries of a health system to the “components” that “...can be utilized as policy instruments to alter the outcomes.” The World Health Report 2000 described health systems as all the activities whose primary purpose is to promote, restore or maintain health (World Health Organization, 2000), which is the definition now widely used.

When considering a health system, it is important to adopt what has come to be known as *systems thinking*. With roots in other disciplines, such as engineering, computing and cognitive psychology, systems thinking views the system as a whole rather than its individual component

¹ This includes family planning interventions.

parts (Senge, 1990). A system is not just any set of elements, but rather one whose essence is that the whole is different from the sum of its parts (Frenk, 1994). In other words, it emphasizes the interdependence that exists between its different parts. Making changes to any single element of the system will have repercussions throughout the system and, vice versa, the impact of the changes on that element is to a large degree dependent on the other elements of the system and the way they interact.

Health systems strengthening

HSS has received increasing attention in recent years. It has to some extent become one of the new catch phrases in the global health community. Yet, the term is often used rather loosely to refer to a wide array of interventions that do not necessarily address the root problems of the health system or that do not address them in a system-wide manner. It is common to see disease-specific, micro-level solutions mistakenly being labeled as HSS (Marchal et al., 2009).

Put simply, HSS involves identifying issues that interfere with the provision of services and introducing system changes that result in sustainable improvements.² A more formal definition, first proposed by the Health Systems Action Network³ and subsequently adopted by Islam (2007), reads as follows: HSS is “...any array of initiatives and strategies that improves one or more of the functions of the health system and that leads to better health through improvements in access, coverage, quality or efficiency...” This definition is very similar (although not totally) to that formulated by the World Health Organization (2006): “...building capacity in critical components of health systems to achieve more equitable and sustained improvements across health services and health outcomes...”

Existing Health System Frameworks

Many health system frameworks can be found in the global health literature, serving a wide range of purposes (Atun and Menabde, 2008; Van Olmen et al., 2010). Based on their intended use and on their target audience, these frameworks emphasize certain aspects or functions of the health system and ignore others. Some frameworks focus solely on the health care system, for example, while others adopt a much wider perspective, including other relevant sectors or contextual factors such as economics and politics. The narrower scope is typically justified by the difficulty for policymakers to influence determinants of health that lie outside the health care system.

Shakarishvili (2009) makes a distinction between health systems and HSS frameworks. The former provide a bird's eye view of the health system, describing the system, its objectives, its structural and organizational elements and/or its functions and processes. An example would be the building blocks framework (WHO, 2007) discussed below. The latter are more action-oriented. They outline possible courses of action for strengthening the system and its performance. Some frameworks under this second category were designed to assist in the analysis of health system reforms (Frenk, 1994; Kutzin, 2001; Hsiao, 2003; Roberts et al., 2004).

A number of health system frameworks were particularly influential in the development of the framework proposed in this paper. These include: the conceptual framework for linking government policies to health sector outcomes proposed by Claeson et al. (2001); the ‘control knobs’ framework first proposed by Hsiao (2003) and further refined by Roberts et al. (2004); and the WHO health system framework with its six building blocks (WHO, 2007). These

² See FHI Web site at <http://www.fhi.org/en/Topics/Health+Systems+Strengthening.htm>.

³ See Health Systems Action Network Web site at <http://www.hsanet.org/>.

frameworks can be found in Annex 1. Each framework was developed to serve a particular purpose. As such, each has its own merits but also its limitations.

The framework developed by Claeson et al. (Figure 6 in Annex 1), for example, shows how reforms can influence the health system and how this in turn can affect health outcomes. While highlighting the role of communities and households, it does not consider these as being part of the health system. Also, it depicts a unidirectional process starting with government policies and actions and ending with outcomes, thereby ignoring how what happens within the (more broadly defined) health system can influence decision makers.

The WHO framework (WHO, 2007) defines the health system in terms of the following six discrete “building blocks”: (i) service delivery; (ii) health workforce; (iii) information; (iv) medical products and technologies; (v) financing; and (vi) leadership and governance (see Figure 7 in Annex 1). Corresponding to the main functions already defined in the World Health Report 2000 (WHO, 2000), these building blocks were intended to:

- Allow a definition of the desirable attributes of a health system
- Help define WHO priorities
- Help identify gaps in WHO support

WHO fully recognized, however, that “... while the building blocks provide a useful way of clarifying essential functions, the challenges facing countries rarely manifest themselves in this way” (WHO, 2007). At the country level, defining the health system in terms of discrete building blocks might be extremely misleading. It could wrongly promote isolated initiatives aimed at addressing challenges within one particular building block, with no consideration for the influence from and the impact on the other parts of the system. What would be far more useful at country level is a framework that recognizes the inter-dependence between the various parts of the health system, or as Chekland (1981) puts it: “...a framework that sees the system as a set of inter-connected elements forming a whole, thereby possessing properties of the whole rather than of its component parts.”

The control knobs framework (Figure 8 in Annex 1), which is more of an HSS framework, is useful in summarizing the options available to reformers for influencing the performance of a health system. As indicated by Atun and Menabde (2008), however, this framework was not designed to describe or analyze the health system itself or its behavior.

A Health Systems Framework For Maternal, Neonatal And Child Health

This section presents a framework that allows the study of how strengthening the health system can result in improved MNCH. The proposed framework is a combination of a health system and an HSS framework. The section starts with a general overview of the framework. Both the different elements of the framework and its potential applications are then illustrated using the example of a case study conducted in Malawi.

Overview of the framework

The proposed framework is presented in Figure 1. The three boxes in the central part of the framework represent the main components of the health system:

- The health care sector, comprising two sub-components: enabling environment and governance; and service delivery

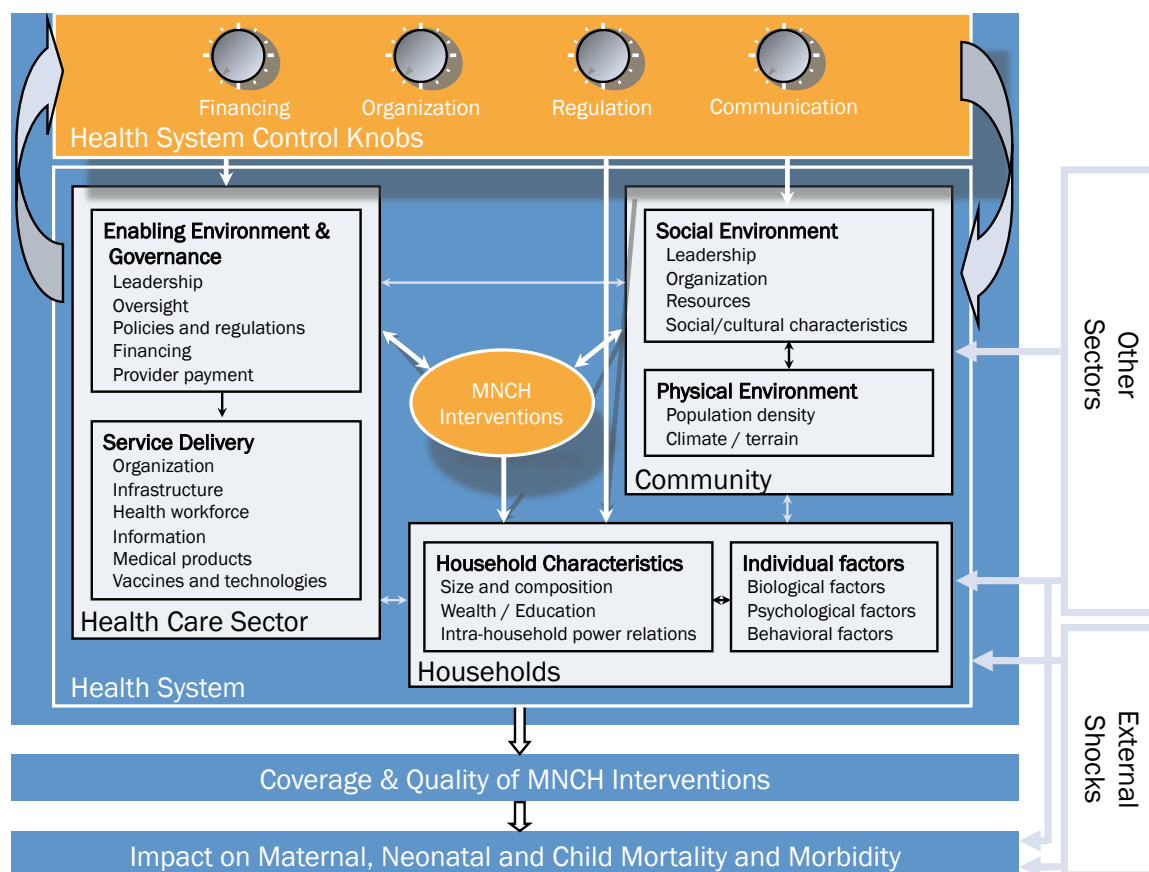
- The community, with the sub-components physical environment and social environment
- The households, which consists of household characteristics and individual factors

Each of these components and sub-components, in turn, comprises various interconnected elements of the health system. The sub-component *enabling environment and governance* under the *health care sector* component, for example, includes the following health system elements: *leadership; policies and regulations; financing; and provider payment*.

MNCH interventions are implemented within the health system. Even though some of the efforts may focus on only a limited number of elements within the health system, it is ultimately the system as a whole—i.e., the combination of the different components and sub-components, and all the interactions within and between them—that will determine the coverage and quality of MNCH interventions, and therefore the impact on maternal, neonatal and child mortality and morbidity. This is shown at the bottom of the framework.

Finally, the four control knobs at the top of the framework allow breaking down HSS initiatives and analyzing how these initiatives trigger changes in the health system, whether and how these changes affect the coverage and quality of MNCH interventions, and what the impact is on MNCH morbidity and mortality. The control knobs represent the types of ‘tools’ available to the different actors—including but not limited to the policymakers—to address weaknesses in the system. These are: financing, organization, regulation and communication. Note that an HSS initiative could very well consist of a combination of several of these tools.

Figure 1. Strengthening Health Systems to Improve MNCH Outcomes - a Framework



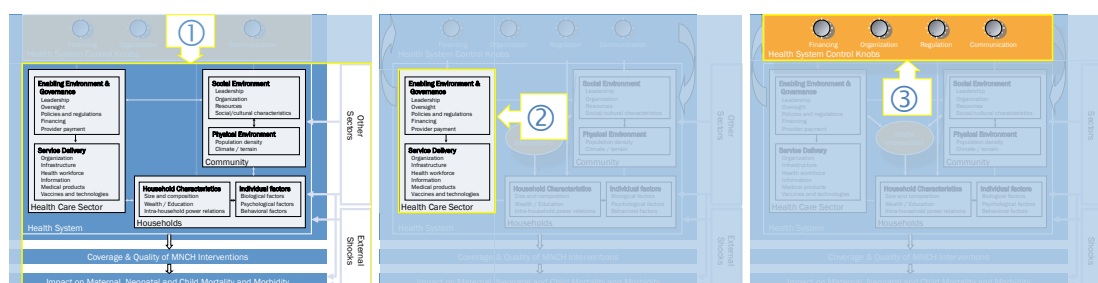
This framework puts particular emphasis on the following aspects of the health system:

- The role of individuals, households and communities as producers of health as well as users of health services produced by the health care sector
- The importance of initiatives that change behaviors and induce health-improving actions throughout the health system: from the level of the individual to that of the service provider, to the local government level, and all the way up to the national policy level
- The linkages between HSS initiatives and MNCH results
- The complementarities between different HSS initiatives

While each of these individual aspects may also be found in other existing health systems frameworks, the distinctive feature of the proposed framework is that it captures them all. In addition, the framework recognizes the important role of other sectors that directly or indirectly contribute to improved MNCH outcomes (e.g., safe water, education, food security), as well as the potential effects of external shocks (e.g., global recession, earthquake, pandemic).

Figure 2 shows the parts of the framework that were influenced by each of the three frameworks referred to in the preceding section and displayed in Annex 1. The whole central part of the framework, with the four main components draws to some extent upon the conceptual framework for linking government policies to health sector outcomes proposed by Claeson et al. (2001) (see ① in the left pane of Figure 2). The six *building blocks* from the WHO framework (WHO, 2007) are captured in one of the four components, namely the *health care sector* (see ② in the central pane of Figure 2). Finally, the control knobs at the top of the framework are those found in the *control knobs* framework proposed by Roberts et al. (2004) (see ③ in the right pane of Figure 2). The only differences are that the control knobs *financing* and *payment* have been combined and that the *behavior* knob was relabeled as *communication* to acknowledge the fact that all the control knobs are, to various degrees, about influencing behaviors.⁴

Figure 2. Influence of Existing Frameworks

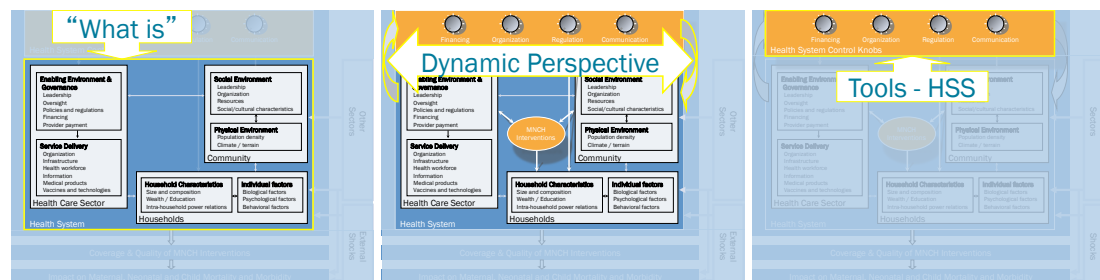


In order to analyze the linkages between HSS initiatives and MNCH results, the framework allows for a dynamic perspective. The central part of the framework provides a snapshot of the health system. It allows to describe ‘what is’ and to identify the main challenges (see left pane in Figure 3). The mix of HSS initiatives adopted to address these challenges can be captured by the control knobs, which represent the types of ‘tools’ the various actors can use to make adjustments to the health system (see right pane in Figure 3). The health system, in turn, responds to the HSS initiatives. How the health system has responded can be assessed by taking another snapshot and comparing it to the first one. This second snapshot will reveal new challenges, calling for a new mix of HSS initiatives, and so forth. The round arrows on both sides of the framework (see middle pane in Figure 3) are meant to highlight these cycles. It

⁴ Interestingly, this control knob was labeled *persuasion* in the initial version of the *control knobs* framework (Hsiao, 2003).

should be noted that changes revealed by the comparison of the two snapshots may also be the result of actions taken in other sectors or they may be the consequence of external shocks.

Figure 3. A Dynamic Perspective



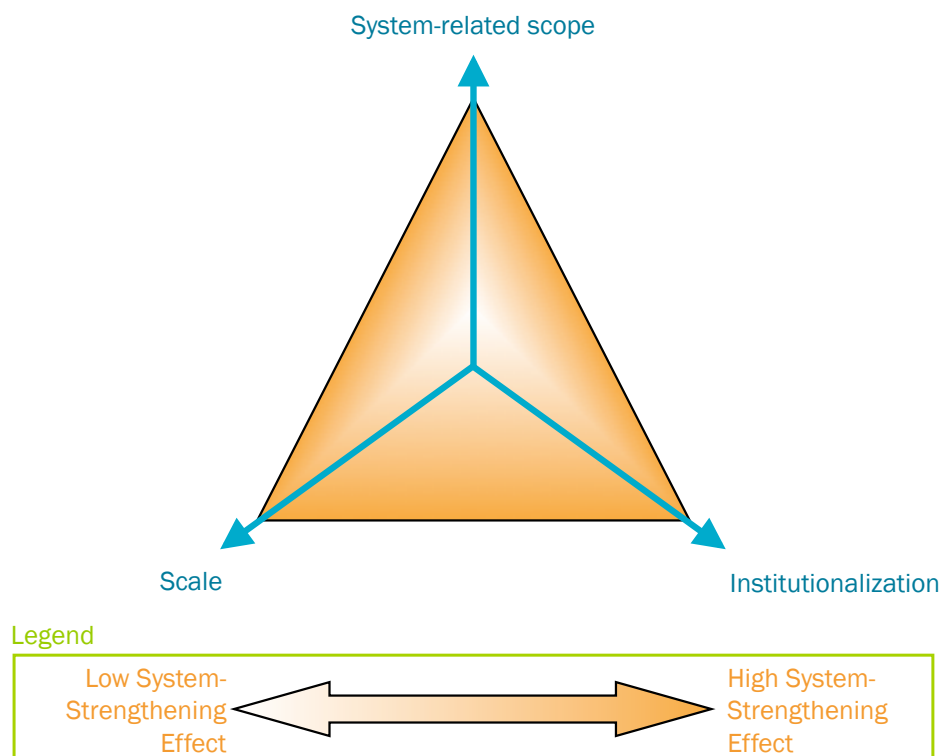
The distinction between these two parts of the framework—i.e., the ‘what is’ part and the ‘tools’ part—explains what may otherwise appear as duplication. Financing, for example, appears in both parts because it is at the same time an important feature of the health system in place, to be described in the snapshot, and a powerful tool to strengthen the health system.

In reality, things are slightly more complicated. HSS measures are not necessarily introduced based on a comprehensive assessment of the health system. Nor are they necessarily designed as a coherent package. Challenges are often seen and responded to in isolation, resulting in a multitude of concurrent cycles with different starting points and durations. New initiatives are often introduced while existing ones are still to bear fruit, making it extremely difficult to attribute changes in the health system to any particular intervention. Unfortunately, no framework can possibly capture such complexity.

In addition, not all measures labeled as *HSS initiatives* will strengthen the system to the same extent. As shown in Figure 4, the extent to which an initiative will actually strengthen the health system depends mainly on three criteria:

- Its *scope*: is the primary purpose of the initiative health-system-related or is it disease-specific or purely clinical, for example?
- Its *scale*: is the initiative implemented nationwide or is it taking place in only one particular community, health facility or district?
- Its degree of *institutionalization*: has the initiative been integrated into a national policy or is it totally dependent on short-term funding from an NGO, for example?

Figure 4. Characteristics of Health System Strengthening Initiatives



Clearly, this is a gradient and the distinction is not always clear-cut. Many initiatives fall in some kind of gray zone between the two extremes. Also, initiatives may gradually move along this gradient. An initiative addressing a weakness in the health system may very well start off as a small-scale project run by a local community or NGO, thereby having limited effect on the health system as a whole, but gradually be scaled up and institutionalized, with an increased health system strengthening effect.

Travis et al. (2004) provide useful examples of possible remedies to typical health system constraints to illustrate what distinguishes a disease-specific response from a health-system response (see Table 1).

Table 1. Typical System Constraints and Possible Disease-Specific and Health-System Responses

<i>Constraint</i>	<i>Disease-Specific Response</i>	<i>Health-System Response</i>
Financial inaccessibility: inability to pay, informal fees	Exemptions/reduced prices for focal diseases	Development of risk pooling strategies
Physical inaccessibility: distance to facility	Outreach for focal diseases	Reconsideration of long term plan for capital investment and siting of facilities
Inappropriately skilled staff	Continuous education and training workshops to develop skills in focal diseases	Review of basic medical and nursing training curricula to ensure that appropriate skills included in basic training

<i>Constraint</i>	<i>Disease-Specific Response</i>	<i>Health-System Response</i>
Poorly motivated staff	Financial incentives to reward delivery of particular priority services	Institution of proper performance review systems, creating greater clarity of roles and expectations regarding performance of roles, review of salary structures and promotion procedures
Weak planning and management	Continuous education and training workshops to develop skills in planning and management	Restructuring ministries of health, recruitment and development of cadre of dedicated managers
Lack of intersectoral action and partnership	Creation of special disease-focused cross-sectoral committees and task forces at national level	Building systems of local government that incorporate representatives from health, education, agriculture, and promote accountability of local governance structures to the people
Poor quality care amongst private sector providers	Training for private sector providers	Development of accreditation and regulation systems

Source: Travis et al. (2004)

MNCH interventions, which are taking place within the health system, are captured by the oval over the central part of the framework in Figure 1. These include all the high-impact interventions—with both their contents and their delivering strategies (Barker et al., 2010; Hodgins, forthcoming)—that a program such as MCHIP is promoting (e.g., the active management of the third stage of labor (AMTSL) or the addition of a new antigen to routine immunization). The delivery of these interventions relies on the various elements of the health system and the way they interact. Both the quality and the coverage of the MNCH interventions will depend on whether or not these elements are present and interact the way they are supposed to.

Potential uses of the framework

The proposed framework will hopefully promote and assist a more comprehensive approach to HSS. Given all of its features, it has at least four possible applications. It can be used:

- As a structure to organize data, by describing the current features of a health system in a snapshot, or to dynamically assess the changes within a health system over time
- As a diagnostic tool, to identify health systems strengths and weaknesses
- As a programming tool, to identify priority areas for assistance, and to thoughtfully design approaches to address the strengths and weaknesses determined in the diagnostic phase
- As a research tool, to trace the linkages between an initiative introduced to improve results, the elements of the health system that are impacted by the initiative, the gaps that remain and the ultimate impact of the initiative

We believe that the framework also has many audiences. At a national level, policymakers at the Ministry of Health (MOH), legislators and bilateral and multilateral donors focusing on MNCH outcomes can use the framework to remind themselves of the key health system inputs required to meet their goals. This audience has the power to have an impact on the broader health system, by designing initiatives that “turn the knobs,” creating national changes. In

circumstances with greater decentralization of public sector functions, sub-national (provincial or district level) policymakers are also able to use the framework to plan how to address deficiencies within their domain. They may be able to propose legislation, raise and channel funds, or create new cadres of health professionals. NGOs and community-based organizations, which receive grants to implement health sector interventions, are a third type of audience for this tool. Communities can use the health system snapshot to advocate for change, partner with other entities and ensure that in the design of local interventions, they are aware of the contextual elements that have to be in place.

Defining the elements of the framework

This sub-section aims to provide clear definitions for the various elements of the proposed framework, to justify the way these elements have been grouped into components and sub-components, and to clarify the meaning of the arrows connecting these elements.

The Health System Control Knobs

While the control knobs in our proposed framework are to a large degree inspired by those in the original control knobs framework, two important distinctions need to be noted. These relate to the following questions:

- Who can turn the control knobs?
- What levels of the health system can be influenced by the control knobs?

Roberts et al. (2004) described the control knobs of their framework as follows:

“... We conceive of a health system ‘control knob’ as something that can be adjusted by government action. Furthermore, adjustments or changes in the control knobs must be significant causal determinants of health system performance. In other words, our control knobs describe discrete areas of health system structure and function that matter significantly for health system performance and are subject to change as part of health reform. Given this formulation, factors in health system performance that cannot be changed as part of health reform are not part of a ‘control knob.’ Conversely, neither is everything that health reform can change...”

This description implies that the control knobs in their original framework can only be turned by the government. The emphasis on health reforms also implies that turning the control knobs is expected to result in system-wide changes, as opposed to changes in one particular health facility or district, for example. In contrast, the control knobs in our framework can be turned by a whole range of stakeholders, including but not limited to the government, to address performance gaps at various levels, including but not limited to the national level. It is important to realize that while it is often the national health authorities who turn the control knobs, other stakeholders in the health sector, including international development partners, the private sector, NGOs and community-based organizations (CBOs), can also play a critical role. Development partners can (and often do) influence policymakers in various ways (e.g., during grant or loan negotiations, through the technical assistance they provide, during joint progress reviews, etc.). NGOs and CBOs can play an important advocacy role. They can also influence decisions taken at the national level by demonstrating, at small scale, the effectiveness of innovative scalable interventions.

What follows is only a brief overview of the various tools falling under each of the control knobs. For a more extensive discussion, we refer to the publications presenting the control knobs framework (Hsiao, 2003; Roberts et al., 2004).

Strengthening the health system typically requires initiatives that involve more than one control knob. It is therefore important to consider the interactions between the four knobs.

As indicated by the three arrows connecting the health system control knobs to the health system, initiatives captured by the control knobs can lead to changes within each of the three main components of the health system: the *health care sector*, the *community*—in particular the social environment—and the *households*.

Financing

The first control knob, labeled *financing* combines two of the control knobs in the framework by Roberts et al. (2004), namely *financing* and *payment*. It therefore refers to both the way in which funds are mobilized and used, and to the methods by which these funds are paid out to individuals and organizations.

The main HSS tools related to the mobilization and use of funds are: financing method; allocation of funds; rationing; and institutional arrangements for financing. Financing methods include general taxation, social insurance, private insurance, donor funding, community financing and direct out-of-pocket payments by patients. The mix of financing methods will determine the volume of the resource envelope for health, who is in control of available resources and who bears the financial burden. How funds are allocated to population groups or across types of services and how health care is rationed to individuals have important implications in terms of both efficiency and equity. Funds need to be allocated among prevention, health services, medical training and capital investments. They also need to be allocated to the different levels of health care and to geographical areas. Even after funds have been allocated, services still need to be rationed. This can be accomplished in various ways, including for example by price, waiting time or patient choice. Institutional arrangements for financing refer to the design of the institutions responsible for collecting the money—and the extent of competition in financing—and the level of decentralization of public financing.

The choice of methods by which funds raised are paid out to individuals and organizations can be extremely powerful in introducing two types of incentives within the health system: financial reward and risk bearing. These incentives can be introduced both on the supply side, through methods such as fees, capitation, pay for performance and budgets, and on the demand side through, for example, conditional cash transfers.

Organization

The second control knob is *organization*. While each of the control knobs has an organizational aspect (e.g., the control knob *financing* captures the way a social health insurance system is organized), this second control knob focuses more narrowly on the organization of health care provision. This can refer to the overall structure of the health care delivery system, including, for example, the supply chain for drugs or vaccines, as well as to how individual organizations providing health care services, including, for example, laboratories and blood banks, are organized and managed. While recognizing that the boundaries of some types of ‘organizations’ can be somewhat ambiguous, Roberts et al. (2004) specify that this control knob focuses on the following four characteristics of the health care system:

- The mix of organizations providing health care services (including public and private organizations—both for-profit and non-profit)
- The division of activities among these organizations
- The interactions among these organizations and their relationship with the rest of the political and economic system
- The internal administrative structures of these organizations

They further identify three types of tools or strategies falling under the *organization* control knob:

- Who-does-what strategies, which focus on changing the mix of organizations or the division of tasks among them
- Incentive strategies, which focus on the incentives created by the connections between health care organizations and the rest of the system. Examples of such strategies include changing the level of competition among health care providers, or using contracting to influence the delivery of services
- Managerial strategies, which focus on changing what happens within organizations. Examples of managerial strategies include total quality management, efforts to improve public-sector management and changes in the level of decentralization

In order to be effective, these strategies need to work together. They need to complement and reinforce one another. Incentive changes, for example, need to be accompanied by changes at the managerial level. In addition, organizational changes often require the use of the other control knobs. Regulation may be needed to change the level of competition. Changes in the way providers are paid may be necessary to alter the division of tasks among them. To the extent that the use of the other control knobs is aimed to produce changes in the organization of health care provision, these interventions will all fall under the *organization* control knob. Roberts et al. (2004) emphasize that what ultimately matters is how organizational changes affect the behavior of front-line workers and their managers, as well as that of users.

Regulation

Regulation should be understood as “... the use of the coercive power of the state to change the behavior of individuals and organizations in the health sector...” (Roberts et al., 2004). It refers to the full range of legal instruments, including laws, decrees, orders, codes, administrative rules, guidelines, etc. These may be issued by the government, by parastatal organizations such as sickness funds or by nongovernmental bodies to which the government has delegated regulatory power. Beyond health care providers, both private and public, and health financing entities, regulation may also target those who produce inputs for the health system such as pharmaceutical companies and those who educate health professionals. It does not stop at the enactment of legal instruments, but also includes enforcement, i.e., the process of identifying, penalizing and deterring violators.

There is an important reciprocal relationship between the *regulation* control knob and the other knobs. Actions involving the other control knobs often need to be accompanied by appropriate regulation, and *vice versa*, regulation tends to be more effective when accompanied by appropriate incentives, by efforts to influence individual behavior and by suitable organizational arrangements.

Examples of initiatives captured by the *regulation* control knob include the regulations pertaining to the organization of social health insurance (e.g., who is eligible, how is the premium calculated, what is included in the benefit package), drug safety regulation (e.g., which drugs are included on a national essential drug list, who can prescribe and dispense drugs, how should drugs be labeled...), and rules compelling graduates of medical and nursing schools to serve for a certain number of years in underserved areas.

Communication

Labeled *persuasion* in the initial version of the ‘control knobs’ framework (Hsiao, 2003), subsequently renamed *behavior* by Roberts et al. (2004), this last control knob captures all the “...methods for changing individual behavior through population-based interventions...” (Roberts et al., 2004). In other words, it captures all the tools at the disposal of the reformers that can change individual behaviors *and* that do not already fit under one of the other control knobs. Changing how providers are paid, how health services are organized or how the various organizations and individuals in the health system are regulated all involve some form of behavior change—whether the behavior of health professionals, producers of inputs into the health system, patients or household members. Because behavior change is so critical to all control knobs, we prefer to give this one another label, namely *communication*, the more that it “...draws heavily from the field of social marketing...” (Roberts et al., 2004), which is all about communication. The communication control knob can address at least four categories of individual behavior: health-seeking behaviors; health professional behavior; patient compliance behaviors; and lifestyle and prevention behaviors. Table 2 provides examples of interventions that could be adopted in each of these four categories.

Table 2. Examples of Approaches Captured by the Communication Control Knob

<i>Category of Individual Behavior</i>	<i>Possible Interventions</i>
Health-seeking behaviors	Campaign to encourage patients to go to the local health center first (possibly accompanied by efforts to improve the quality of care at those facilities—through the <i>organization</i> control knob or the introduction of user fees for bypassing the health center—through the <i>financing</i> control knob)
Health professional behavior	Provide information to health care providers using a social marketing approach to change their prescribing behavior Campaign targeting drug sellers to encourage the sale of oral rehydration salts or to discourage the sale of injectable forms of medicines where an oral equivalent is available
Patient compliance behaviors	Mass media campaign to encourage patients to take the full course of antibiotics or to promote exclusive breastfeeding for six months
Lifestyle and prevention behaviors	Behavior change and communication program to promote handwashing with soap at critical times

Even though the emphasis is on individual behavior, what matters in many instances is the collective action of groups of individuals (e.g., district health management teams (DHMTs), community action groups, households...). Some interventions under this control knob may therefore target entire groups rather than focusing on individuals.

The Health System

Within the body of the framework lie several domains comprising the health system. Traditionally, the health system has been limited to the formal health care sector; however, as described above, we define the health system to also include households and communities.

The health care sector

The elements of the health care sector are controlled by the four knobs, and are influenced by the characteristics of the communities and households they serve, at both the local and national

levels. This is a reciprocal relationship, whereby certain features of the community and household domains can be influenced by the health care sector. The description of the elements of the health care sector, below, is adapted from other literature (WHO, 2007; Claeson et al., 2001; Van Olmen et al., 2010).

Enabling environment and governance

The governance and stewardship of the health care sector should usually be the responsibility of the national MOH; however, other supporting institutions can include other ministries, the legislature, professional councils, independent auditors and NGOs that may serve as watchdogs. Creating the environment within which the health care sector can function effectively, and upon which the control knobs can effect change, comprises several key items.

Leadership within the health system includes setting priorities and an overall vision and direction for the health system. Good leaders will also ensure that policies and regulations are in place for effective, safe service delivery, and that there are appropriate mechanisms in place to ensure accountability. Stewardship of the health care sector includes coordination between service delivery agents, donors and other ministries. It can also comprise regular monitoring and evaluation, as a method of maintaining oversight and promoting accountability to the defined priorities of the health system.

Finally, the enabling environment for health care delivery includes the regulations and practices regarding provider payment and the financing of the health care sector. Distinct from the control knob of financing, in this portion of the framework, we refer to the operational aspects of user fees, health insurance, contractual agreements, results-based financing or fee-for-service, by which funds are transferred between the various actors and clients within the health system. The presence or absence of each of these features of the enabling environment has a direct impact on the service delivery functions of the health care sector.

Service delivery

Delivery of health services comprises many different elements, each of which has many layers of functioning. The following section illustrates the broad elements that should be considered when using the framework, whether it is to evaluate the current state of the health system or to plan a future intervention.

The organization element of service delivery corresponds broadly to what the organization control knob described earlier tries to change. It therefore encompasses the same four characteristics of the health care system already listed above, namely:

- The mix of organizations providing health care services (including private, for-profit and CBOs)
- The division of activities among these organizations
- The interactions among these organizations and their relationship with the rest of the political and economic system
- The internal administrative structures of these organizations

A second element of the service delivery is the *infrastructure*, which constitutes the physical capacity and readiness of the (usually public sector) buildings, equipment, communication systems and transport networks.

The health workforce is the backbone and limbs of the health care sector. Human resource crises in health are prevalent (for varying reasons) all over the world, and policymakers often do not address health worker shortages until it is too late. Issues within the workforce sub-sector

include the number and distribution of health workers,⁵ their skill mix and overall skill set, staff productivity and quality of care provided. In Africa in particular, health workforce issues also include the impact of HIV/AIDS on workers and their families, and the subsequent impact on the health system. A comprehensive picture of the health workforce would include all issues that affect the inflows and outflows of these valued professionals within the health care sector of a particular country or region.

Integral to the delivery of health services is the timely availability of high quality drugs and supplies to facilities at all levels of the health sector.⁶ The stocks of medical products and vaccines should be well managed, affordable to facilities and clients, and appropriately distributed (rational prescribing, equitable geographic availability). The availability of pharmaceutical and medical supplies enables health workers to deliver appropriate care, and builds the community's trust in the health system (Wagstaff and Claeson, 2004).

Managing the supply chain is predicated by having the right data at all levels—case load and case mix, current stock levels for drugs and supplies, and predictions of future needs. This information, combined with information on the quality of the care delivered, is a key input in ensuring that resources are appropriately utilized. Data drives accountability and oversight, decisions on what health systems changes need to be made, and how the system as a whole and each of its parts is functioning. An important aspect of the information and data element is to understand whether and how the information collected within the health system is used to guide decisions.

The community

The link between community and health has been studied extensively in the literature on social determinants of health. In their review of this literature, Patrick and Wickizer (1995) first looked at the various ways in which *community* is being defined. They observe that definitions of community vary widely across disciplines and fall into three broad categories: community as place, community as social interaction, and community as social and political responsibility. They propose the following working definition of community: "...Community concerns the entire complex of social relationships in a given locale, and their dynamic interaction and evolution in working toward [the] solution of health problems..." They then propose a framework for studying community and health, which builds heavily on a causal model developed by Evans and Stoddart (1990). That causal model distinguishes the physical and social environment from the individual behaviors and biology that constitute the 'host' response. The framework proposed in this paper draws upon this work and recognizes the importance of both the social and the physical environment and their interaction, as well as that of the individual response. It adds a layer by placing individuals within households (see below).

The double arrows connecting the *community* component of the framework to the *health care sector* and the *households* emphasize the fact that these different components are in many ways intertwined and not always easy to dissociate. Much of the health service delivery takes place within the community, often with the active involvement of or at the initiative of the community. Community health workers are often selected within—and sometimes by—the community, while also being part of the health workforce. Community action groups created to address particular health issues such as maternal and newborn health, which in the framework would fall under the *organization* element of the *social environment*, have in an increasing number of countries come to play an important role as consumer advocates in national delivery strategies. As change advocates or purveyors of information/primary health care, they are also

⁵ The term *health workers* should be understood broadly, to also include categories such as pharmacists, laboratory technicians, radiologists, etc.

⁶ This includes drugs and medical supplies distributed by community health workers.

closely linked to the *organization* element under the *service delivery* sub-component of the framework. Likewise, the community is composed of households, and even though a community is more than simply the sum of the households living in that community, its characteristics are to a large degree shaped by the characteristics of its composing units. Vice versa, the community is an important part of the environment in which the households live. Consequently, household characteristics are strongly influenced by those of the community as a whole.

Social environment

A community's social environment includes a range of social units, such as worksites, schools, families, friends, social organizations or institutions, all captured by the *organization* element. These are all sources or reciprocal social influence affecting the health of individuals, either directly, as in the case of community health organizations, or indirectly. Individuals and groups are both agents and recipients of social influence (Evans and Stoddart, 1990). The success of community mobilization, organization and empowerment is to a large extent dependent on the presence of leadership within the community. It also depends on the resources available within or made available to the community. Note that resources include not only physical and human resources but also social capital, i.e., the connections within and between social networks.

The social environment encompasses different social and cultural characteristics and processes ranging from ethnic composition and demographic characteristics to the dynamics of community interaction. Based on their review of the literature, Patrick and Wickizer (1995) found that the most important social and cultural characteristics of a community are the level of poverty (and more particularly the degree of social inequality), the presence and extent of gender inequality, social cohesion/homogeneity, and cultural and social norms. These are all captured by the element *social/cultural characteristics* in the proposed framework.

Physical environment

Communities also contain the physical environment. The physical environment of a locale affects the health of its residents (Evans and Stoddart, 1990). Major physical factors identified by Patrick and Wickizer (1995) include population density, climate, food supply, transportation and pollution. In the proposed framework, we have included population density and terrain/climate, the rationale being that the terrain is an important determinant of environmental quality, food production and transportation.

The households

Both the individuals' need for services—preventive and curative—and their ability to access and use these services, to adopt healthy dietary and sanitary practices, etc., depend on a variety of factors, including several at the household and the individual levels. The following paragraphs highlight the most important of these factors at each of the two levels.

Household characteristics

Even though practices vary from country to country, a household is usually defined as a group of persons (or one person) who make common provision for food, shelter, and other essentials for living (Bongaarts, 2001).

Household size and composition are important in many ways. First and foremost, household size is strongly related to the total fertility rate, which is one of the factors determining the lifetime risk of maternal death. Several studies have also demonstrated an association between household size and the frequency and degree of malnutrition among children in the household (Tomar and Srivastava, 1980). In many countries, the sibling sex composition in a household influences the likelihood of having an additional child (Filmer et al., 2009). Household headship can also be an important factor. Female-headed households tend to be poorer than either male-

headed or dual-headed households. At the same time, women in female-headed households may have more decision power (Staten et al., 1998; Bomela, 2007).

Household wealth, which reflects the material household conditions, can affect health directly through the exposure to factors such as cold, malnutrition and infection. As such, it will determine whether a household's basic needs, such as shelter and food, are fulfilled or not. Household wealth is also an important factor influencing health-seeking behavior. Poor households have limited resources (including cash and in-kind income, assets, etc.). Moreover, the availability of these resources often fluctuates widely over time, especially for those involved in seasonal trades (e.g., agriculture). Low levels of wealth, especially wealth that is easily convertible into cash, are a major constraint for poor households in times of illness.

Education is a powerful determinant of health (Berkman et al., 2004; Cutler and Lleras-Muney, 2006; Gakidou et al., 2010; Skolnik, 2007). Poorly educated women are more likely to get married and have children at an earlier age. They have also been shown to be less likely to adopt practices known to promote and protect their health and the health of their children such as handwashing with soap, exclusive breastfeeding, antenatal care visits or birth attendance (Grosse and Auffrey, 1989).

Another critical household characteristic is the intra-household power relationship. In many societies, the balance of power within households is unequal between men and women, especially among poorer, less educated households. This may translate in women having little control over household finances or in their having limited say when it comes to the use of contraceptive methods to prevent unwanted pregnancy and/or sexually transmitted infections. It may also translate in mothers' limited ability to seek care, either for themselves or for their children (Claeson et al., 2001).

Individuals

One of the main conclusions formulated by the Institute of Medicine's Committee on Health and Behavior (2001) was that health and disease are determined mainly by interactions over time among biological, psychological, behavioral and social factors. Social and psychological factors, commonly referred to as psychosocial factors, influence health both directly through biological mechanisms and indirectly through behaviors. These factors reflect the 'health-damaging potential of psychological stress,' as 'generated by despairing circumstances, insurmountable tasks or lack of social support' (Krieger, 2001). They involve social stressors (including life events, acute and chronic stress) and buffers (such as coping responses, social supports), and operate at both the individual and the population level. They are therefore themselves the product of or response to factors beyond the individual, including household characteristics such as the material household conditions and the broader social environment (Schor and Menaghan, 1995; Lantz et al., 1998; Institute of Medicine, Committee on Health and Behavior, 2001; Brunner and Marmot, 2006; Jarvis and Wardle, 2006). This is yet another illustration of the interdependence that exists between the different components and sub-components of the framework.

MNCH Interventions

The types of interventions captured by the *MNCH interventions* oval in the framework were already described and illustrated above. The double arrows connecting the oval to the three components of the health system—the *health care sector*, the *community* and the *households*—emphasize that these interventions are implemented within the health sector and that their successful delivery is dependent upon the presence and the well-functioning of the various elements of the health system.

Other Sectors

Maternal, neonatal and child mortality and morbidity depend on much more than the performance of the health sector. The role played by other sectors, including but not limited to education, water and sanitation, agriculture, communication and economy, is equally important. These sectors can affect MNCH either directly or indirectly through their effect on the health system at any of the levels. An example of the former is food security, which refers to the availability of and access to food. The availability of food is greatly influenced by the level of per capita food production, which, to a large degree, is the responsibility of the agriculture sector. The effect is direct in the sense that food insecurity, which translates into different forms of malnutrition, directly impacts MNCH. An example of the latter is the road conditions, which influence the health-seeking behaviors and the access to health services. Despite the important role they play in the context of MNCH, these other sectors can usually not be influenced by the health system control knobs.

External Shocks

In addition to the influence from HSS initiatives and from other sectors, the health system can also be affected by external shocks. These include natural disasters such as earthquakes, droughts, floods, hurricanes and epidemics. They also include man-made shocks such as war, political changes and economic shocks (e.g., a global economic crisis). As was the case for *other sectors* discussed above, the effect of external shocks on MNCH may be direct, indirect or a combination of both. An earthquake, for example, may injure and kill many mothers and children (direct effect). In addition, it may also destroy health infrastructure and disrupt the cold chain for vaccines (indirect effects).

Coverage and Quality of MNCH Interventions

What is the role of the health system? Within the context of this framework for MNCH, the role of the health system, with all of its actors and actions, is to have a positive impact on MNCH through the reduction of mortality and morbidity. These desired reductions can be attained through high-impact *MNCH interventions* if these interventions are delivered in ways that have considered the context of the health system and that have adequately accounted for its deficiencies and the manner in which these deficiencies are being or will be addressed (through the control knobs). The broader context, such as the state of the supply chain, health workforce, or policies and regulations, will affect the outcomes of the interventions. As described on page 11, this framework can be applied as a programming and research tool, to design and evaluate a variety of programmatic approaches from a health systems perspective, and their impact on MNCH. The outcomes of MNCH interventions can be assessed based on their coverage (number of people reached), quality, equity (whether the intervention was pro-poor) and affordability. These elements will be influenced by the household, community and health care sector context within which the interventions are being delivered.

Impact on Maternal, Neonatal and Child Mortality and Morbidity

Finally, the ultimate assessment of the interventions, and of the health system, is the impact on the lives and lifespan of the vulnerable members of society. Maternal, neonatal and child mortality and morbidity can be impacted directly, through interventions designed for that purpose, efforts by other sectors (e.g., education, labor, women's affairs), or external shocks such as natural disasters. It can also be indirectly affected, through omissions in policy decisions, prevailing inequalities and prejudices, or external shocks such as war or global recession. Impacts, particularly on maternal mortality, are difficult to measure due to the large sample sizes required and the high cost of obtaining such data, and the full picture of the health system may only be able to be obtained intermittently. Nevertheless, working within the framework,

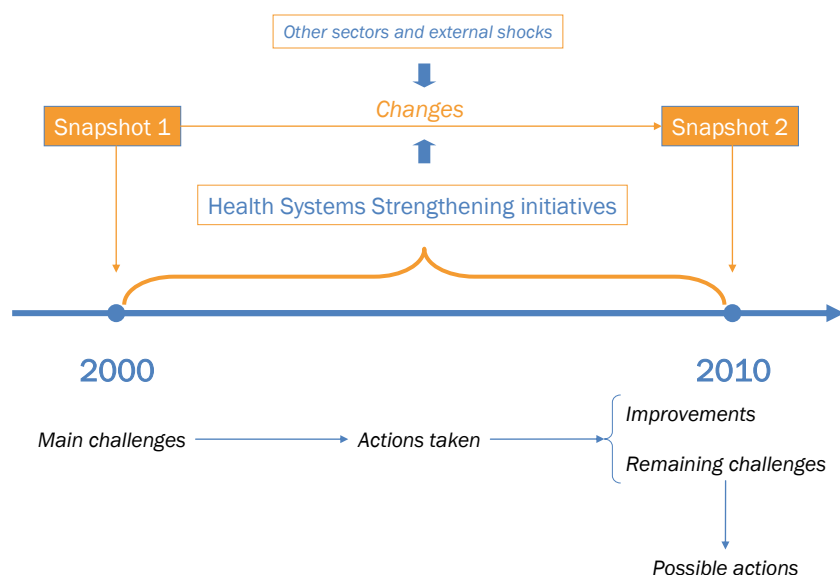
which makes explicit the ultimate goal of our health sector efforts, is a useful tool in ensuring that the big picture is not forgotten.

Applying the Framework—The Example of Malawi

The various elements of the framework, as well as its potential applications, are illustrated using the example of a case study conducted in Malawi in May 2010 (Ergo, Shah, Rashidi and Rozario, 2011). Drawing upon an extensive review of both published and unpublished literature, data from large household surveys and information obtained from key informants representing the views from the different stakeholders, the case study investigates how various HSS initiatives have affected maternal health in the country. The proposed framework was actively used throughout the preparation of this study. It helped structure the interview guide (included as an annex to the case study), provided a structure for organizing and analyzing collected information, and shaped the structure of the paper itself. This practical application, in turn, provided a good opportunity to validate and further refine the framework.

The dynamic perspective discussed above was built into the design of the Malawi case study as displayed in Figure 5. Information was collected on both the status of the health system and the maternal health situation at two different points in time, namely around the year 2000 and around the year 2010. These two snapshots were compared to identify whether and where major changes had taken place. Information was then gathered on the main HSS initiatives undertaken during the 10-year period between 2000 and 2010. The contribution of these initiatives to the observed changes was assessed, as were the remaining challenges by the end of the 10-year period. Note that observed changes may also have been brought about by actions taken in other sectors or by external shocks.

Figure 5. A Dynamic Perspective: Illustration



This can be illustrated with a concrete example. Throughout the example, links to the framework are indicated using *italics*. The 2000 snapshot of the Malawi health system revealed many interrelated and mutually reinforcing challenges. One of these challenges was undeniably the severe shortage of health workers (*health workforce*). This shortage was to a large extent

due to the combined effect of the high prevalence of HIV/AIDS (*external shocks*) and the unattractive working conditions (*provider payment*). In addition to its direct effect on the health workforce, the HIV/AIDS epidemic also influenced many not to enter the medical or paramedical profession for fear of becoming infected with the virus, especially given the inadequate infection control in most health facilities that resulted from a lack of guidelines and standards (*policies and regulations*). Among those already in the profession, many left to go to the UK or to South Africa, where conditions were far more attractive.

Both the staff shortage and the inadequate infection control within health facilities contributed to the poor quality of maternal health interventions (*coverage and quality of MNCH interventions*). This poor quality of care helps explain why, despite the moderate coverage of these interventions (*coverage and quality of MNCH interventions*), maternal health indicators were among the worst in the world (*impact on maternal, neonatal and child mortality and morbidity*). In addition, many maternal deaths were, either directly or indirectly, a consequence of the HIV/AIDS crisis (*external shock*).

After 2000, the MOH and its development partners launched a series of HSS initiatives to address weaknesses in the health system. All these initiatives can be captured by the control knobs at the top of the framework. For the purpose of illustrating the framework, we will mention only three of them, namely the three that contributed most to addressing the challenge described above: the adoption and institutionalization of Standards-Based Management and Recognition (SBM-R), the System-Wide Approach (SWAp), and the Emergency Human Resource Program (EHRP). The first of these, SBM-R, is a practical management approach for improving the performance and quality of health services. It consists of clear guidelines and set standards. In that sense, it can be seen as what was referred to as a managerial strategy aimed at changing what happens inside health facilities. As such, it fits under the *Organization* control knob. The second one, the SWAp, got donors to agree on a Joint Program of Work focusing on the delivery of the Essential Health Package. It also got these donors to pool most of their funding. This initiative relates to the control knob *Financing*. The third initiative undertaken to address the human resources crisis was the EHRP. This program consisted of a mix of measures focusing on retention, deployment, recruitment, training and tutor incentives for 11 priority cadres. Some of these measures introduced financial and non-financial incentives for health workers, including a 52% salary top-up, improved staff housing and other in-service incentives such as transportation and priority for professional development training. Other measures aimed at expanding training capacity, improving training quality and increasing student intake through tuition subsidies. Overall, all the measures under the EHRP can be captured by the *Financing* control knob.

The various HSS initiatives undertaken by the MOH and its partners between 2000 and 2010, including the three mentioned above, have undeniably improved the overall situation of the Malawian health system. These improvements were revealed by a comparison of the 2000 and the 2010 snapshots. The SBM-R approach was adopted in a large number of health facilities throughout the country (*policies and regulations*), which has contributed greatly to creating a safer and, therefore, more attractive work environment for both existing and new health workers (*health workforce*). Thanks to the SWAp, there is now better donor coordination, a greater focus on results, an integrated monitoring framework and enhanced transparency (*Financing*). In conjunction with ADB funding, the SWAp has also enabled the upgrade of equipment and infrastructure in health facilities (*infrastructure and vaccines and technologies*). The EHRP has made it possible to substantially improve working conditions for health staff through, for example, higher salaries (*provider payment*) and better staff housing (*Infrastructure*). It has also been able to increase training capacity through, for example, upgraded training facilities (*infrastructure*). As a result, the number of health workers and staff retention have both seen a sharp increase (*health workforce*).

These positive developments in the health system, together with others captured by other elements of the framework, have led to improvements in the availability, use and quality of key reproductive health services. These improvements are reflected by the changes in the values of some of the indicators, such as the lowered rate of hospital infections, the increased proportion of facility-based deliveries and the increased proportion of health facilities able to provide basic or comprehensive emergency obstetric care (*coverage and quality of MNCH interventions*). Analysis of the data from the 2010 Demographic and Health Survey, to be released in early 2011, will show whether and to what extent this translates into an improvement in maternal health indicators (*impact on maternal, neonatal and child mortality and morbidity*).

Despite the positive developments, however, many challenges still need to be addressed. These challenges range across all levels of the health system and many are not yet being effectively addressed. At the household level, for example, the cost of transportation to health facilities remains prohibitive for many, resulting in delays in seeking care or reluctance to go to the facility for delivery and postnatal checks (*household wealth*). The problem of transportation is exacerbated in remote areas with poor road networks (*physical environment and transportation sector*). One regulatory change, which occurred over the 2000–2010 period, was to ban traditional birth attendants (TBAs) from attending deliveries, and instructing them instead to serve as referral conduits for the health center. At the community level, prevailing *cultural and social norms* make it difficult to enforce this changed role of the TBA (*policies and regulations*).

Within the health care sector, the supply chain, for drugs and commodities, is inefficient and often leaves health centers with stock-outs. Using the framework, it is evident that the supply chain includes *health workforce, information* or appropriate data and management of the *medical products, vaccines and technologies*. Initiatives that address the supply chain challenge should account for each of these aspects. The quality and use of data in Malawi are also poor, which hampers many well-planned efforts that rely on the HMIS for feedback (*information*).

A final example of the challenges, for which possible strategies have been proposed (Ergo, Shah, Rashidi and Rozario, 2011), is in the realm of *enabling environment and governance*. There does not appear to be a culture of accountability within the Malawian health system, which is compounded by a lack of authority at various levels to enforce accountability, through supervision and oversight (*oversight, leadership, policies and regulations*). Changes to provider payment, through incentives, or to the organization of chains of command, are possible strategies that could be employed to address this challenge. These are captured by the control knobs *payment* and *organization*, respectively.

The cyclic nature of the framework (arrows between the control knobs and the health system) is well-illustrated by the Malawi example. Snapshots describe the Malawian health system at different points in time and highlight the main challenges. A dynamic perspective allows one to describe the steps undertaken by the Government of Malawi and its development partners to address these challenges and to assess the effectiveness of these steps. It also allows one to propose strategies for the future.

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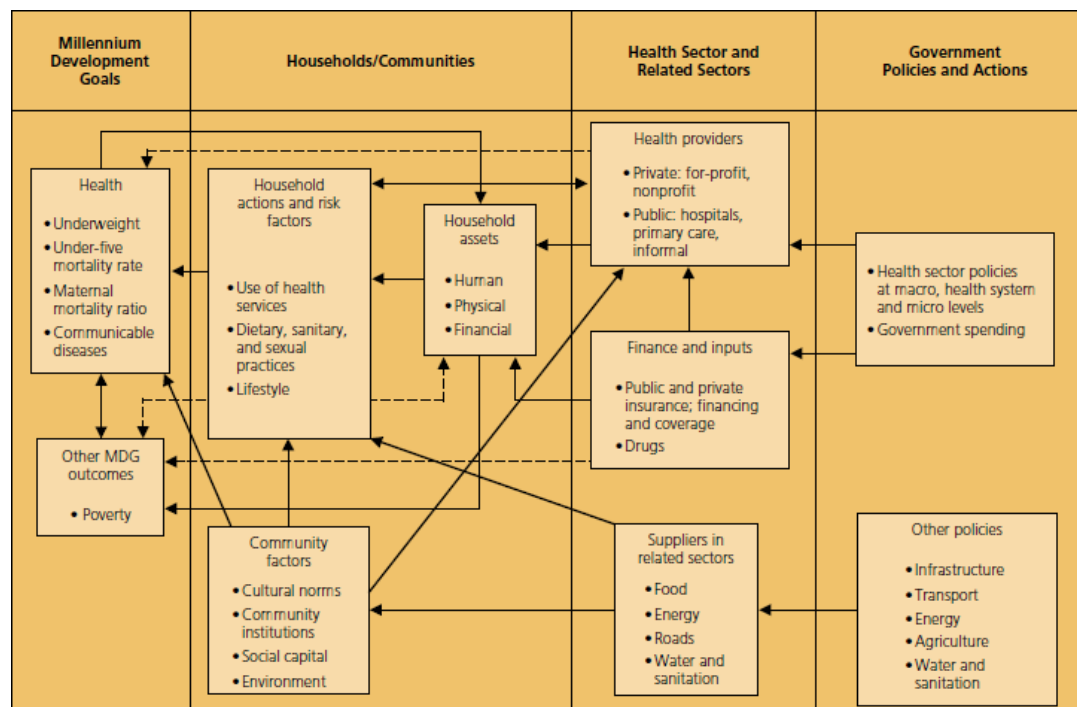
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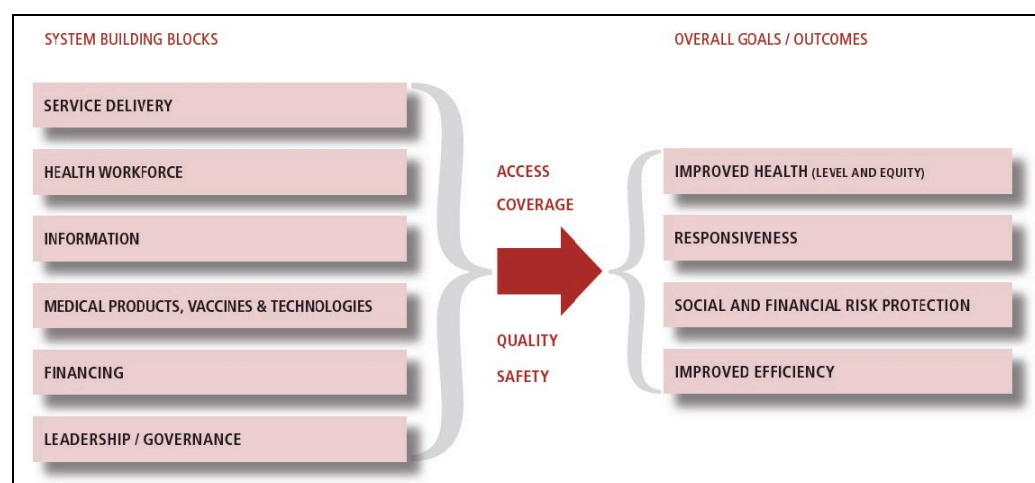
Annex 1—Health Systems Frameworks that Helped Shape the Proposed Framework

Figure 6. Conceptual Framework for Linking Government Policies to Health Sector Outcomes



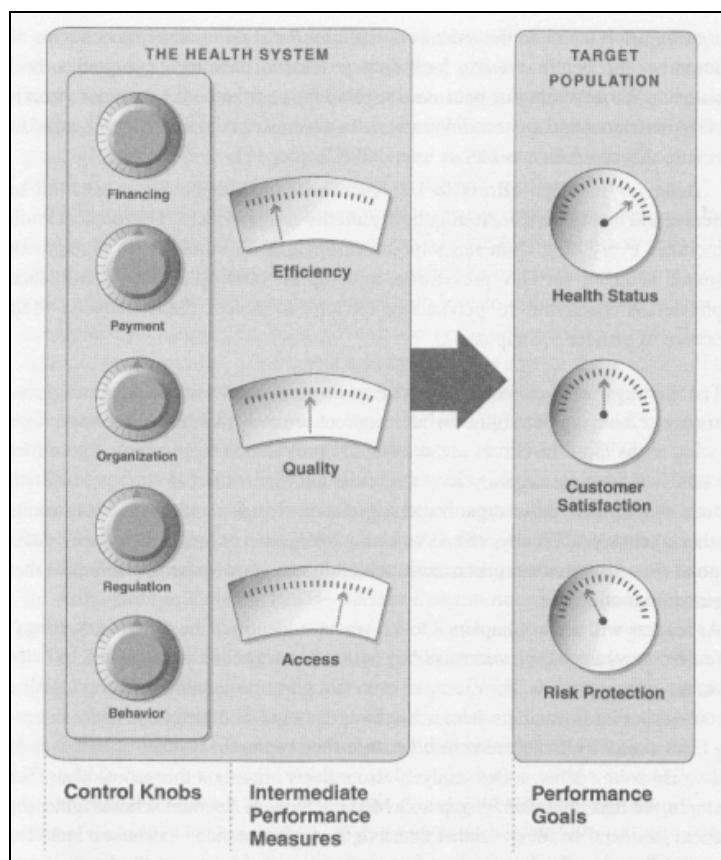
Source: Claeson et al., 2001; Wagstaff and Claeson, 2004

Figure 7. “Building Blocks” Framework



Source: WHO, 2007

Figure 8. “Control Knobs” Framework



Source: Roberts et al., 2004