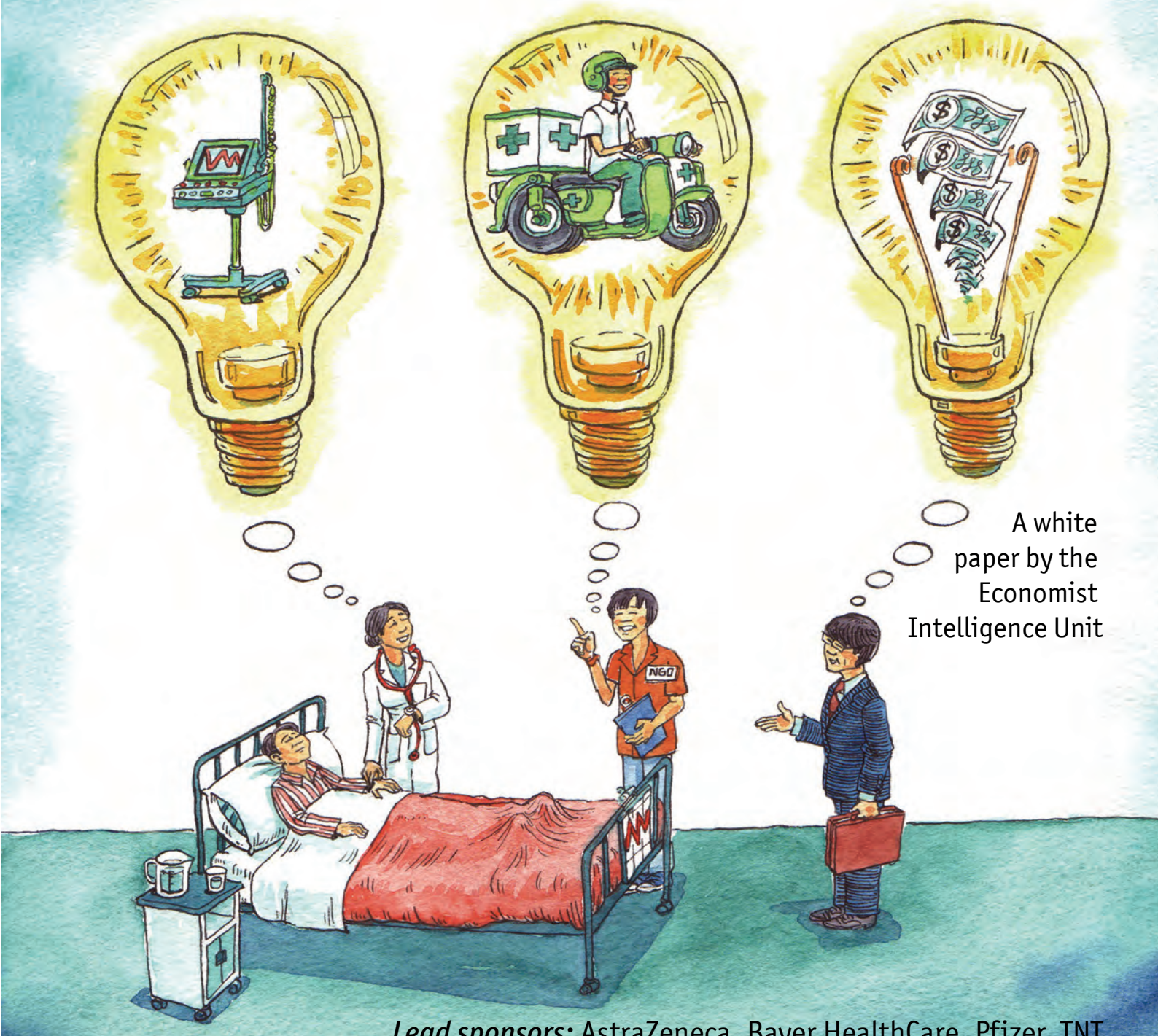
Economist Intelligence Unit

The Economist

Healthcare in Asia

The innovation imperative



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Preface

Healthcare in Asia: The innovation imperative is an Economist Intelligence Unit report. The EIU conducted interviews independently and wrote the report. The findings and views expressed here are those of the EIU alone. Justin Wood was the author of the report, with contributions from Gabrielle Babbington, and Laurel West was the editor. Gaddi Tam was responsible for design. The cover image is by David Simonds.

We would like to thank all interviewees for their time and insights.

February 2011

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Executive summary

Every nation in the world faces healthcare challenges, and those in Asia are no exception. For poor countries like Cambodia, the issues are about improving access to basic health services, and tackling poverty-related problems such as contagious disease and infant mortality, working against a backdrop of major financing constraints, given low-income levels. For rich countries like Japan, the challenges of development loom large, from battling rising diabetes, cancer and cardio-vascular illness to caring for an ageing population—again with severe financial constraints.

In between the rich and poor extremes lie middle-income countries such as China that are facing a double burden: the diseases of development and ageing are arriving before the problems of poverty have been fully addressed, and before incomes have risen to match the resources available in the developed world. Given that much of Asia still has low incomes, the healthcare challenges are greatest in improving the availability and quality of health services for the poor.

Tackling these challenges demands innovation: to manage healthcare in new ways, more effectively, with better quality and for lower cost. It's tempting to think of innovation as being about new drugs and better machines. But innovation is just as powerful when applied to financing, to regulation, to business models for delivering health services, and to the nature of partnerships between different types of healthcare organisations, be they private companies, government departments or NGOs.

Yet healthcare innovation is not easy to implement. It often requires patience and perseverance, given issues such as winning regulatory approval. Just as important, the healthcare sector is notoriously resistant to change. It is hard to persuade people to adopt new technologies, new techniques, and new thinking. Moreover, for innovation to be effective it must address a real need, identified through observation and research. All too often, however, healthcare initiatives are based on poor data, vague perceptions, and political considerations rather than what people actually need.

This report examines technical, financial and organisational innovation in Asian healthcare, assessing

challenges to adoption and the potential impact of innovation on healthcare systems across Asia. It also seeks to identify best practices for governments seeking to learn from pioneers across the region. Its key findings are as follows:

- **Organisational innovation can yield substantial benefits.** One of the most promising areas for innovation is in the way that different types of healthcare organisation join forces and work together, from the public sector, to the private sector, to NGOs. Debate rages about their various strengths and weaknesses in providing healthcare. But combining these players in innovative ways can yield impressive results. The key is to understand the incentives that drive each type of organisation. In much of Asia, a consensus believes the private sector is best placed to provide health services, but the public sector should pay for those services and act as regulator. For their part, NGOs have unique skills that can be combined with both the public and private sectors. They are powerful in providing early-stage funding for innovations aimed at the poor before the private sector takes over. And they can help implement health policy in places where governments lack resources or are mistrusted.

- **Innovation in healthcare funding, particularly to broaden insurance coverage, is of most importance for poor countries.** In low-income communities, insurance is often rare, with most healthcare paid for via out-of-pocket payments. As such many millions are tipped into poverty every year when a family member falls seriously ill. Overall spending on health is closely tied to a country's per-capita GDP, so it is difficult to increase the amount of money available for health. But in poor countries, the little money that is spent on health can be better organised by converting out-of-pocket payments into health insurance premiums. Designing health insurance policies for the poor is challenging, given low incomes, high illiteracy, and low awareness of how insurance works. Despite the challenges, however, more and more micro insurance schemes are appearing.

- **"Frugal engineering" can give poor countries access to the latest technology.** In the field of medical technology, innovation is often designed for rich countries where high incomes create a greater chance of making a return on R&D investment. Inevitably this means that such innovation is often too expensive and inappropriate for Asia's millions of poor. But more and more organisations are focused on "frugal engineering". Frugal technology aims to make healthcare products that are cheap, use local materials, can withstand tough treatment and harsh environments, are easy to repair, and simple to use by healthcare professionals with limited skills or training. Innovating for the poor often means adapting existing technology to new uses rather then developing new technology.

- **Delivery innovation is needed to improve coverage in rural areas.** Improving healthcare delivery—how to run the infrastructure of clinics, hospitals, and health centres—is critical in many Asian countries because so many people live in rural areas where doctors are thin on the ground. That leaves the poor relying on health workers that have little or no training. Many promising models of healthcare delivery are emerging to overcome the skills gaps in rural areas, from harnessing mobile phones to deliver telemedicine, to building branded franchises of clinics to improving training. Alongside these new

"horizontal" models of healthcare delivery—those that address the full range of illnesses—innovative "vertical" models are also being used that tackle specific diseases, such as tuberculosis.

- **Governments can do much to foster innovation in their health systems.**

— First, they need to think deeply about what role they want to play in their health system. Often it makes most sense to act as payer and regulator of the health system, but to use the private sector to deliver health services.

— In the role of payer, governments can influence the demand for innovation from the private sector by allocating resources for new products and services.

— Governments can also encourage innovation by managing their health spending in transparent and predictable ways so that private sector companies can plan their investments with greater confidence.

— Governments are well-placed to bring together different players in the health system and to act as the focal point for new forms of collaboration. For example, they can facilitate partnerships between academia, business and government hospitals.

— Education is critical for innovation to thrive; not only the quantity, but also the quality. Governments should promote creativity and problem-solving rather than rote learning.

— A stable business environment is a crucial foundation for innovation. Bureaucracy, poor infrastructure and an uncertain legal environment all stymie innovation.

— In poor countries, corruption is entrenched and a great barrier to the adoption of new technology, ideas and business models. Governments have a vital role in fighting corruption and promoting transparency.

1. Introduction

Every nation in the world faces healthcare challenges, and those in the Asia Pacific region are no exception. For poor countries like Cambodia, the issues are about improving access to basic health services, and tackling the problems of poverty such as contagious disease and infant mortality. And all the while working against a backdrop of major cost constraints, given low-income levels.

For rich countries like Japan and South Korea, the challenges of development loom large, from battling rising diabetes, cancer and cardio-vascular illness to caring for an ageing population. Once again, though, the financial constraints are great. A study by the Organisation for Economic Cooperation and Development (OECD) shows that per-capita spending on healthcare among its 34 members has risen by 3.2% in real terms every year since the early 1990s, compared to economic growth of just 2.4% a year.[1] Health spending now accounts for an average of 9% of GDP. During this time, health outcomes have improved, with life expectancy increasing, on average, by four years. But given the high levels of debt in many OECD countries and the expanding ranks of the non-earning elderly, many believe such spending is becoming unsustainable.

In between the rich and poor extremes lie middle-income countries such as China and Indonesia that are facing a double burden: the diseases of development and ageing are arriving before the problems of poverty have been fully addressed, and before incomes have risen to match the resources available in the developed world.

This raises difficult questions. Expectations of better health will keep rising. But how can countries in Asia—both rich and poor—keep improving standards given limited resources? How can health systems address the ever-rising needs of the people they serve without placing unrealistic demands on their wallets?

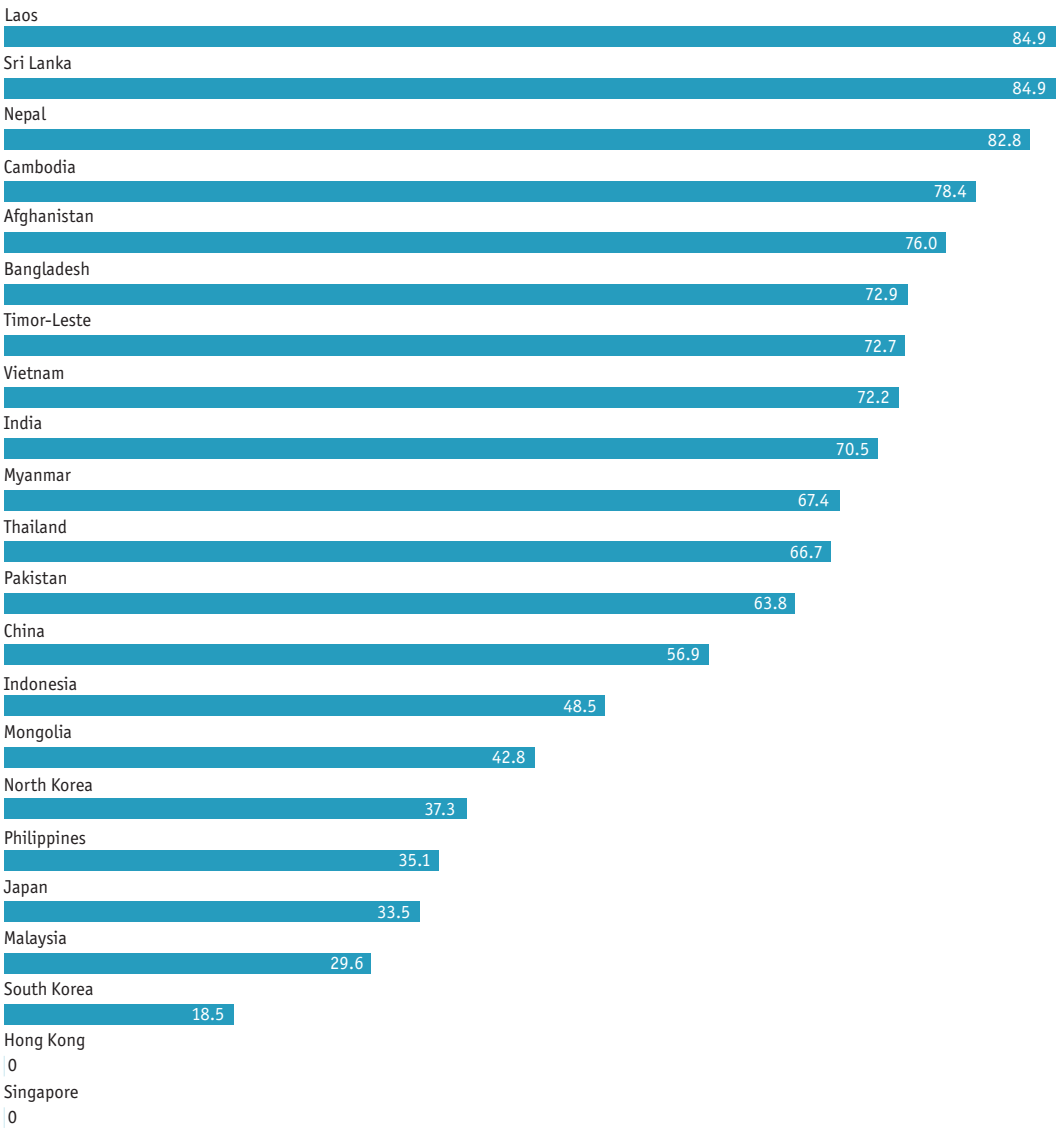
The answer, surely, lies in innovation; that is, in doing more with less and in managing health in new ways, more effectively, with better quality and for lower cost.

[1] *Health care systems: Getting more value for money*, OECD Economics Department Policy Notes, No 2, 2010

"Innovation has an essential role to play, not only in improving healthcare standards around the world, but even in maintaining existing standards, given constrained funding," says Stephen McMahon, principal director of the George Institute, a health policy and research centre based in Australia.

The need for innovation is greatest of all in low-income countries, he argues. "In resource-poor parts of Asia, the models of healthcare that have developed in the West are inappropriate and impossible to apply. Instead, we need new tools, new delivery systems, and new financial models that will work in poor communities."

Figure 1
Rural population as share of total
(%)



Source: EIU and *World Bank, 2008*

Within these poor communities, it is the rural poor that have the worst health. Of Asia's 3.7bn citizens, almost 61%—or 2.3bn people—live in rural areas. In many countries the rural population is far higher, such as in Laos and Sri Lanka, both of which are 85% rural (see Figure 1). Compared with their urban neighbours, Asia's rural majority is poorer, with lower living standards, fewer job opportunities, poorer infrastructure, and less access to public services such as health and education. In Vietnam, for example, only 7% of city dwellers live below the national poverty line, compared to 36% of rural inhabitants. In Bangladesh, 28% of the urban population lives in poverty compared to 44% in the countryside.[2]

This report examines some of the many ways in which innovation is being harnessed to improve health systems in Asia, and in particular how it is helping the region's poor—especially its rural poor. The report seeks to uncover what characterises successful innovation in healthcare, the barriers that hold innovation back, and what governments and other organisations can do to promote it.

[2] World Bank, Development Research Group, data for latest year available

Key points

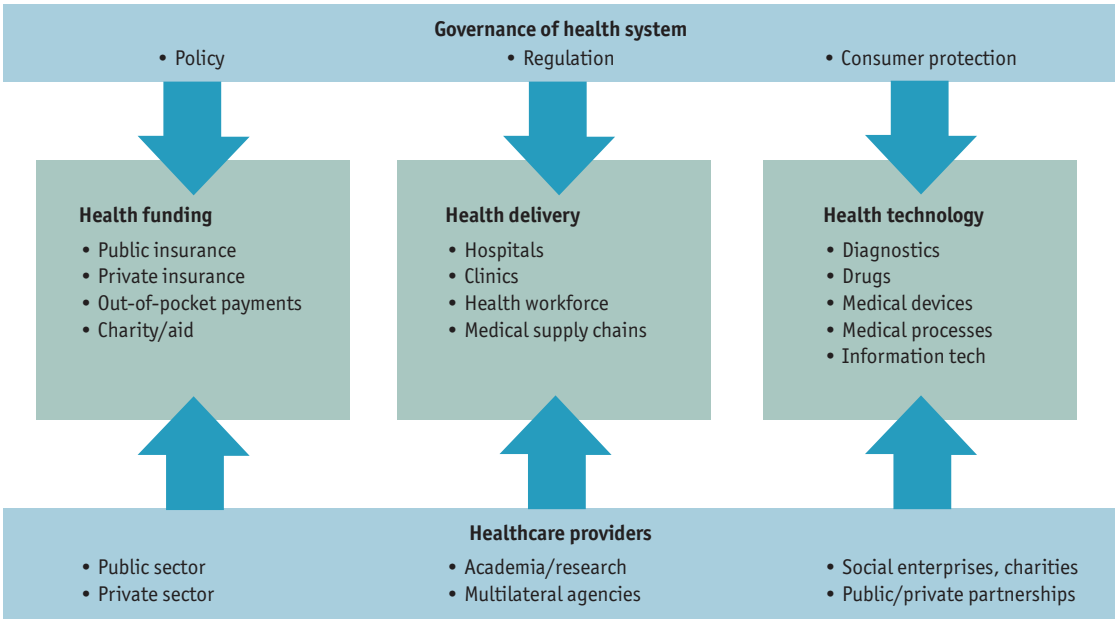
- In healthcare, it is tempting to think of innovation as being about new drugs and better machines. But innovation is just as powerful when applied to financing, regulation, and business models for delivering health services.
- For innovation to be effective it must address a real need, identified through observation and research. Too often, healthcare initiatives are based on poor data, vague perceptions and political considerations, rather than what people actually need.
- The health sector is notoriously resistant to change, making it hard to implement innovation.

2. Innovation: From buzzword to best practice

Innovation is a much-used term these days, and seemingly the goal of every company, government and organisation the world over. But what exactly does it mean?

In essence, innovation is about three things. First, it is founded on original ideas, whether for products, services, processes, forms of organization, or business models. Second, innovation is about implementation. An idea doesn't become an innovation until it is transformed into something that can be used, consumed, put into practice or experienced. Third, innovation is about improvement. Whatever

Figure 2
Areas where innovation can be applied in healthcare



is produced must be better than what went before, for instance by creating more value for customers, or higher returns for the innovator, or both. Take away any of these three—ideas, implementation or improvement—and the result cannot be called innovation.

In healthcare, it's easy to think of innovation simply in terms of new technology such as better diagnostic techniques, new drugs or more sophisticated machines. But while new medical technology is important, it is only one part of the innovation spectrum. As Figure 2 shows, innovation can be pursued in many different areas.

The way in which healthcare is funded is a major area of innovation. In rich countries, this often centres on tinkering with different insurance models, whether public or private, or re-thinking the ways that governments subsidise certain treatments. In poor countries, large swathes of the population have no insurance at all, so innovation involves introducing new forms of risk pooling, such as micro-insurance, for the first time.

In the field of healthcare delivery, innovation can apply to how health services are provided, for instance through clinics and hospitals, or the ways that supply chains for the delivery of medical products are organised. The focus is often on re-designing business models and operating processes. This type of innovation is especially powerful in poor countries where many people have no access to healthcare at all.

Innovation can be equally powerful when applied to new structures for organising healthcare providers. The public sector, private sector, multilateral agencies and charities all have different strengths and weaknesses that can be brought together in compelling new combinations.

Just as important is innovation in governance and healthcare policy. What types of regulation encourage better health outcomes? How can standards be applied to improve the quality of health providers? And what forms of pubic education encourage more healthy behaviour?

Many of the most exciting ideas in healthcare today combine aspects of all these types of innovation. A non-profit social enterprise might team up with a private company to develop a new medical technology, and then deliver it with a new business model, perhaps drawing on innovative financing tools to make it affordable to low-income communities.

Need is the seed

Not all innovations succeed, but those that do have at least one thing in common: they address a genuine need.

"All too often, innovation starts from the wrong end," says Ray Avery, founder and CEO of Medicine Mondiale, a New Zealand-based developer of medical devices for low-income countries. "Companies develop a particular technology and then try to find a customer who wants to buy it. Instead they should start by identifying a need before they think about technology."

Mr Avery recalls working with one company that developed a jumper that could be worn for a month without being washed. The wool was embedded with silver nano particles that killed bacteria and stopped it from smelling. "The technology was great, but the idea never took off. People didn't want to wear a jumper for a month at a time. The innovation didn't address a real need," he says.

It's for this reason that Mr Avery stresses the importance of being on the ground, and seeing and talking to intended customers. As he puts it: "Observation is the key to innovation."

One of the latest products from Medicine Mondiale is a baby incubator that costs less than one-tenth of a standard incubator. The idea for the product came from hours spent waiting in hospitals in developing countries in order to meet hospital administrators. During those long waits, Mr Avery noticed that almost all the corridors in such facilities had two things in common: dead babies with toe tags lying on stretchers, and broken incubators. He realised that all the machines were made in the West, but rarely lasted more than a year or two before they broke down and were thrown away for lack of spare parts. Based on those observations, Mr Avery decided to design a new incubator that could last for a minimum of ten years.

Professor McMahon at the George Institute agrees with the importance of observation, but notes that it frequently doesn't happen that way. "In Asia, there is often a dissociation between research and intervention, and that means the intervention is ineffective," he says. "Too often innovation is driven by financial and political necessity rather than by good evidence of what is actually needed. In the 21st century, we need to adopt a much more evidence-based approach to innovation."

The problem, though, is that gathering evidence and identifying needs are far from easy. This is especially true in low-income environments. For a start, many rural communities have no formal health services, so no data is collected about them. And when data is collected, it is often years out of date. Surveys are carried out infrequently and usually by health workers going from door-to-door with clipboards filling in paper forms. It can then take years for the data to be inputted into a computer system and aggregated into meaningful information.

"When governments set health policy, they are often making decisions based on the picture as it looked five years earlier," says Joel Selanikio, CEO of DataDyne, a US-based social enterprise developing health technology. "If running a health system was a business, it would be completely non-viable." It's for that reason that Dr Selanikio and his organisation have developed a data-gathering tool that uses simple mobile phones to provide real-time health information. (See "Dial D for data", on page 13.)

Drug resistant

Healthcare is an especially challenging arena in which to develop innovation for many other reasons. For a start, the regulatory environment can be challenging, in many cases with good reason given that people's lives are at stake. Regulatory approval for a new drug or treatment can take many years and demand extraordinary patience.

More generally, the health sector is notoriously resistant to change, making it tough to push through innovation, even when the change is in everyone's interests. Doctors, especially, are prone to getting stuck in a certain way of managing their clinics, or of treating patients—usually the methods they learnt at medical school many years earlier.

"Technology adoption by other industries is way ahead of healthcare," notes Loke Wai Chiong, director of the Health and Wellness Programme Office in Singapore, which was established as part of the government's efforts to encourage innovation in its health sector. "There's so much scope to adapt existing technology that other sectors are already using."

Dial "D" for data

It was only after working at the Centre for Disease Control in the US that Joel Selanikio realised how tough it is to get reliable health information in low-income countries. His work involved tracking the incidence of disease in places like Africa, but often he had no data to work with at all.

Many rural communities that he was monitoring had no formal health services, so no data was ever collected about them. And when data was collected, it was often years out of date. Surveys were conducted infrequently, and usually by health workers going from door-to-door with clipboards filling in paper forms. It then took years for the data to be inputted into a computer system and aggregated into meaningful information.

As well as having medical qualifications, Dr Selanikio is also a trained software engineer. He decided to set up DataDyne, a US-based social enterprise, in order to develop a system for gathering health data electronically in real-time. But rather than use computers as his platform, Dr Selanikio decided the most powerful tool would be the humble mobile phone.

"Very few technologies have scaled down to even the remotest village in sub-Saharan Africa. Cars haven't, fridges haven't, literacy hasn't. But mobile phones have," he says. "The last successful example of a technology receiving that sort of penetration was radio. The impact of the mobile phone is a once-a-century success story."

The software he has developed is called EpiSurveyor (short for "epidemiology surveyor"). Users of the service access a website where they create simple multiple-choice surveys online. These surveys, or forms, are downloaded to a health worker's mobile phone over the internet. And they then go from door-to-door inputting answers to the form questions via their phone keypads. The completed forms are sent to the central website where users can access the data and analyse it.

One of the keys to the system has been simplicity. Users can create a form in minutes. Indeed, Dr Selaniko says that it takes just an hour for someone who has never used the service to be up and running with live forms.

DataDyne has relied on grant money from organisations like the World Bank to develop its technology, and is now offering its service on a "freemium model". The idea is to keep the basic software available for free, but to charge premium users a fee for add-on services, such as data storage.

So far, the system has supported more than 100,000 surveys. Interestingly, the system is also being used by people in ways that were never intended at the start. In Kenya, for example, the Ministry of Health is not only using EpiSurveyor to track the incidence of diseases recorded at rural clinics, it is also using it as a supply chain management system. Health workers in rural clinics fill in forms on their phones detailing how many drugs they have in stock and what needs replacing.

"People often think of telemedicine as being all about remote diagnostics—linking doctors in cities with patients in the countryside. But it can be much more than that. Our simple survey software is acting as a cloud-based supply chain management system," says Dr Selanikio.

Key points

- Debate rages about the strengths and weaknesses of the public sector, the private sector, and NGOs in providing healthcare. But combining these players in innovative ways can yield impressive results.
- The key is to understand the incentives that drive each type of organisation. In much of Asia, there is a consensus that the private sector should provide health services, but the public sector should pay for those services and act as regulator.
- NGOs have unique skills that can combine with both the public and private sectors. They are powerful in providing early-stage funding for innovations for the poor before the private sector takes over. And they can help implement health policy in places where governments lack resources or are mistrusted.

3. Innovative combinations: Public, private and non-profit

In any health system, numerous different types of organisation are at work, including the public sector, private sector, multilateral organisations, charities, and social enterprises. Debate rages about the relative strengths and weaknesses of each type of organisation, and which is best suited to perform different functions. Often the debates are polarising, pitching those on the political left against those on the right. But amid the rancour, interesting ideas for innovation are also emerging. These ideas typically experiment with new ways of combining different types of operator to achieve health improvements that any one organisation couldn't manage alone.

In almost all countries, the majority of health services are provided by a combination of the public and private sectors, with only a small share coming from other organisations such as NGOs. The split between public and private varies widely, and shows little correlation with income. Among wealthy nations, the government is the biggest player in the UK, while in America the private sector is dominant. Further down the income scale, the public sector is prevalent in places like Vietnam, but takes a back seat in India where more than 70% of healthcare is provided by private enterprise.

Public vs private

Gina Lagomarsino, a managing director at Results for Development, a US-based think-tank and research centre, describes herself as "agnostic" about whether public or private provision is best. But, she stresses, "The incentive structures are different in the public and private sector. To get the most out of what each has to offer, it's important to recognise how the incentives work."

In the public sector, employees earn a salary regardless of whether they do a good job or not. That can cause high levels of staff absenteeism and low levels of performance. A study in 2006 published in the Journal of Economic Perspectives found that in India and Indonesia, 40% of health workers in primary

health centres were absent from their posts during working hours.[3] The private sector, by contrast, only gets paid if it delivers a service that customers want. That drives better performance, while the competition of the marketplace encourages innovation and efficiency.

But private-sector incentives also encourage undesirable behaviour. Because they are motivated to increase their sales, private companies might persuade patients to buy treatments they don't need, or even to buy incorrect and harmful treatments. This problem—exacerbated by information asymmetry, because patients know much less than the providers—is less serious when government is the provider. Just as problematic is the issue of how to supply health services for poor communities where demand for healthcare may be high, but incomes are too low to attract the interest of the private sector.

"Given how the incentives work, we're seeing more and more governments decide that the provision of health services is best left to the private sector, but that funding for those services is best done by the state," says Ms Lagomarsino.

When arranged this way, the private sector can do what it does best—running clinics, hospitals and medical supply chains. Meanwhile, the government can focus on areas where its own incentives are best aligned; namely creating big insurance pools that include the poor, and overseeing regulation and quality. When people covered by government health insurance are only allowed to use clinics and hospitals that have been accredited by the state, it creates great incentives for the private sector to meet standards of care required by the government. And because government insurance gives resources to low-income communities to pay for health, it encourages the private sector to build facilities in those places.

"The biggest lever the government has is financing," says Ms Lagomarsino.

This model of public payer/private provider is leading to interesting innovations, none more so than in India. On April 1st 2008, the Ministry of Labour and Employment launched a health insurance scheme called Rashtriya Swasthya Bima Yojana (RSBY). Aimed specifically at people below the poverty line, it provides insurance for illnesses that require hospitalisation, including 727 types of surgical procedure.

Importantly, given that many poor families are illiterate, the scheme is entirely paperless, and requires no payment from the insured when they seek treatment. Families enroll into the scheme by paying an annual registration fee of Rs30 (US$0.66) for a family of five. They receive a smart card containing their identification details, which they present to a hospital to cover their treatment costs. So far, the scheme has been rolled out in just a handful of states, but already 70m people living below the poverty line are covered.

The scheme is run by awarding contracts to various private-sector insurance vendors who then market the scheme to the poor. For each family that joins, the government pays a premium of between Rs450 and Rs650, depending on the arrangement with the insurer. In return, the insurer agrees to cover all the costs for the prescribed package of treatments covered by the scheme. Around 75% of the premium is paid by the national government and the rest paid by state governments.

Among the many benefits of the scheme, it allows the government to demand certain standards from the private-sector hospitals that choose to be part of the programme. The government also sets prices for each procedure, by which hospitals must abide. To date, 5,000 hospitals have been accredited. Meanwhile, insurance companies are incentivised to expand the scheme as much as possible in order to grow their premium income.

[3] "Missing in Action: Teacher and Health Worker Absence in Developing Countries", *Journal of Economic Perspectives*, Vol 20, No 1, 2006

NGOs as venture capitalists

NGOs, charities, and social enterprises are also playing interesting new roles in healthcare, and serving purposes that are sometimes hard for either the public or private sector to fulfil. This is especially true in low-income environments where private enterprise doesn't yet see a viable market, but where governments lack the resources to address health challenges. In such situations, NGOs can bring expertise and funds to address problems. They can also tackle problems in such a way that it then becomes attractive for the private sector to take over.

One important area where NGOs and donation-funded entities can deliver real value is in supporting ideas at an early stage when the private sector lacks conviction that they are viable. This is exactly the model pursued by PATH, a US-based non-profit organisation that has helped to bring numerous new medical technologies to market in the emerging world. Over the past 30 years, PATH has developed technologies ranging from new contraceptives, to nutrient-enriched rice, to solar-powered fridges for keeping vaccines fresh.

PATH acts as the catalyst for developing an innovation. But, explains Jacqueline Sherris, vice president of global programmes at the organisation, "Once we have a solution, we typically try to find a partner in the private sector in order to take the solution to scale and make it sustainable." What's more, she adds, "We try to encourage competition where we can." So, for example, if PATH has developed a new vaccine, it will try to engage several different research organizations, biotech companies, and/or manufacturers rather than just one.

As part of its partnership with the private sector, PATH also explores ways of making its innovations available to the lowest income groups, which might not be considered a viable market. "When we craft agreements for technology development, we might negotiate a deal whereby the partner guarantees to provide the product or service at an affordable price for the poorest communities as well as at a higher price for the wider public," says Dr Sherris.

At DataDyne, Dr Selanikio also sees great potential in using NGO-type funding as a way to get innovations for the poor off the ground. His company relied on grant money to develop its mobile phone health technology, and is now offering it on a "freemium model". The idea is to make the basic software available for free, but to charge premium users a fee for add-on services. (See "Dial D for data", on page 13.)

"The development of technology is much better done in the private sector," he says. "But sometimes it can be hard to attract commercial capital for projects aimed at the poor, so grant capital helps overcome that. My hope is that, as people come to realise that even the poor can be a viable market, we'll see more commercial capital coming in."

Powerful partnerships

Other types of innovative partnership are also emerging. The Bangladesh Rural Advancement Committee (BRAC), for example, is now the biggest NGO in the world, bringing health services to 100m people—or 62% of Bangladesh's population. While the organisation itself is funded by a mix of donations and profits from its activities, BRAC pursues its goals by harnessing the principles of free enterprise. It employs an

army of 83,000 community health workers who earn a living by selling health services to poor farming families.

What makes the BRAC partnership especially powerful is that it uses its huge reach to implement government health policies, such as fighting tuberculosis. The key to its success is the trust that its health workers have earned from their communities. BRAC began life in 1972 and has steadily increased in size and influence. By contrast, many government regimes have come and gone during that period, and the country has experienced such turmoil and upheaval that Bangladeshis often no longer trust the government and its motives. But they respect BRAC, making it the perfect platform for delivering health policy. (See "In BRAC we trust", below.)

Naturally, health outcomes have the best chance of improving when all the different players in the ecosystem can work effectively together. Here too, innovation is emerging. In Hong Kong, for example, the government has just unveiled a new system for managing the electronic health records of its citizens. Patients in Hong Kong typically seek treatment in both public- and private-sector facilities, a situation that can cause repetition of investigations, over-prescribing of drugs, and errors in diagnosis and treatment. The new system aims to link up the medical records of both the public and private sectors in one system, so reducing such instances. (See "A record achievement", on page 18.)

In BRAC we trust

In the years since Bangladesh gained independence from Pakistan in 1971 the country has experienced much political upheaval, including numerous military coups, political assassinations and popular revolts. Against this background of turmoil and change, the country's 160m citizens have grown mistrustful and disillusioned with their political leaders. The country is also poor, with a per-capita income of just US$641. Given the past instability, the widespread mistrust of the state, and the poverty, successive governments have failed to build a functioning health system for their country.

But where the government has failed, one NGO has succeeded surprisingly well. The Bangladesh Rural Advancement Committee (BRAC) began life in 1972 and today is the biggest NGO in the world. BRAC runs many different programmes, including a large micro-lending scheme for the poor. But its health programmes have been especially successful. By working with the government, BRAC is able to implement many of the health policies that the state itself is unable to achieve.

The foundation of BRAC's work is a network of community health volunteers (CHVs), known locally as Shasthya Shebika. BRAC now has 83,000 CHVs, each delivering health services to an average of 250 households, or 100m people in total.

Each CHV is a married woman aged 25 or older who is part of the community in which she works. BRAC gives each woman four weeks of basic training, with refresher courses at regular intervals thereafter. The training enables the women to diagnose and treat specific health issues—such as life-threatening cases of diarrhoea—to help with pregnancies, and to provide health and nutrition advice. The CHVs receive drugs and health commodities from BRAC that they then sell to those in their communities that need them, so earning themselves a small income.

"We believe the best way to improve health is to focus on primary healthcare in the community with programmes of prevention and health promotion," explains Faruque Ahmed, director of BRAC's health programme. "The CHVs are how we achieve that."

The drugs they sell and the training they receive are designed to match the national health priorities set by the government. That makes BRAC one of the most effective tools for achieving national health goals.

"To be effective at health promotion and care in poor communities, you need to have the trust of those communities," notes Mr Ahmed. "BRAC has earned that trust through more than 30 years of continuity. The government, on the other hand, changes often and is highly centralised, so people don't have the same level of trust."

A record achievement

The health system in Hong Kong has both public- and private-sector providers, with patients often using both, especially for complex conditions. While that gives Hong Kong citizens plenty of choice, it creates problems in managing patient data and records. In the past, patient information was stored in multiple places and some private practitioners charged exorbitant fees to patients wanting to take possession of their own health records. This caused errors in diagnosis and treatment, such as repetition of investigations and over-prescribing.

Today, however, that issue is being addressed with a new electronic health record (EHR) sharing scheme that aims to gather patient data from the public and private sectors into one central repository. By doing so, the government hopes to stitch the two different sectors into one system that functions more efficiently and productively than before.

"Doctors can see a patient's entire medical history, no matter where the patient was seen," says Dr Cheung Ngai-tseung, the Hospital Authority's chief medical information officer.

Besides providing a complete picture of a patient's illness, the system has built-in warnings that flag allergies and potentially hazardous drugs. By providing mineable health data, the system can also reveal disease trends, the uptake and efficacy of clinical guidelines and future health-service needs.

Hong Kong's regulatory environment meant pre-existing health record software was unsuitable, so in the mid 1990s, the Food and Health Bureau commissioned the Hospital Authority to develop a system in-house. In 2000, they rolled out a single content management system (CMS), spanning the Hospital Authority's 41 hospitals and 122 clinics. Since then, a further 1,500 private healthcare practitioners have been added to it through a secure platform that gives them access to the public EHRs of consenting patients.

The government has now set its sights on a territory-wide scheme that allows for two-way EHR sharing between the public and private healthcare sectors. Announced in 2009 with a pledge of US$90m, the first stage of the project is due for completion in 2014. To encourage private-sector participation in the opt-in scheme, the Hospital Authority has developed a simplified open-source CMS for private clinics and hospitals that puts patient data into a sharable format.

To date, Hong Kong's EHR project compares favourably with similar international schemes that have cost billions of dollars but achieved less. "There has been a lot of money spent on healthcare software, with varying levels of success. But Hong Kong has been able to spend much less and develop software that doctors and nurses actually use," says Dr Cheung.

Key points

- Improving healthcare funding is crucial for poor countries. Insurance is often rare, with patients using out-of-pocket payments for most healthcare. Many millions of people are tipped into poverty every year when a family member falls seriously ill.
- Overall spending on health is tied closely to a country's per-capita GDP and is therefore difficult to increase. But the little money that is spent on health can be better organised by converting out-of-pocket payments into health insurance premiums.
- Designing health insurance policies for the poor is challenging, given low incomes, high illiteracy, and low awareness of how insurance works. But more and more micro insurance schemes are appearing.

4. Getting to the bottom: New thinking in healthcare financing

Innovation in the field of health funding is about how to pay for the provision of healthcare services—usually through some form of insurance that can pool the risk and cost of illness across a large group of people. In general, this is less of an issue for wealthy countries. Not only are people richer, but the regulatory environment frequently ensures that all citizens are covered, whether by the state or, for example, by employers providing insurance for their employees.

In poorer countries, however, not only is insurance more expensive relative to incomes, but many people work in the informal sector and so are not covered by employee health insurance laws. In such environments, health costs are met by out-of-pocket (OOP) payments rather than by insurance. In Pakistan, 82% of all health spending is in the form of OOP payments. In Cambodia the figure is 63% of spending, and in China it is 54%.[4]

This creates huge vulnerabilities among the poor, who are often uneducated about how to manage their health. All too often they wait too long before seeking treatment, so allowing their situation to worsen. And when they do seek help, the costs can tip families into dire poverty. If the primary earner is the one falling ill, then the effect is magnified further. In Indonesia, the World Bank estimates that half of the population lives at an income level that is vulnerable to poverty from so-called catastrophic health expenditure.[5]

The seemingly simple solution to this problem is to increase the money spent on health in low-income countries. Sadly, however, this is extremely hard to achieve. A 2008 report from the Results for Development Institute found that 92% of the difference in health spending between countries is explained by differences in per-capita income. Furthermore, the report finds that pumping more external money into health spending, for example through foreign aid, does not lift spending levels. "The only effect of donor support appears to be a shift from private funding to government funding, leaving total resources unchanged," the report states.[6]

[4] World Health Organisation, national health accounts data, 2006

[5] *Investing in Indonesia's Health: Challenges and Opportunities for Future Public Spending*, World Bank, 2008

[6] *Towards a New Paradigm for Health Sector Development*, Jacques van der Gaag and Vid Stimac, Results for Development Institute, 2008

But while overall spending levels may be hard to change, the manner in which funds are used to support healthcare can certainly be improved. Gathering all the money spent on OOP payments and converting it into premiums for an insurance scheme, for example, would bring much greater security to the vulnerable poor.

Premium problems

Creating insurance schemes for low-income customers—often called micro insurance—is fraught with difficulties. For a start, low incomes mean low premiums. Moreover, many poor communities in rural areas are highly fragmented, with little infrastructure to reach them, making it expensive to sell and market insurance services. Many of the customers are illiterate, so policies are hard to document and expensive to administer. And commercial underwriters have little data to work with in terms of understanding and pricing the risks involved.

Perhaps the greatest challenge of all is trust. Villagers who have never come across insurance before have little faith in salesmen from outside their community who represent companies they have never heard of. They have equally little confidence in the legal system to enforce their policies.

"Every assumption that underpins traditional insurance products in wealthy countries has to be redesigned for the bottom of the pyramid markets," says David Dror, the founding chairman and managing director of the Micro Insurance Academy in India. "Almost all insurance companies struggle to see how they can make a profit in this type of market which is why very few are even trying."

He argues, however, that the poor do represent a viable market for health insurance if companies can be innovative in their thinking. A report in 2009 from Lloyd's, a London-based insurance market, and the Micro Insurance Centre, a research group in South Africa, estimates the potential market for micro insurance—including health as well as other forms—could be as high as 3bn policies worldwide.[7] At present, only 135m low-income people are being served, with few policies written for health.

"The success of microcredit worldwide has shown that people with low incomes are a proven market for financial services and are effective consumers if given appropriate products, processes, and knowledge," the report states.

Some micro insurance schemes for health have tried to build directly on the back of microfinance. In Bangladesh, for example, the country's two biggest micro-lenders, BRAC and Grameen Bank, have both experimented with packaging health insurance policies as part of the loans they make to the poor. Results have been mixed, partly because such schemes only cover those who borrow money.

Fixing broken hearts

Other schemes have been developed by hospital groups as a way to open their services to poor communities. In Bangalore, Devi Shetty, a cardiac surgeon, has built a 25-acre health city called Narayana Hrudayalaya that houses numerous hospitals catering to heart surgery, cancer treatment, organ transplant, eye-care and other conditions. The principle behind all of the hospitals is to employ economies of scale and specialisation to slash the costs of providing healthcare. The heart hospital, for example, has 1,000 beds (compared with 160 in an average American hospital) where Dr Shetty and a team of 40 cardiologists perform 600 operations every week. (The cancer hospital has 1,400 beds.)

[7] *Insurance in Developing Countries: Exploring Opportunities in Microinsurance*, Lloyd's and Micro Insurance Centre, 2009

The sheer number of patients, and the narrow specialisation of the surgeons, means they quickly become experts—Dr Shetty has performed more than 15,000 heart operations. The scale of the operation drives down the cost, especially as the heart hospital shares central facilities such as administrative services, laboratories and a blood bank with the other hospitals. The facility charges around US$2,000 for open heart surgery, against prices of at least ten times as much at a hospital in the US, and with success rates that are as good, if not better.

Nonetheless, even US$2,000 is too much for most Indians, and so Dr Shetty has also devised innovative insurance programmes for the poor in Karnataka state that enable them to use his hospitals. Starting eight years ago, he teamed up with a local cooperative of dairy farmers, selling micro insurance to its members for 11 US cents per person per month, with the premiums deducted every time a farmer sold his milk. He persuaded the local government to chip in a further 7 cents for each member of the scheme.

Today, the scheme has several million insured members, and 400 hospitals across the state where those on the scheme can access health services, with no cash payments required. The funding arrangement has changed slightly, as the initial scheme proved too expensive for the government. Policyholders now pay 22 cents per head and the government acts as a reinsurer if claims go above a certain threshold. Dr Shetty is in the process of rolling out similar insurance schemes in other states such as Andhra Pradesh and Tamil Nadu.

Dr Shetty uses politics to get the schemes off the ground, always naming each scheme after a local politician looking to get re-elected. Come election time, it's a highly popular move among voters to roll out an affordable insurance scheme that is part-funded by the government. "Politicians do the right thing for the wrong reason and we use that," explains Dr Shetty.[8]

Some observers have criticised Dr Shetty's insurance programmes for being more about driving business through the doors of his hospitals than providing the types of services most in need to the poor, such as primary and maternal care. Equally, the foundation of the scheme, namely using the short-term goals of politicians, may not be the most stable. But it's hard to argue with the fact that he has treated many thousands of heart and cancer patients who would otherwise have gone without.

The example of Dr Shetty also illustrates another line of attack in the battle to finance healthcare for the poor. Faced with financial constraints, why not focus instead on reducing the cost of treatments by developing new medical technology and new forms of healthcare delivery? The next two chapters will explore these ideas further.

[8] *Old problems, fresh solutions: Indonesia's new health regime*, Economist Intelligence Unit, 2010

Key points

- New medical technology is often designed for rich countries, making it too expensive and inappropriate for Asia's millions of poor. But more and more organisations are focused on "frugal engineering".
- "Frugal engineering" aims to make healthcare technology that is cheap, uses local materials, can withstand tough treatment and harsh environments, is easy to repair, and is simple to use by healthcare professionals with limited skills or training.
- Innovating for the poor often means adapting existing technology to new uses rather then developing new technology.

5. Back to basics: Innovation in medical technology

Many parts of the healthcare industry are heavily focused on developing new medical technology. Pharmaceutical companies spend billions of dollars every year on R&D for new drugs. Research hospitals look for better ways of diagnosing and treating illnesses. And technology companies strive constantly to build better machines and medical devices, from gene sequencers to bandages to medical IT systems.

Many of these innovations bring important improvements to healthcare. But they tend to do so for rich countries where wealthy consumers can afford them—and where fees for their use are likely to repay the R&D investment. Meanwhile, in poor settings, many countries struggle even to adopt technology that is already decades old.

Partly this is because of inefficiencies and poor management of health systems. But often it is because technologies developed for the rich world are not only too expensive, but inappropriate. In countries where large parts of the population have yet to install 19th century technology, such as paved roads, decent sanitation and regular electricity, it makes little sense to buy 21st century innovations.

Increasingly, though, a new breed of innovation is arising that takes as its starting point the needs of the poor. Frequently dubbed "frugal engineering", it means producing medical goods that cost just a fraction of similar goods in the rich world. It means designing technologies that can be used by medical staff with only limited training. It means using local manufacturers and locally-sourced materials so that spare parts can be found easily and repairs carried out by local engineers. And it means developing innovations that can withstand extremes of temperature, dust, irregular power and rough treatment.

"People are often obsessed with the latest and greatest technology, but that is rarely the best investment for many parts of Asia," notes Henk Bekedam, director of health sector development for the Western Pacific region at the World Health Organisation in Manila. "What's needed instead is appropriate technology."

Mark Landry, a colleague of Dr Bekedam's at the WHO, and a specialist in health IT, argues that technology is often too much the centre of attention. "Technology is merely an enabler to help tackle health challenges, it should never be an end in itself," he says.

Sounding a frugal call

In Vietnam, Luciano Moccia agrees. He works for East Meets West Foundation, an NGO dedicated to tackling difficult development problems. He has spent the past five years producing new technology to help Vietnam tackle infant mortality.

The number one killer of newborns, explains Mr Moccia, is respiratory problems. When babies are born prematurely, often their lungs aren't fully developed, they struggle to breathe and frequently die. In wealthy markets such conditions are treated using a Continuous Positive Air Pressure (CPAP) machine, which keeps their lungs inflated until they can breathe on their own.

"The problem in Vietnam," says Mr Moccia, "was that these machines were too expensive to buy and run." A CPAP machine usually costs around US$4,500 to buy, and then requires even more expensive "consumables" to operate it. Every baby must be connected to the machine by a set of special tubes that cost around US$300. To prevent infection, these tubes are designed to be thrown away after each use. "In the West, that's an acceptable cost," says Mr Moccia, "but not in Vietnam."

To solve this issue, Mr Moccia teamed up with a local manufacturer in Vietnam called MTTS to design a new CPAP machine that was appropriate to the local market. That meant producing the machine for a much lower cost. It also meant doing away with the need for expensive consumables. Just as important was the need to make the machine rugged enough to withstand the rough treatment common in Vietnamese hospitals.

The result was a CPAP unit that MTTS now sells for US$2,200—or half the price of a Western equivalent. More importantly, the disposable tubes were replaced by a set of glass bottles and special silicone pipes that can be washed and re-used instead of being thrown away after a single use. In addition, the new CPAP was made significantly more robust, for example with special software to regulate the supply of electricity (in Vietnam, the unstable electricity supply often damages Western-designed machines).

"We took the CPAP and completely re-engineered it to suit the local market," says Mr Moccia. "Our solutions are never the best in the world. We don't even ask what the best possible design would look like. Instead, we try to build the best possible given the local environment and the local resources."

Today, MTTS's machines are installed in every one of Vietnam's national and provincial hospitals and in a quarter of its district hospitals. In 2009, they treated 40,000 babies, many of whom would have died or been brain-damaged without them.

Frugal innovation can apply just as much to production processes as it does to products. The Serum Institute of India, a private company producing vaccines, has succeeded in reducing the cost of a single DPT and hepatitis B vaccination from US$1.70 to US$0.69. The trick was to apply economies of scale using technology developed by the Dutch government. In the past, vaccines were produced in batches of 100 litres at a time. Today, the Serum Institute produces 3,000 litres in one go, so reducing costs and making it the biggest supplier of vaccines to both UNICEF and the Pan American Health Organisation.

Turning old into new

Another important aspect of frugal innovation is the adaptation of existing technology rather than the creation of new technology. Take Embrace Global, a social enterprise based in India. Over the past two years, it has developed an incubator to keep newborn babies warm that costs less than US$200, compared to machines used in rich markets that cost US$20,000 to buy. The product is a tiny sleeping bag packed with a special "phase change material" that looks like wax and is able to maintain a constant temperature for hours on end.

"Phase change materials have been around for at least 40 years," says Linus Liang, co-founder and chief operating officer of Embrace. "It's used for things like keeping telecom transmission towers insulated at a constant temperature. All we did was take an old technology and adapt it to a new use." (See "Embracing realities", on page 25.)

Sometimes the technology doesn't even need adaptation. It's enough just to implement it in a new setting. At PATH, for example, Dr Sherris points to the idea of introducing barcodes to improve the supply chain management of vaccine shipments. "Vaccines can easily become old or spoiled if the logistics are mishandled, so using barcodes, radio frequency ID tags and other technologies to track them is a simple but highly effective improvement," she says. "There is enormous innovation that already exists outside the healthcare environment that we can use."

At DataDyne, Dr Selanikio is of a similar mind. "There is huge buzz around what is known as 'ICT4D', or information and communication technology for development, but the paradox is that almost all efforts in this field have failed," he says. "The technologies that have had the biggest impact on health for poor countries have been general applications like email, and the evolution of the mobile phone. These have had immeasurably more impact on the ability of health workers in low-income countries to do their jobs than any IT tools that were developed specifically for them."

But even with appropriate technology produced at an affordable price, innovation is often still called for in order to market and distribute these new products, especially where awareness of health issues is low and distribution systems are weak or non-existent. This has certainly been the case for WaterSHED, an NGO that promotes clean water and better sanitation in Cambodia and Laos. The group has developed cheap water filters and affordable latrines that can bring substantial health improvements. But in order to popularise its products, WaterSHED has had to develop innovative ways of working with local entrepreneurs to distribute its products, and innovative ways to educate poor villagers about the importance of hygiene. (See "An excrement idea", on page 26.)

Embracing realities

Every year, 20m babies are born prematurely or with a low birth-weight, most of them in developing countries. Around 4m of them die within the first month of their life. Among those that survive, many develop problems such as heart disease and diabetes and suffer from a low IQ.

One of the biggest problems these babies face is hypothermia because they struggle to regulate their body temperature. The problem is easily solved in rich countries by using a baby warmer or incubator to help them stay warm. But these machines can cost as much as US$20,000 to buy, far beyond the means of most health centres in poor countries. What's more, these machines are inappropriate to rural settings where electricity is often not available.

To tackle this problem, a social enterprise called Embrace Global in India has developed a baby warmer that costs less then US$200—just 1% of a traditional machine. The warmer is a good example of how frugal innovation can meet the needs of the poor by approaching the problem from a new angle.

Embrace was set up in 2008 by four students who shared a class called "Extreme Affordability" at Stanford University in the US. The students were asked to think about ideas for addressing infant mortality in low-resource settings. They visited Nepal to study the problem first-hand, visiting hospitals, clinics, and rural villages.

"We realised it was no good designing a warmer for use in hospitals because 80% of babies are born at home. The roads are too long and too rough for pregnant mothers to travel to hospital, so we needed a warmer that could be used in rural settings," explains Linus Liang, co-founder and chief operating officer of Embrace.

The design they came up with has three parts. The first is a tiny sleeping bag that the baby lies in. The second is a sealed pouch of "phase-change material", a wax-like substance that holds a constant temperature for four hours at a time. The third is a heater that is used to warm the waxy substance before it is placed inside the sleeping bag. The hardest part of the design was finding a material that not only could keep a constant temperature, but which also wouldn't overheat and burn the baby.

"Phase-change materials have been around for at least 40 years," says Mr Liang. "They're used for things like keeping telecom transmission towers insulated at a constant temperature. All we did was take an old technology and adapt it to a new use."

The warmer comes in two varieties. The first, already available, uses an electrical heater to warm the phase-change material. This version is intended for clinics that have a power supply. The second version, which is close to being ready, uses hot water to heat the material, and so doesn't need electricity and can be used in more remote areas.

Mr Liang notes many challenges in taking the warmer from a vague idea to a physical product, particularly financing challenges, although that will be less of an issue in future. Embrace plans to sell the warmers to rural clinics at a price—around US$200 each—that will cover their ongoing costs.

He also stresses the difficulties of delivering quality in an environment where incomes are low. "Cheap can't mean poor quality. These products have to be good enough to use in any market, rich or poor, and that was hard to achieve."

An excrement idea

Health innovation is most often associated with new medical technology and better ways to organize hospitals, clinics and health insurance schemes. But conditions in the wider community often have much more influence on health.

Take issues of water quality, sanitation and hygiene. Globally, 1.5m people die of diarrhoea every year, most of them children under the age of five. Many more would die without the widespread use of oral rehydration therapy, whereby patients are fed a life-saving solution of salts and sugars. Arguably a better solution, though, would be to prevent diarrhoea from striking in the first place. That requires improving the quality of water and sanitation in low-income communities so that the germs that cause diarrhoea don't get into the body in the first place.

This is the idea behind WaterSHED, an alliance of social enterprises and NGOs that strives to raise standards of water, sanitation and hygiene in Cambodia, Laos and Vietnam. Set up with support from the University of North Carolina in the US, and funded by donors such as USAID, WaterSHED approaches the problem by developing innovative products that can be made and sold by local entrepreneurs for a profit—all supported by marketing and education programmes to raise understanding of why clean water and sanitation are important.

So far, WaterSHED has developed innovative water filters and latrines. All of them use extremely low-level technology, all made from locally available materials, but which work just as effectively as expensive products from multinational companies.

"Our solutions are not hi-tech, they are right-tech," explains Tom Outlaw, co-founder of WaterSHED. "They're cheap to make, affordable to buy, extremely durable, and appropriate to the setting."

Its water filters, for example, use an innovative mix of clay, rice husks, and silver nitrate. An urn made from this mix is filled with water that then seeps through the walls at a rate of two liters per hour into a plastic container below. As it filters through the ceramic walls, the clay, rice husk and silver nitrate mix kills all the harmful bacteria in the water.

WaterSHED spent US$140,000 to set up a factory in Cambodia in October 2010 with a capacity to make 8,000 filters a month. Operating under a company called Hydrologic, the plant produces several designs—a basic one with a cheap plastic receptacle, and a more aspirational model made from transparent blue plastic with a metal spigot for pouring the water. Production costs range from US$10 to US$25, and the filter typically lasts for five years before needing to be replaced. The cost to a consumer to buy these filters is higher and varies.

"We tell our [distribution] partners to sell the filters for as much as they can get," says Mr Outlaw. "The typical NGO mentality would be to give them away, or sell them at cost, but we want this project to be sustainable and scaleable." Hydrologic is currently owned by the project donors, but it's likely to be put into the hands of employees soon to be run as their own business.

To build even deeper commercial foundations, WaterSHED has also launched an aggressive advertising campaign in Cambodia that not only educates about the importance of clean water, but also portrays the product as hip and cool. The water filter, called "Rabbit"—an animal considered both wise and cute in Khmer culture—is now a widely known brand in the country.

WaterSHED has also developed an innovative latrine technology to address lack of sanitation in rural villages where the poor tend to defecate in their fields or on open public spaces and roads. The latrine project is built on the same commercial foundations as the water filters, using local builders to manufacture the latrines (for a cost of around US$100), and local entrepreneurs to sell and install them in their communities. Once again, though, marketing and education have been critical to the project's success.

"We take a model of a latrine into a village and organise a festival, with lots of hoopla and fun, and in the process explain why good sanitation is so important," says Mr Outlaw. "Local entrepreneurs win the business and build the latrines using our designs, and we help the sales process by bringing in micro-lenders."

Key points

- Running clinics and hospitals is hard in many Asian countries because so many people live in rural areas where doctors are thin on the ground. That leaves millions of poor relying on health workers with little or no training.
- Many promising models of healthcare delivery are emerging to overcome the skills gaps in rural areas, from harnessing mobile phones to deliver telemedicine, to building branded franchises of clinics to improving training.
- Alongside "horizontal" models of healthcare delivery—those that address the full range of illnesses—innovative "vertical" models are also being used that tackle specific diseases, such as tuberculosis.

6. Doctor dilemmas: Innovative ways of delivering healthcare

When it comes to delivering health services—the infrastructure of clinics and hospitals—innovations revolve around experiments with new business models, and new operating processes.

In wealthy countries, systems for delivering health services are based on the use of fully-qualified staff from top-to-bottom. From the humblest rural clinic to the most sophisticated research hospital, patients are seen by qualified doctors, supported by qualified nurses and other staff. Innovation in such settings is about how to organise these resources most effectively, and how to improve their productivity. The chief goal is to reduce costs and raise quality and performance.

In poor countries, the situation is quite different. Here, the chief aim of innovation is improving access. Millions of people live in places that lack not only doctors and nurses, but also health centres and clinics. This is true in many urban settings, such as slums and squatter settlements, but is doubly true of rural areas.

Consider the case of Indonesia. In 2006, the country's urban areas had one doctor for every 2,763 inhabitants, but in rural areas the ratio was one for every 16,792 people.[9] By way of comparison, the national average for Japan is one doctor for every 454 citizens.

The effort required to get doctors to work in poor rural communities is all too familiar to Mohammad Yunus, founder of Grameen Bank in Bangladesh. Although famous for his part in pioneering micro-lending, Dr Yunus is also building health services, but struggles when it comes to staffing his rural operations.

"We hire doctors to run our health centres, we pay them well, but they rarely last more than six months," says Dr Yunus. "They just don't want to be stuck in the middle of a remote rural area."

One of the most promising ways of addressing this lack of access to health services is to use telemedicine, whereby rural villages are connected to centres of medical excellence in the cities staffed by

[9] Data from PODES, or Potensi Desa, regular government surveys of Indonesia's villages

doctors. Often the workers in the field are simply villagers themselves, with little more than rudimentary training. But by using mobile phones, and where possible by using internet-enabled computers, these workers and their patients can access fully-trained doctors hundreds of kilometres away. What's more, by using this model, the central pool of doctors can be only small, yet still service millions of patients.

In India, Gopi Gopalikrishnan, founder and president of World Health Partners (WHP), a social enterprise, is building a health system for rural Bihar based on exactly this model. By his estimates, India has around 2m rural entrepreneurs practicing rudimentary medicine. "Some of them have a little bit of training, but many don't and they do crazy things like prescribe steroids and antibiotics in completely inappropriate situations," he says.

Mr Gopalakrishnan's goal is to gather these existing health workers into a franchise of health centres that operates under a proven and trusted brand. WHP provides the workers with basic training to cover simple illnesses, but connects them to doctors in a call centre for more complex conditions. The basis for the model is entirely commercial—the rural practitioners charge their patients for the services they provide. They also pay a franchise fee to WHP to cover the costs of training and building the brand.

For Mr Gopalakrishnan, the model's commercial foundations promise enormous scalability. Today, the scheme covers 3.6m people. Within four years, he expects it to reach 70m. (See "The Sky's the limit", page 29.)

Vertical and horizontal

Projects such as those of WHP represent efforts to deliver the full range of health services to patients, and as such are a "horizontal" business model. Other innovations in healthcare delivery are much more "vertical", focusing on addressing just a single health issue, such as HIV Aids.

One particularly interesting example of an innovative approach to tackling a specific illness comes from Operation ASHA, an NGO in India that is trying to stamp out the curse of tuberculosis. Although a cure has long been available, it requires clinicians to ensure that patients take a course of drugs for six months. This would be difficult enough if the disease didn't also carry a stigma that makes sufferers reluctant to come forward for diagnosis or treatment.

Operation ASHA is overcoming these issues by running a chain of TB clinics that operate "incognito" among the slum-dwellers of Delhi. "By taking the treatment into the communities, we can make sure that patients stick to the drug schedule, and we can provide education to overcome the stigma of the disease," says Shelly Batra, the doctor who founded Operation ASHA. (See "Joining the DOTS", on page 30.)

The Sky's the limit

In India, Gopi Gopalakrishnan is convinced that the best way to deliver health services to the rural poor is to harness the power of the private sector. He has set up a social enterprise called World Health Partners (WHP) to do exactly that.

"The public sector is very hard to manage efficiently, it struggles to deliver quality, and supplies less than 30% of the country's healthcare," he says. "NGOs have the right motivation, but they aren't scalable. In India we have 3.3m NGOs, yet they deliver only 1% of our healthcare. The majority, more than 70%, is provided by the private sector."

In rural communities, however, the quality of care from the private sector is frequently not only poor but dangerous. Today, almost 2m health practitioners provide health services to rural villagers, but in general do a poor job.

"Some of them have a little bit of training, but many don't and they do crazy things like prescribe steroids and antibiotics in completely inappropriate situations," he says.

To improve matters, WHP is building a system that gathers existing resources in the private sector and tries to reorganise them so that they deliver much more consistent, better quality care. The model is based on a franchise, run under a brand called Sky that guarantees certain standards.

The front line of the franchise is called Sky Care. These are health providers in remote villages with little infrastructure or facilities. WHP provides training to these workers so that they can treat simple conditions. To help, they are connected via basic mobile phones to centres of medical excellence based in the cities. Using just SMS text messages, Sky Care providers can send enough information about a patient for remote doctors to make a diagnosis and then send a text message back with a recommended prescription or a course of action.

Sometimes the recommendation is for the patient to visit the next rung up in the chain—Sky Health Centres that are based in villages with better infrastructure. These are more formal clinics, set up and run by health entrepreneurs, but again connected to a central pool of doctors. This time, however, the connection is via a PC and the internet. The clinics also have a remote medical diagnostic kit called ReMeDi, developed by a Bangalore-based firm called Neurosynaptic, that can measure heart activity, temperature, listen to a patient's lungs, measure blood pressure and carry out other tests. Armed with this information, the central pool of doctors can diagnose much more complex conditions.

"The framework is about connecting city-based medical excellence with the available skills we find in rural areas," explains Mr Gopalakrishnan.

The system is based on curative care, which acts as the economic anchor. Sky providers charge for their services and have a chance to make money and earn a living. However, once the franchise is built out, it provides an infrastructure that can also be used to deliver less commercial preventative health programmes, such as immunisation and family planning.

Because the model is commercial, members of the Sky franchise must pay a fee to WHP to cover the costs of training, building the brand, and auditing of standards among franchisees. Entrepreneurs who set up the more advanced Sky Health Centres also have to invest around US$1,000 to set up their clinics. However Mr Gopalakrishnan says that when a health worker joins the franchise, they typically see the number of consultations they receive rise by between 40% and 60%, an increase in business that more than covers the investment and the franchise fee.

WHP is building other parts to the system too, including a network of diagnostic centres, and a supply chain for medicines produced by generic manufacturers under the Sky brand.

For Mr Gopalakrishnan, the model's commercial foundations promise enormous scalability. So far, the scheme has been rolled out as a pilot project in the state of Uttar Pradesh and has taken in 1,300 Sky Care providers and 120 Sky Health Centres which together reach 3.6m people. Now the scheme is being introduced to Bihar state. Within four years, he expects it to reach 70m there, and to move into other states too.

Joining the DOTS

For Shelly Batra, a doctor based in Delhi in India, the curse of tuberculosis is a worsening tragedy. Despite there being a perfectly good cure for the disease, the number of people who contract TB is rising, leading to 500,000 deaths in India alone, and 100,000 women being abandoned by their husbands every year.

"I realised that we would never really solve this problem without innovation," says Dr Batra. To that end, she set up an NGO called Operation ASHA that is experimenting with new ways of tackling the disease.

The best way to treat TB is to use a technique known as Directly Observed Treatment Short-Course, or DOTS. But implementing the treatment is hard because it requires patients to complete a six-month course of drugs. The problem comes because patients start to feel better long before the end of the treatment and so stop taking their medication. Sadly, that allows the disease to re-emerge, allowing the patient to spread it to others when they cough.

As such, DOTS treatment calls upon health workers to directly observe patients taking their medication to ensure that they complete the full course of drugs. Overseeing six months of observation is hard enough. But the disease is also considered shameful, so many patients are reluctant to get tested or to be seen taking TB medication.

"TB carries huge stigma. It is often considered to be a punishment for sins committed in a past life," explains Dr Batra. "Many also believe there is no cure, and live in fear that if they are discovered to have the disease they will be fired from their jobs."

The government of India runs excellent TB hospitals that provide free diagnosis and free drugs for the disease. But many of these hospitals are too far away from the TB sufferers for them to make the trip to take their medication. And the TB centres are only open during working hours.

As such, Operation ASHA—which means "hope"—is taking the treatment out of the hospitals and into the slums of Delhi where patients can receive their treatment without disrupting their working day. The treatment centres are housed in existing businesses such as small shops, or in temples, that are open for long hours and convenient to reach.

What's more, by operating in places that serve other purposes, the clinics can provide treatment without drawing unwanted attention to the TB sufferers. That layer of "camouflage" is strengthened further by supplying these centres with other drugs, such as paracetamol, so that health seekers visit the centres for many reasons, not just TB.

"By taking the treatment into the communities, we can make sure that patients stick to the drug schedule," says Dr Batra. "And we can also provide education to the local communities to overcome the stigma of the disease."

Another innovation is a scheme of incentive payments for the TB workers. They receive US$4 for every new case of TB that they help to identify. And they receive a similar amount for every patient that successfully completes their six-month treatment.

Underpinning the incentive scheme is a biometric device that Operation ASHA developed in partnership with Microsoft, a US software company. Patients must place their finger on an electronic reader every time they receive their drugs, with the treatment record then stored on a small laptop computer.

Operation ASHA runs a team of counselors who each look after several TB treatment centres. The system automatically alerts these counselors via an SMS text message when a patient has missed a treatment and the counselor then visits the patient's home to administer the drug. Both the counselors and the local community TB workers are incentivised on achieving a zero default rate.

Key points

- To encourage innovation in their health sectors, governments need to think deeply about what role they should play. Often it makes most sense to act as payer and regulator of the health system, but to use the private sector to deliver health services.
- In the role of payer, governments can influence the demand for innovation from the private sector by allocating resources for new products and services.
- Governments are well-placed to bring together different players in the health system and to act as the focus for new forms of collaboration.
- Education is critical for innovation to thrive; not only the quantity, but also the quality. Creativity and problem-solving should trump rote learning.
- A stable business environment is a crucial foundation for innovation. Bureaucracy, poor infrastructure and an uncertain legal environment all stymie innovation.
- In poor countries, corruption is entrenched and a great barrier to the adoption of new technology, ideas and business models. Governments have a vital role in fighting corruption and promoting transparency.

7. Incubating innovation: Conclusions for government

Innovation is clearly essential in order to address stubborn health challenges, to manage costs, and for health systems to keep improving. But what can governments do to encourage and nurture the innovation that they need?

Most importantly, argues Ms Lagomarsino at the Results for Development Institute, they can think more clearly about what role they want to play in the health system. "Should the government be regulator, payer or provider?" she asks. "In general, the state is best placed to act as regulator and payer of health services, with providers coming from the private sector."

In the role of payer, governments can support innovative organisations most easily by creating demand for their products and services. That demand can come through purchasing their services indirectly through insurance or vouchers, or directly through contracts. But in order for governments to create an environment conducive to innovation they must, in their role as payer, create a degree of stability in their purchasing and insurance policies so that companies can plan and manage their resources more efficiently and have a clearer picture of expected demand.

Governments can also bring financial support to innovation by providing funds for research and development. This could be in the form of grants or low-interest loans to organisations that need time to bring their innovations to market.

An even more important role could be to act as a much-needed bridge between the disparate organisations seeking to operate in the healthcare sector. The public sector, private sector, social

enterprises and NGOs all have different strengths and weaknesses. In many countries, the government is well positioned to encourage new partnerships to form and to be the anchor around which different operators collaborate.

In Singapore, for example, the nation's Ministry of Health has joined forces with Singapore's Economic Development Board to set up the Health and Wellness Programme Office (HWPO) in order to encourage innovation in its health sector. The HWPO works by building bridges between private companies on the one hand, and local hospitals, clinics and nursing homes on the other. This enables companies to understand what the needs of the patients are, to develop technology to meet those needs, and then to test it with patients in a sort of "living lab". (See "Healthy and wealthy", on page 33.)

The wider ecosystem

Innovation is much more likely to thrive in settings where companies can operate freely and fairly. The quality of the business environment, the ease of setting up companies, the transparency of information, and the certainty of the legal system are all essential ingredients that encourage companies to invest more heavily in innovation.

In low-income countries, infrastructure is a vital ingredient that is still often missing. While the lack of roads and sanitation is itself stimulating innovation to get around these impediments, the type and quality of innovation would be better if these constraints were removed. The same goes for education. Poor countries lack doctors and nurses and administrators. And while new business models such as telemedicine are emerging to overcome this problem, arguably better innovation would emerge if well-qualified health workers were already in place.

At East Meets West Foundation, Mr Moccia believes education is an especially important area that governments should focus on. But it isn't just the quantity of education, it's also the quality. "The way that people are taught is too much through rote learning and doesn't encourage creative thought from the students," he says. "This is true from doctors right down to repairmen fixing machines. They need to think more creatively about problems rather than doing the same things that have always been done."

But the biggest barrier to innovation in Mr Moccia's mind is corruption. In his efforts to develop frugal technology for poor markets, he has found that hospitals frequently prefer to buy expensive, prestigious-looking machines from Western firms rather than his more appropriate, much cheaper, but less attractive alternatives.

"Hospital directors do not choose based on merit and cost. Instead they buy machines that will look good in their hospitals, and they buy because they receive kickbacks," he says. "The fact the machines often break down after a short time is good, because it means they can get another kickback buying the machine all over again."

Mr Moccia says it takes patience to get around corruption. He succeeded by first giving his machines to hospitals for free. And when the doctors using them realised how superior they were to the more expensive ones, they began to demand that their hospital directors start buying them.

Innovation is never easy. It takes perseverance, especially in the healthcare industry where important steps such as conducting clinical trials and winning regulatory approval can stretch over many years.

What's more, innovation is about trial and error. Many promising ideas lead to nothing, causing great frustration. But innovation is also vital for a better future. If governments can help to make the process of developing ideas and turning them into products and services any easier, the rewards are tremendous. Not only will their citizens be healthier, but their economies will be richer.

Healthy and wealthy

Governments can encourage innovation in many ways. One of the most important is their ability to bring together disparate organisations in the healthcare sector. The public sector, private sector, social enterprises and NGOs all have different strengths and weaknesses. In many countries, the government is well-positioned to encourage new partnerships to form and to be the anchor around which different operators collaborate.

In Singapore, for example, the nation's Ministry of Health has joined forces with Singapore's Economic Development Board to set up the Health and Wellness Programme Office (HWPO) in order to encourage innovation in its health sector.

"Singapore is an ageing society, we face rising diabetes, and rising obesity. We are facing these problems earlier than most other countries in the region," explains Loke Wai Chiong, director of the HWPO. "So we decided to set up the HWPO to encourage medical innovation that can help us with these challenges. For the Ministry of Health, this programme will improve standards of healthcare in Singapore. For the EDB it will help the economy to develop products and services that will be in great demand in our region."

The HWPO works by building bridges between private companies on the one hand, and local hospitals, clinics and nursing homes on the other. This enables companies to understand what the needs of the patients are, to develop technology to meet those needs, and then to test it with patients in a sort of "living lab".

To facilitate the process, the HWPO actively looks for pairings between private firms and local health facilities and brings the two sides together to explore ideas. They also stage forums where they introduce health providers to technology that is already being used in other industries, but not yet in the health sector. In some cases, the HWPO provides seed funding to get promising ideas off the ground.

Among the projects under way so far, the HWPO is working with Hill Rom, a US company, to develop new designs and electro-mechanical systems for hospital beds. And it has facilitated a pairing between Hocoma, a Swiss technology firm, and Tan Tock Seng Hospital to design a new rehabilitation centre.

The intellectual property that arises from the collaborations fostered by the HWPO generally stays with the private firm, although not always. For their part, the health facilities that co-develop the innovation receive the technology for free, or at reduced prices.

"As well as improving healthcare, we're taking issues that might be thought of as negative, like ageing, and turning them into positive opportunities for our economy," says Dr Loke.

The result, he hopes, is not only a better health system, but also a richer nation.

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