

Industry Agenda

Health Systems Leapfrogging in Emerging Economies Project Paper

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Preface



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The opportunity for emerging economies to set their health systems on a path to sustainability is unprecedented. By 2022, an estimated one third of all global health expenditure will occur in emerging economies. For every additional US\$ 100 spent on health in 2022 (compared with 2012), US\$ 50 will come from emerging economies. Whether this increased investment will lead to the difficult challenges that developed economies now face or to a transformation of emerging economy health systems depends on decisions being made today.

Trailing behind has advantages. Emerging economies are generally less burdened by the legacies of the past and enjoy a greater degree of freedom to design efficient and cost-effective systems. This allows them to leverage technological advances more easily and to learn from the experiences of developed economies. Seizing this unique opportunity requires an innovative, well-coordinated and implementable set of actions that relies on the expertise, support and collaboration of diverse stakeholders.

Thus the initiative *Leapfrogging in the Health Systems of Emerging Economies: Transformation Towards Sustainability* sets out to identify insights for emerging economies. The initiative will last three years and its objectives are twofold: to describe a health system vision based on key lessons from the experiences of developed and emerging economies and to develop potential paths for the health systems of emerging economies to leap over the problems encountered by developed economies as they achieve this health system vision. The initiative will yield a holistic understanding of health system challenges in emerging economies and create strategies to ensure systems are financially sustainable, while also delivering high quality, cost-effective and accessible care that satisfies individuals' expectations.

What makes this initiative different from similar ones is that it brings all relevant stakeholders together to work towards the vision in a new way: it puts preserving human dignity at the centre of all efforts. Unfortunately, in recent years, economies have focused too much on health outcomes at the expense of the individual. This initiative seeks to help re-humanize health. To this end, a set of fundamental principles are proposed to guide the work on identifying leapfrogging opportunities.

This paper is the first to come out of the initiative. Its objective is to give an update on the progress made during the first year of work and to explain the path forward. It describes both the challenges and the opportunities facing emerging economies, outlines a vision for health systems and introduces leapfrogging as an approach and mindset to achieve that vision. Health systems leapfrogging in practice is illustrated with several case studies.

The work thus far is just the beginning of a journey towards building more sustainable health systems globally. This journey starts with emerging economies, but may also extend to developed economies exploring the possibilities for reverse innovation.

Section I: Why Health Systems Need Leapfrogging

A. Context and Problem

Emerging economies¹ face a major and growing challenge to their ambitions to put their health systems² on a path to sustainability. As they try to catch up with more advanced health systems, they often replicate the path of developed economies. In following those examples, however, emerging economies risk manoeuvring themselves into financially untenable situations which could be even worse than those developed economies face today.

Three main factors exacerbate the challenges facing emerging economies. First, the costs of developing their health systems in the same way as developed economies are prohibitive. Nigeria, for example, currently has roughly 14% of the number of doctors per capita of OECD countries. To catch up, Nigeria would need approximately 12 times as many doctors by 2030, requiring, under current training models, about US\$ 51 billion – or 10 times current annual Nigerian public health spending (*Exhibit 1*).

Second, many emerging economies face a double disease burden. On the one hand, they are struggling to satisfy demand for basic health services and to reduce the incidence of preventable communicable diseases.

At the same time, they face escalating incidence of non-communicable diseases³ driven by aging populations and unhealthy lifestyles.

Third, the drivers of demand and supply for health services in emerging economies are more complex and diverse than in developed economies. In Nigeria, for instance, poverty and poor basic health combine with violence and environmental factors to create strong demand for healthcare at the same time that weak infrastructure and delivery systems limit supply.

Historically, emerging economies have under-invested in health: in 2012, their GDP allocation for health was, on average, 5.6%, less than half that of developed economies (12.5%). This has led to shortages in health infrastructure and workforce. As evidence on the impact of health investment on growth became more evident, emerging economies have succeeded in increasing their health spending. From 1995 to 2012, emerging economies' health expenditure grew at an annual average of 7.4%, partly driven by strong GDP growth (5.5%). Until 2022, health expenditure is expected to grow even faster, at 10.7% compared with 3.7% in developed economies for the same period (*Exhibit 2*).

Exhibit 1: Imitating Traditional Development Paths Is Impossible for Emerging Economies Nigeria would need over 700,000 additional doctors to reach OECD levels by 2030

Sources: World Bank, WHO, Africa Health Workforce Observatory, BMI, IFC, BCG

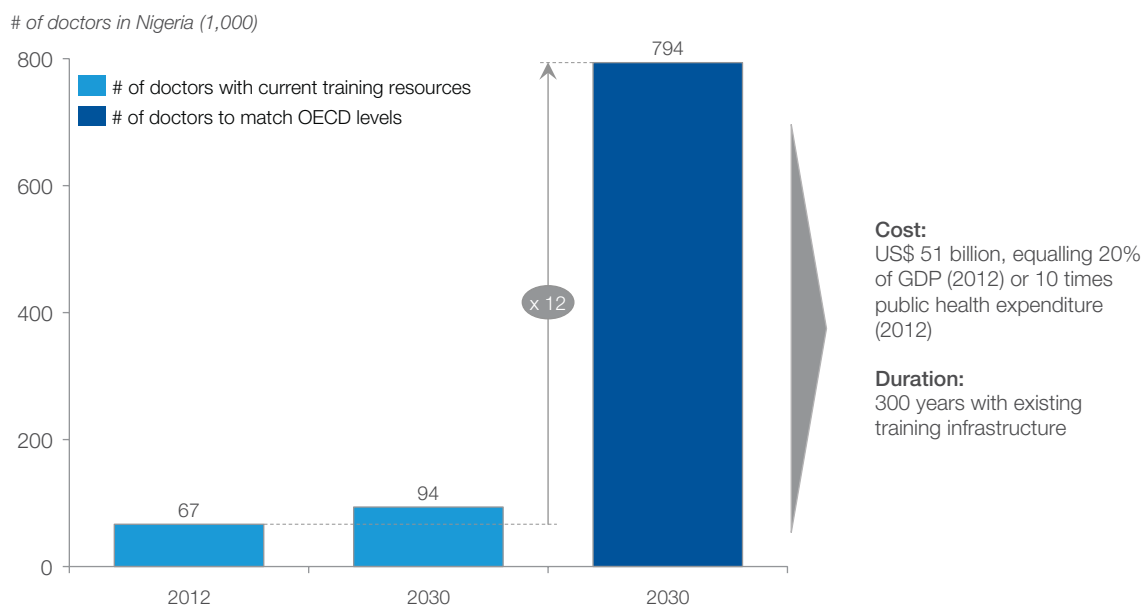
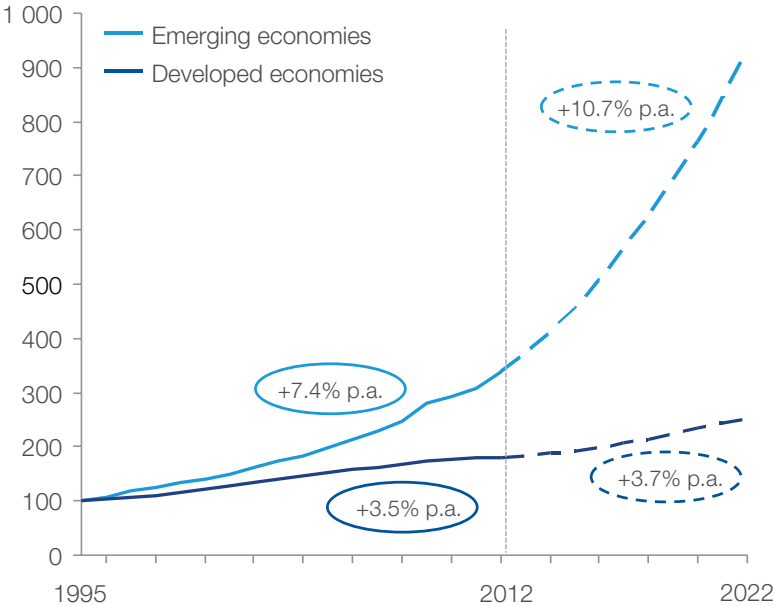


Exhibit 2: Emerging Economies Are Increasing Their Healthcare Spending
 For every additional US\$ 100 spent on health in 2022 (compared with 2012), US\$ 50 will have come from emerging economies.

Sources: World Bank, Business Monitor International, BCG

Health expenditure (Index: 1995 = 100)

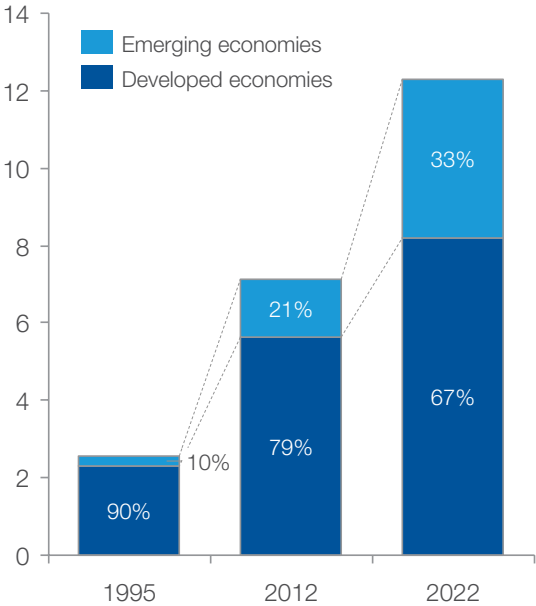


Emerging economies need to make the right investments now if they want to avoid the problems of developed economies. The evolution of health systems is highly path-dependent: large-scale investments in infrastructure and workforce determine the course of development for decades to come. Similarly, once established, individuals' expectations from health systems are difficult to change.

B. Opportunity

Emerging economies' share of global health expenditure is growing rapidly. Emerging economies account for 21% of global health expenditure, up from 10% in 1995. By 2022, one third of global health expenditure, roughly equal to

Global health expenditure (trillion US\$)



developed economies' expenditure in 2005, will occur in emerging economies. For every additional US\$ 100 spent on health in 2022 (compared with 2012), US\$ 50 will have come from emerging economies.

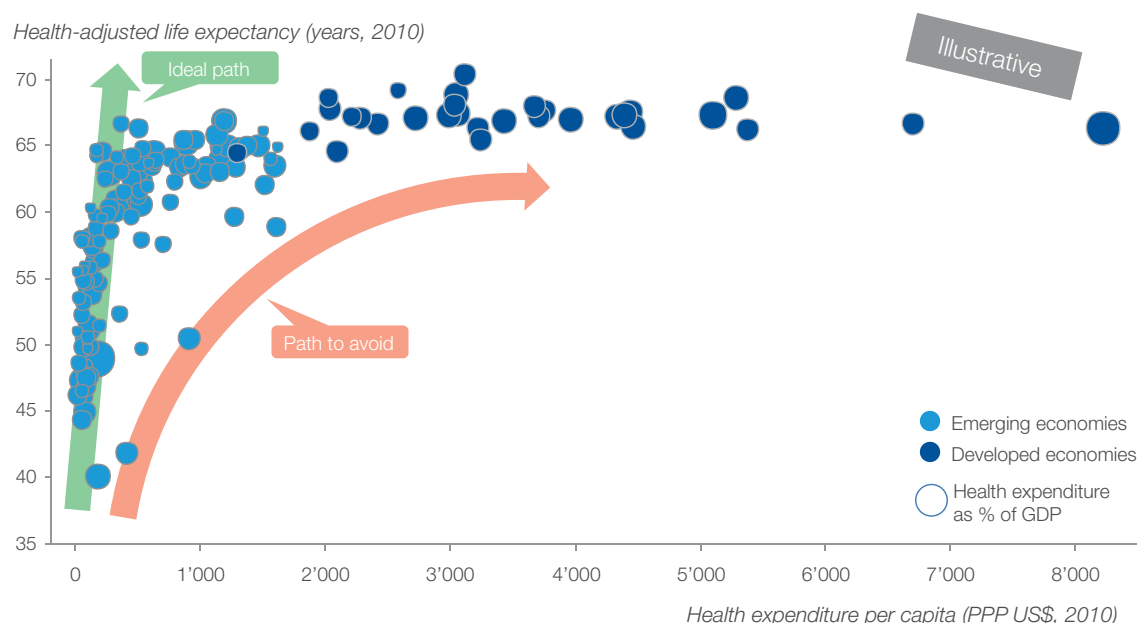
However, higher investment does not necessarily translate into better outcomes (*Exhibit 3*). South Korea, for example, spends only 25% per capita what the United States spends per capita, yet still achieves better outcomes (measured in health-adjusted life expectancy).



Exhibit 3: Health Systems in Emerging Economies Need to Avoid the Path of Health Systems in Developed Economies

Health-adjusted life expectancy: Estimates the number of years in full health an individual is expected to live at birth by subtracting the years of ill health (weighted according to severity) from overall life expectancy

Sources: World Bank, WHO, The Lancet, BCG



In many emerging economies there is unprecedented interest in sustainable solutions. The momentum for change is coming from increasingly well-educated populations demanding greater access and higher quality care. National and international leaders and private sector actors recognize that equitable access to high-quality care contributes to political stability and economic growth.

Policy-makers must choose one of two paths: the familiar, but long, expensive and unsustainable path of developed economies – or a shortcut that leads to a sustainable future. Emerging economies are well suited to the second path. They have fewer impediments to change than developed economies: fewer sunk costs of existing infrastructure and equipment, lower fixed costs from building overcapacity, weaker vested interests (e.g. health professional associations) and a less divided public (e.g. privacy laws in developed economies that make data sharing and use difficult). They also have at their disposal disruptive technological innovations, alternative operating and financing models and new legal frameworks that were not previously evident or even possible for developed economies.

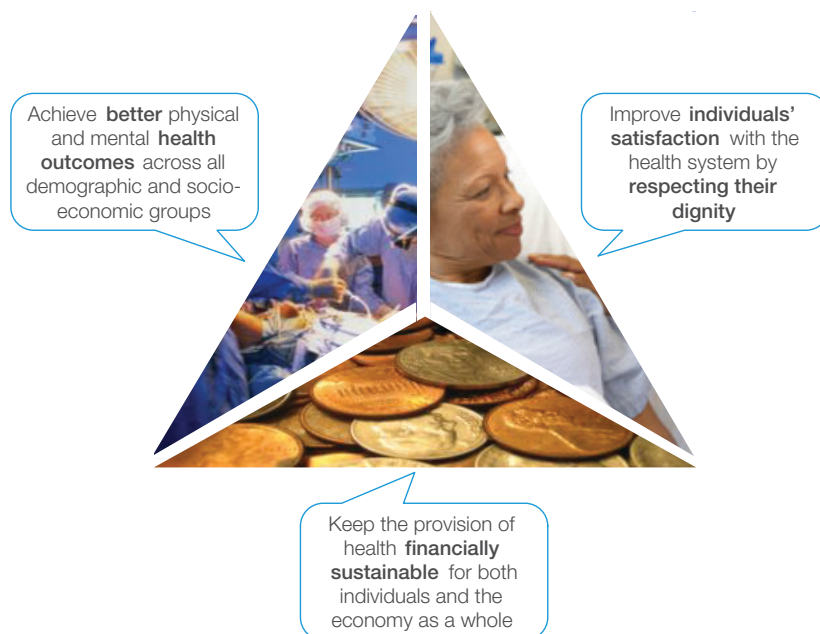
C. Destination

Putting a health system on a path to sustainable development requires an understanding of the intended destination – the vision of an ideal health system (*Exhibit 4*). Health is generally a local matter. No universal model exists that will work for every country. It is appropriate for policy-makers to approach the challenge of developing their own vision with due humility. Whatever its particular design or implementation, however, an ideal health system should pursue three fundamental objectives:⁴

- **Better outcomes:** Achieve better physical and mental health outcomes across all demographic and socio-economic groups through timely and effective interventions.
- **Individual satisfaction:** Improve individuals' satisfaction with the health system by respecting their dignity.
- **Financial sustainability:** Keep the provision of healthcare affordable for both individuals and the economy as a whole.

Exhibit 4: Proposed Health Systems Vision Focuses on Better Health Outcomes, Higher Individual Satisfaction and Financial Sustainability

Sources: Expert interviews, Working Group discussions, literature survey, BCG



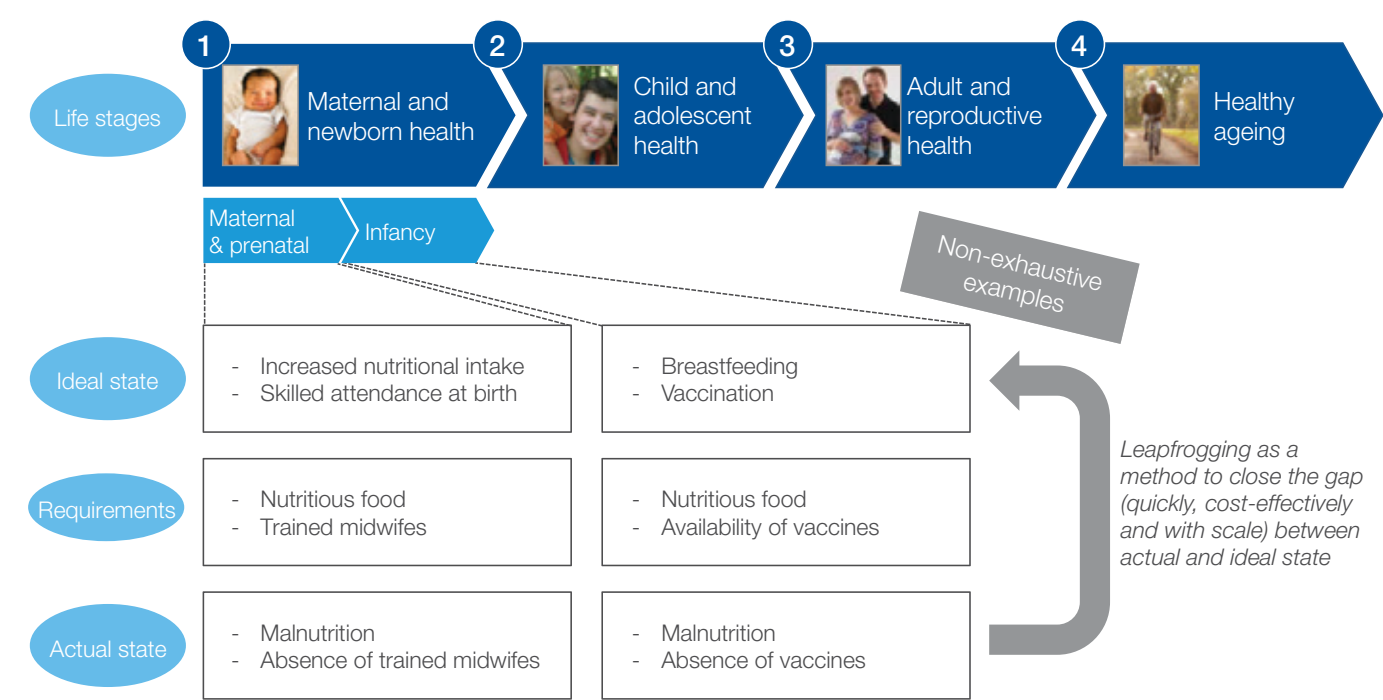
The three objectives are interdependent. They can be mutually reinforcing (for example, streamlining referral systems improves patient experience *and* cuts costs) or they may require trade-offs (e.g. improving outcomes through new but costly procedures). The art of designing an ideal health system consists of balancing these objectives and making them work together in a virtuous circle. Many developed economies have ended up in a vicious cycle: health outcomes and individual satisfaction stagnate, while costs increase. Achieving a balance that maintains the dignity of individuals requires that the following three fundamental principles be observed:

- **Health is an individual right and responsibility and is crucial to human dignity.**⁵ Health activities and interventions must be accessible and affordable for all individuals. Their dignity must be respected.
- **Health is an element of the common good.**⁶ Health issues should be approached with socially optimal solutions in mind. All individuals benefit from good public health.
- **Health demands a holistic perspective.**⁷ Health should be a crucial part of economic and social development and should be embedded in all government policies in a coordinated manner.



Exhibit 5: The Life Course Approach Helps Identify Areas of Major Impact

Source: WHO Europe, Health at key stages of life: The life-course approach, 2011, BCG



A valuable tool for conceptualizing an ideal health system is the “life course” concept developed by the World Health Organization (WHO)⁸ (*Exhibit 5*). Different stages of life require different resources, investments and intervention strategies. For example, the infrastructure, technology and workforce needs for maternal and child health interventions are largely different from those for ageing populations. An ideal health system must provide care for individuals at all stages of life.

Section II: How Health Systems Leapfrogging Works

A. Definition of Leapfrogging

The term “leapfrogging” is over-used and often ill-defined. The concept first emerged in the 1960s in the field of industrial engineering. More recently, it has been used more broadly to describe a mindset, an ability to see and grasp opportunities.

Leapfrogging means using a new technology, operating model or pattern of behaviour to accelerate the development of a system (be it an organization, industry or an entire economy) by helping it skip over development stages that had previously been unavoidable. In developed economies, techniques and structures that had been created to meet previous developmental challenges have tended to remain embedded in health systems, even after circumstances have changed or superior methods have become available. Outmoded organizational, behavioural and financial models can be expensive and difficult to replace.

Leapfrogging helps to avoid such traps. A now-classic example is the introduction of mobile phones to remote areas of Africa. Those areas received the social and economic benefits of telephone networks without the sunk costs of massive landline infrastructure. They thus “leapfrogged” an entire stage of development, going directly from little or no telephone service to the same, efficient technology used in developed countries.

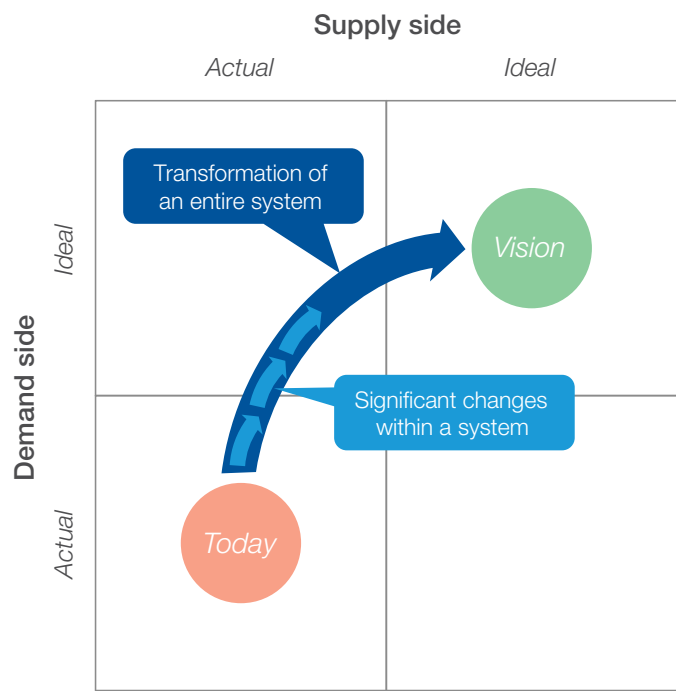
For emerging economies, the most valuable use of leapfrogging is not just to catch up with developed economies – but to use innovation that allows them to take a shortcut in reaching a more advanced development stage without accumulating inefficiencies along the way. Trailing behind can be turned into an advantage. Emerging economies can avoid the path-dependency problem of developed economies because they have fewer investments in physical infrastructure and weaker vested interests. They have the opportunity to assess the results and question the underlying assumptions of developed economies’ health systems such as hospital-centric systems and the necessity of highly trained physicians providing routine care. Accordingly, they can decide what they want to replicate or leap over.

Leapfrogging can occur at two levels. At a macro level, leapfrogging means the transformation of an entire system, for instance via comprehensive infectious disease programmes. This kind of large-scale change is very challenging and rare. At a micro level, leapfrogging means discrete but significant changes within specific components of the health system, such as task shifting within the workforce, revamping vaccine supply chains or leveraging innovation in medical diagnostics. The two conceptions of leapfrogging can be mutually reinforcing. A series of small innovations can lead to a macro-level transformation. Conversely, macro-level change can guide micro-level change. For example, a comprehensive infectious disease programme will define the set-up of service delivery points and prevention campaigns (*Exhibit 6*).



Exhibit 6: Two Meanings of Leapfrogging: Transformation of an Entire System and Significant Changes within a System

Sources: Expert interviews, BCG

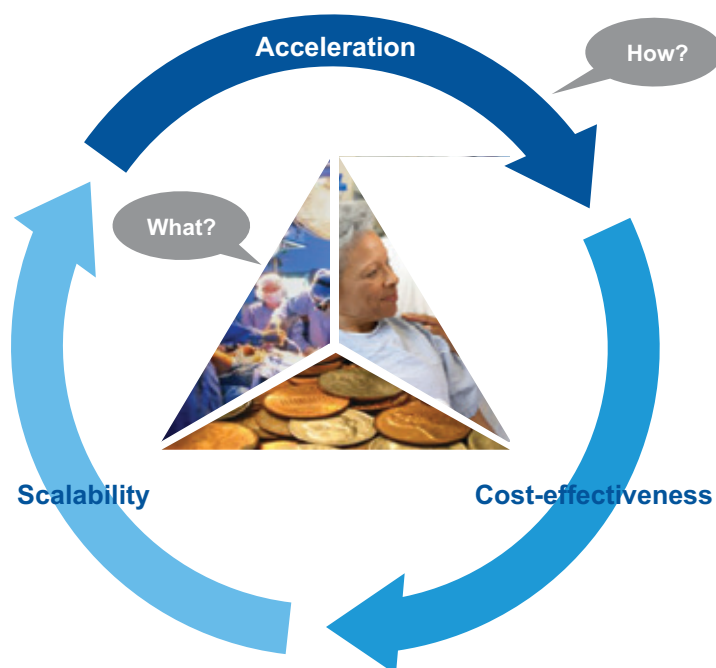


While leapfrogging effects are usually the intended results of careful design, they can also be serendipitous. Our third case study on introducing antenatal ultrasound screening to rural Uganda illustrates this point: what started as a medical product innovation led to a number of unintended positive effects, empowering women to take a more active role in health choices surrounding their pregnancy.

To be considered leapfrogging, a change must create a transformative impact satisfying three distinct criteria: 1) it must accelerate the health system’s development (i.e. it must reduce the time needed to get results); 2) it must be cost-effective (i.e. it must achieve the same or better results at the same or lower costs than traditional methods); and 3) it must be scalable (i.e. it must accommodate expansion efficiently) (*Exhibit 7*).

Exhibit 7: Leapfrogging Innovations Satisfy Three Conditions (how?) as They Move a System towards an Ideal State (what?)

Sources: Expert interviews, Working Group discussions, BCG



Leapfrogging in health systems requires certain enabling conditions. These include a minimum level of physical infrastructure (e.g. basic sanitation and electricity supply) and a minimum level of workforce sophistication (e.g. reading or computer literacy). An environment or mindset that encourages and rewards leapfrogging is also necessary. Key aspects of such an environment are: a policy framework creating a favourable environment for innovation, both within and outside the health system; the agility to adapt to new trends and evolving patterns of medical needs; and flexibility in the design and implementation of health policies to suit different contexts and cultures.

B. Leapfrogging Matrix

While powerful leapfrogging ideas may come from any part of the health ecosystem – e.g. health-related areas like agriculture or education – this paper focuses on leapfrogging within the core aspects of the health system itself. These opportunities may be visualized as a “leapfrogging matrix”. The matrix organizes leapfrogging opportunities along two dimensions: health system categories and innovation types. It can be applied to each stage described in the life-course approach. The leapfrogging matrix in *Exhibit 8* proposes major leapfrogging themes; *Exhibit 9* depicts the same matrix with illustrative leapfrogging examples.

The first dimension on the vertical axis represents the seven fundamental components of health systems: prevention and health promotion, service delivery, medical products, workforce, information, financing and governance. These categories are based on the six building blocks of a health system proposed by WHO,⁹ to which the category of prevention and health promotion is added. Each of the seven categories represents a distinct lever for health system transformation and provides opportunities

for leapfrogging. The other dimension of leapfrogging opportunities, represented on the horizontal axis, is made up of three innovation types – technology, operating model change and behaviour change – describing the kind of innovation that can induce leapfrogging within the seven categories.

“Technology” encompasses new health-related activities and products. For emerging economies, the most powerful technological innovations are often those that are simpler, more affordable and more durable than existing solutions.

“Operating model” refers to any modification in the organizational set-up and process design of health-related activities. This includes, for example, changes to the roles, workflow and incentives of health workers at a given service delivery point.

“Behaviour change” refers to the evolution of the preferences and conduct of individuals (e.g. patients or health workers) and organizations (e.g. payers) acting within the health system. It could include the adoption of different lifestyles by individuals or changes in the way physicians interpret their roles within the health system.¹⁰

While innovations in the organizational and behavioural field can happen by themselves, more often than not, they are innovations of a secondary order, triggered by new technology. By the same token, technological innovation usually has a greater impact and is longer-lasting if it translates into changes in operating model and behaviour.

Exhibit 8: Leapfrogging Matrix with Major Themes

Sources: Expert interviews, project partner organizations, desk research, BCG






















Health system categories	Innovation types	Major Themes		
		A Technology	B Operating model change	C Behaviour change
0 Prevention & health promotion		<p>Mobile technology can be used to prevent disease and create demand for healthcare via mobile-phone-based health education programmes and counselling hotlines. (Example: <i>Project Masiluleke in South Africa</i>)</p>	<p>A holistic approach to prevention and health promotion can bring health considerations into every aspect of people's daily lives. (Example: <i>Health Promotion Board in Singapore</i>)</p>	<p>Using social marketing employing proven commercial marketing techniques can improve individuals' health choices. (Example: <i>Greenstar social marketing for family planning in Pakistan</i>)</p>
1 Service delivery		<p>Care can be moved from hospitals to homes using smart phone technology enabling remote support and tracking of therapy adherence. (Example: <i>Helius software tool by Proteus Digital Health in the United Kingdom</i>)</p>	<p>Telemedicine can improve the quality of care for remote communities by leveraging centrally-located expertise. (Example: <i>Fortis and GE Healthcare tele-ICU in India</i>)</p>	<p>Insights from behavioural sciences can be used to effect behaviour change in both the demand and provision of medical services. (Example: <i>Abdul Latif Jameel Poverty Action Lab study on immunization incentives in India</i>)</p>
2 Medical products		<p>Refocusing medical product innovation on value to create products balancing quality with cost can increase access to care for low-income populations. (Example: <i>Philips Healthcare Infant Warmer; Qiagen CareHPV Test</i>)</p>	<p>Strengthening supply chains for medical products, for example through supply chain integration, can make products more accessible and affordable to low-income populations. (Example: <i>"Deliver" Project by USAID</i>)</p>	<p>Incentivizing the workforce to prolong equipment longevity through careful handling, regular maintenance and safe reuse of devices sold as single-use products. (Example: <i>CARE hospitals in India</i>)</p>
3 Workforce		<p>Clinical decision support (CDS) software can empower health workers to improve the quality of the services they provide. (Example: <i>Diagnostic software used by "Minute Clinic" walk-in clinics in the United States</i>)</p>	<p>Empowered community health workers can promote health and provide primary care, supported by and acting as a gateway to more qualified health workers. (Example: <i>Pesinet child health programmes in Africa</i>)</p>	<p>Increasing workforce awareness of financial considerations can reduce costs by promoting transparency and rewarding suggestions for process improvements. (Example: <i>Narayana Health's cost awareness policy in India</i>)</p>
4 Information		<p>Mobile technology can be harnessed to communicate to broad population segments, especially in rural and low-income areas. (Example: <i>Kenya Integrated Mobile MNCH Information Platform</i>)</p>	<p>Defined global standards for measuring health outcomes can allow meaningful international benchmarking and sharing of best practices. (Example: <i>International Consortium for Health Outcomes Measurement (ICHOM)</i>)</p>	<p>Providing food labelling on health impact can help consumers better health-related choices. (Example: <i>"Traffic light" nutrition labelling in the United Kingdom</i>)</p>
5 Financing		<p>Smart cards for health insurance buyers can streamline administration, facilitate data collection and mobility, and improve the quality of service delivery while preserving patient privacy. (Example: <i>RSBY biometric smart card in India</i>)</p>	<p>Micro-insurance products can increase access to care for low-income populations while limiting exposure to financial risk. (Example: <i>Hygeia Community Health Care in Nigeria</i>)</p>	<p>Rewarding health insurance buyers for healthy lifestyles by adjusting premiums to take into account exercise activities and consumption habits can improve health and cut costs. (Example: <i>Discovery Insurance in South Africa</i>)</p>
6 Leadership/governance		<p>A nationwide, integrated electronic health record system can improve quality and efficiency of care by avoiding data silos. (Example: <i>Electronic Health Record System in Estonia</i>)</p>	<p>Intersectoral governance can bring health considerations into all aspects of public policy-making in a holistic manner. (Example: <i>National Committee on Public Health in France</i>)</p>	<p>Imposing excise taxes on unhealthy products (foods, tobacco, alcohol) can discourage unhealthy consumption habits. (Example: <i>Sugar tax in Norway</i>)</p>

Proven theme

Nascent theme

Exhibit 9: Leapfrogging Matrix with Concrete Examples

Sources: Expert interviews, project partner organizations, desk research, BCG

Health system categories		Innovation types	
0	Prevention & health promotion	A	Technology
			Project Masiilele : Leverages mobile technology for HIV/AIDS and TB prevention through phone-based counselling and text-message-supported self-testing.
1	Service delivery		Proteus Helium system : Administers hypertension therapy remotely via smart phone technology, moving care from service points to homes.
2	Medical products		Philips Healthcare Infant Warmer : Provides reliable, easy-to-use and cost-effective infant thermo-regulation to reduce neonatal mortality in low-income countries.
3	Workforce		Clinical decision software used at MinuteClinic : Enables nurse practitioners to treat routine ailments with computerized medical guidelines on diagnosis, treatment and drugs.
4	Information		Kenya Integrated Mobile MNCH Information Platform : Provides pregnant women with mobile-phone-based health information to promote safe pregnancy.
5	Financing		RSBY Smart Card : Uses biometric smart cards to register low-income (and often illiterate) insurance takers, streamline administration and service delivery and facilitate data collection.
6	Leadership/ governance		Electronic Health Record System in Estonia : Creates a nationwide, integrated electronic health record system to improve the quality and efficiency of diagnosis and treatment.
		B	Operating model change
			Singapore Health Promotion Board : Invests in the maintenance of public health using a holistic approach, bringing health considerations into every aspect of people's daily lives.
			Fortis & GE Healthcare tele-ICU : Reorganizes delivery of critical care by connecting remote ICUs with centrally located intensivists through telemedicine.
			USAID "Deliver" Project : Provides technical assistance to streamline medical supply chains in emerging economies, increasing availability and affordability of medical products.
			Pesinet : Deploys community health workers with limited expertise to detect and monitor childhood diseases with remote assistance from physicians.
			International Consortium for Health Outcomes Measurement : Defines global standards for measuring health outcomes and fostering better decision-making.
			Hygeia Community Health Care (HCHC) : Provides low-income populations in Nigeria with affordable health insurance covering essential treatment.
			National Committee on Public Health in France : Creates an inter-ministerial committee to act as a steering body in coordinating health policies across all ministries concerned.
		C	Behaviour change
			Greenstar : Conducts social marketing to raise public awareness of reproductive health, leveraging private healthcare providers to act as franchisees.
			Abdul Latif Jameel Poverty Action Lab study on immunization in India : Provides non-monetary incentives for parents to immunize their children, thereby overcoming cognitive biases.
			CARE hospitals : Improve equipment longevity and reduce waste by safely reusing devices sold as single-use products.
			Narayana Health's cost awareness policy : Incentivizes physicians to take financially prudent decisions and make suggestions for cost savings and process improvements.
			"Traffic light" nutrition labelling in the United Kingdom : Simplifies food labels to avoid obesity by helping consumers better understand products' health impact.
			Discovery Insurance : Rewards health insurance buyers for healthy lifestyles through a variety of benefits.
			Sugar Tax in Norway : Charges excise tax on foods with high sugar content to discourage unhealthy consumption habits.

☐ Proven example

☐ Nascent example

Section III: What Health Systems Leapfrogging can Achieve

The following five case studies demonstrate leapfrogging in a variety of different health system categories, employing different innovation types. They are drawn from different geographies and from both public and private organizations.

Case Study 1: Organizational Innovation in Medical Service Delivery in India



While Western healthcare providers struggle with ever-increasing cost, some healthcare providers in India have managed to cut prices for care drastically without compromising quality. They now perform a large number of interventions, ranging from antenatal care to open-heart surgery, at as much as 95% below the prices charged at hospitals in the developed world.¹¹ Their outcomes compare favourably with results in developed economies. Cost differentials between India and developed economies are only a minor factor explaining these lower prices. A more important factor is these providers' operational set-up, which challenges traditional ways of setting up points of care, harnessing resources and defining workforce roles.

This set-up is based on three organizational principles. First, care is delivered via a hub-and-spoke set-up. Providers strive to treat the majority of ailments at primary care facilities located within communities (spokes). A smaller number of specialized secondary and tertiary care facilities, which are significantly more costly to operate, act as referral

centres (hubs). LifeSpring Hospitals, a chain of maternal clinics, takes this organizational principle even further by avoiding investments in specialized care altogether. It instead collaborates with paediatric hospitals as points of referral for the few mothers (2% to 3%) requiring intensive care.

The second principle is maximization of asset utilization. The providers limit capital investment by concentrating expensive equipment in central hubs or sharing it between spokes, ensuring that it is being used extensively. For example, Narayana Health, a chain of cardiac hospitals, runs its operating theatres six days a week, from early morning to late night. LifeSpring Hospitals combines different clinics into geographic clusters that share expensive equipment.

The third principle is maximization of workforce productivity: the providers strive to match the skill level of health workers with the difficulty of the task at hand, preventing staff from performing tasks for which they are overqualified (task-shifting). Fortis Healthcare, a multi-speciality hospital chain, for instance, concentrates critical care physicians at a centrally located intensive care command centre, from which they diagnose and monitor patients at remote ICUs via telemedicine. This ensures high utilization of costly specialists' skills, while improving the quality of treatment through enhanced collaboration between specialists.

Thanks to this organizational set-up, these Indian healthcare providers have managed to leapfrog the costly mistakes of their counterparts in the developed world, such as the overemphasis on secondary and tertiary care and the ineffective use of expensive equipment. Many of these providers have seen impressive growth and plan to scale up extensively, including outside India. Some already have a strong presence across Asia, and are planning expansion of their business model to developed economies. While this model is highly scalable and transferable, it is not ideal for every context. One limit is that it requires a large enough volume of patients to make specialization profitable.

Case Study 2: Overcoming Human Resource Constraints through Innovative Workforce Models in Sub-Saharan Africa



A recent WHO study found a shortage of 7.2 million health workers worldwide. By 2035, this number is estimated to climb to 12.9 million with emerging economies accounting for over 90% of the gap. A key reason for this shortfall is a lack of resources for training and retaining health workers. Although medical technology has made huge advances, qualified human health professionals remain the foundation of any successful health system. Qualified healthcare personnel are by far the most scarce in Africa, which faces 28% of the global disease burden but has only 3% of the world's health workforce. A number of countries in that region, however, have successfully developed and implemented innovative models to address their workforce shortages.

Health extension workers in Ethiopia: In Ethiopia, the Ministry of Health has responded to the country's severe shortage of physicians and nurses by employing health extension workers. They function within rural communities – a team of two is responsible for between 500 and 1,000 households – acting as advanced community health workers assisted by community volunteers. They deliver a number of essential preventive and curative services, with a strong emphasis on health education, family planning and sanitation. This focus is due to the fact that 60% to 80% of the disease burden in Ethiopia comes from preventable communicable diseases.

Health extension workers are recruited from rural high school graduates, trained for one year at a central training centre and then sent back to their local communities. Since its inception in 2004, the programme has been scaled up across the country, with 38,000 health extension workers trained and deployed. Child mortality in Ethiopia has dropped by 32% and maternal mortality has dropped by 38%. The health extension workers programme is largely credited with this success.

E-learning for nurses in Kenya: In Kenya, a partnership of public and private stakeholders has established a comprehensive e-learning programme for the country's 20,000 nurses, providing training in the treatment of major diseases such as HIV, tuberculosis and malaria. The programme provides computer-equipped training centres across the country, where nurses take e-learning courses and computer-based exams.

Previously, owing to the capacity limitations of traditional classroom-based teaching, only 100 nurses a year could participate in continuing education programmes on these diseases. Now, over 1,000 nurses are able to complete the training every year. At the same time, the e-learning programme has cut the cost of this advanced training from US\$ 2,273 to US\$ 114 per participant, a saving of 95%. To date, 12,000 nurses have enrolled in the programme and it is currently being expanded to Uganda.

Mothers as health workers to prevent vertical HIV transmission: mothers2mothers, a global health NGO, has developed new ways to prevent vertical (mother-to-child) transmission of HIV in sub-Saharan countries with high HIV prevalence, namely South Africa, Swaziland, Kenya, Malawi, Lesotho, Zambia, Rwanda, Uganda and Tanzania.

Responding to the severe understaffing of most health centres in these countries, mothers2mothers relies on patients themselves to fill the gap by taking on the role of health workers. Specifically, it trains mothers living with HIV ("mentor mothers") to support other HIV-positive mothers in protecting their babies from infection. Mentor mothers educate other mothers on the correct administration of antiretroviral treatment and breastfeeding best practices, while acting as role models for the prevention of vertical HIV transmission. With appropriate antiretroviral therapy and breastfeeding, the risk of vertical transmission can be reduced from 40% to 2%. To date, the programme has reached 1.1 million mothers across nine countries.

These three examples demonstrate how changes to a health system's operating model can reduce workforce shortages without costly investment by means of three organizational principles: 1) task-shifting, i.e. rationally redistributing tasks among health workers (using health extension workers in Ethiopia where nurses and physicians are unavailable); 2) harnessing information and communications technology (ICT), i.e. using the "multiplier effect" of ICT in workforce training and service delivery (e.g. e-learning for nurses in Kenya); and 3) empowering communities and building capacity within communities to address health issues (training mothers to assist each other in HIV prevention).

Case Study 3: Providing Access to Antenatal Ultrasound Care to Rural Communities in Uganda



The United Nation's Millennium Development Goal 5 has made the reduction of maternal mortality a priority. In Uganda, women still face a 1 in 49 lifetime risk of dying during childbirth, compared with a 1 in 9,200 risk in OECD countries.

Reducing maternal mortality requires a concerted effort among public, private and non-profit stakeholders. Philips Healthcare's partnership with the NGO "Imaging the World" to improve antenatal care in Uganda is an example of this type of collaboration. The initiative involves all three types of health system innovation – technology, operating model change and behaviour change. The project provides specially designed ultrasound screening units to rural communities in Uganda. The units are easy to use, highly reliable and provide diagnostic accuracy at low cost. Comparable ultrasound screening units tailored to emerging market needs have recently also been presented by GE Healthcare and a number of research institutes around the world.

In addition to low-cost screening devices, the project also offers a training programme on antenatal ultrasound examination to build local expertise and relies on a simplified screening protocol based solely on surface anatomic landmarks. The protocol can be learned by nurses at rural health centres in only three days. Ultrasound images are transmitted wirelessly to centrally located experts for remote diagnosis, which makes it possible to tap into scarce expertise (there are only 34 trained radiologists in Uganda).

The initial results of a pilot conducted in Uganda are encouraging. Sixteen percent of women screened needed and received a change in care management (follow-up screenings, dietary change, skilled birth attendance or referral to secondary care). There was also an increase in the number of women seeking skilled birth attendance among those not expecting complications.

There were also positive spillover effects beyond those intended. The first was a more active role for fathers, the primary health decision-makers in Ugandan families, in the

health choices surrounding pregnancy: fathers attended ultrasound exams to view their child on screen, sparking their interest in maternal health. Second, there was also an overall improvement in community health thanks to the use of ultrasound exams for community outreach, i.e. as an avenue for general health education (e.g. HIV and other infectious diseases) and prevention (e.g. malaria and hookworm).

A small fee (less than US\$ 2) per ultrasound exam allows clinics to break even after about three years. All patients in rural Uganda were able to afford this fee. The programme is substantially more cost-effective than similar procedures in developed economies. This provides an opportunity for emerging economies to leap over the pitfall of large investments in a specialized workforce and expensive but underutilized equipment. Positive results from this pilot project support a planned scale-up in Uganda and in other sub-Saharan countries.

Case Study 4: Reducing Maternal and Newborn Mortality through Simple and Inexpensive Product Innovation



Every year, 260,000 women die from causes related to pregnancy and childbirth, 99% of them in emerging countries. Eight percent (20,000 women) die as a result of obstructed labour. Achieving falling maternal mortality rates – and improved health outcomes in general – in a financially sustainable manner in emerging economies requires new technologies that can do more for less. These technologies must fit an environment characterized by limited financial resources, a shortage of skilled health workers and limited availability of medical infrastructure. This environment requires simple, easy-to-use products that maximize patient satisfaction while minimizing resource utilization.

An example is the "Odon device," a new obstetrical instrument for assisted vaginal delivery in case of complications during the second stage of labour (obstructed labour). The device is a simple, inflatable plastic sleeve slipped around the baby's head to gently pull the newborn through the birth channel. It is meant to be a safe, simple and cost-effective alternative to traditional procedures like forceps or vacuum extraction as well as some Caesarean

sections. Clinical trials are currently under way. The Odon device could significantly reduce fatal maternal and newborn complications at an estimated cost of US\$ 50 per device or potentially even less.

The Odon device is the result of a partnership between WHO and medical technology company Becton Dickinson. This cooperation began at the World Economic Forum Annual Meeting 2012 in Davos-Klosters.

The Odon device shows how acceleration of health system development towards greater value-consciousness, an important design principle for any financially sustainable health system, demands innovative solutions that improve health outcomes while keeping costs down.

Case Study 5: Closing Gaps in Immunization Coverage through Better Data Management in Sub-Saharan Africa



Health systems in developed economies generally do a poor job of harnessing data. Many lack standardized measurement of health outcomes and do not have interoperability between different data systems, resulting in data silos. Many make insufficient use of data for decision-making. New information and communications technologies provide emerging economies with the tools to leapfrog these pitfalls and create comprehensive, up-to-date, integrated and user-friendly health information systems. Additional momentum to build such information systems comes from the need to prevent and manage the rising prevalence of non-communicable diseases in emerging economies.

PATH, the global health NGO, with support from the Bill & Melinda Gates Foundation, is working to improve access to immunization by harnessing data. The Better Immunization Data (BID) Initiative aims to help emerging economies improve their collection and management of vaccine stock and supply chain (including cold chain management) data as well as birth and vaccination registration data. Most of the cost of vaccination comes from the supply chain and administration. Better immunization data can create savings by enabling better decisions on resource allocation, supporting implementation management and improving health workforce efficiency.

The initiative is currently identifying potential partner countries in sub-Saharan Africa. Similar projects conducted by PATH in Albania have had a number of positive outcomes. One is the introduction of electronic immunization registries that record births and generate vaccination appointments automatically. These have improved coverage rates and streamlined administration. Similarly, computer-based stock and supply chain management has significantly increased the availability of vaccines at the right time and location, while driving down costs.

The BID Initiative aims to identify best practices in immunization data management for each participating country and to scale these solutions up across the entire country. The initiative also aims to facilitate the export of best data management practices to other health areas besides vaccination (such as antenatal care and HIV), thereby promoting data systems integration.

Prevention through immunization is one of the most cost-effective health investments, saving an estimated 2-3 million lives every year and protecting many more from illness and disability. For sub-Saharan Africa, the cost of traditional vaccines included in WHO's Expanded Program on Immunization (EPI) is as low as US\$ 7 per disability-adjusted life year (DALY) averted or US\$ 205 per death averted. This makes immunization a "very effective" intervention by WHO standards, saving not only lives but also avoiding treatment costs, maintaining workforce productivity and reducing disease transmission.

The BID Initiative aims to further enhance the cost-effectiveness of immunization. The marginal costs of immunization rise with the percentage of a population that is being targeted – it is much harder to reach the last 20% of a population than the first 20%. The initiative holds the potential to significantly drive down the cost of reaching the "fifth child" – the 20% of children worldwide currently not immunized.

Section IV: Conclusion

This report is the start of an important, timely and long-term initiative. Future work will focus on the following three main areas.

First, the *menu of leapfrogging opportunities* will be expanded to identify the various components of the health system that can be leapt over as well as the scale of the transformation that can be induced. Proven concepts as well as ideas that have not yet undergone extensive impact evaluations will be identified.

Second, the *design elements behind leapfrogging opportunities* that lead to success will continue to be explored. The aim is to learn if and how they vary by region and by type of leapfrogging opportunity (e.g. financing, workforce, etc.).

Third, the best ways to *implement leapfrogging opportunities* will be identified, particularly how to overcome barriers and enhance enabling factors.

Emerging economy policy-makers as well as private sector actors can use the answers to these questions to start strategically planning their journey to transformation. The road will be complicated and long, but leapfrogging opportunities can guide countries to the areas where effective shortcuts can be taken.

This work can have relevance for developed economies too. Low and lower-middle income groups in economies such as the United States face access and affordability challenges comparable to those of the developing world. Emerging economies are breeding innovation across all parts of the health system. Successful leapfrogging practices from emerging economies can change the direction of key learnings and help developed economies improve their own health systems (“reverse innovation”).

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Endnotes

1. “Emerging economy” is defined broadly – any of the economies now going through a period of rapid growth, industrialization and urbanization. This group includes more than 160 countries along a wide spectrum of income and socio-economic development levels. For the purposes of this paper, the distinction between developed and emerging economies is based on the distinction between advanced and emerging/developing countries made by the International Monetary Fund. Country data used throughout this report comes from the World Bank, the Economist Intelligence Unit and Business Monitor International.
2. “Health system” has multiple definitions, but generally speaking it means the institutions, people and actions affecting health in a society. Inevitably, a health system is large and complex, including multiple stakeholders with different incentives and practices reflecting local characteristics. A “sustainable” health system is one that provides good care to every segment of society at an affordable cost.
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