

CHAPTER FOUR

What Resources are Needed?

Providing health care efficiently requires financial resources to be properly balanced among the many inputs used to deliver health services. Large numbers of physicians, nurses and other staff are useless without adequately built, equipped and supplied facilities. Available resources should be allocated both to investments in new skills, facilities and equipment, and to maintenance of the existing infrastructure. Moreover, these delicate balances must be maintained both over time and across different geographical areas. In practice, imbalances between investment and recurrent expenditures and among the different categories of inputs are frequent, and create barriers to satisfactory performance. New investment choices must be made carefully to reduce the risk of future imbalances, and the existing mix of inputs needs to be monitored on a regular basis. Clear policy guidance and incentives for purchasers and providers are necessary if they are to adopt efficient practices in response to health needs and expectations.

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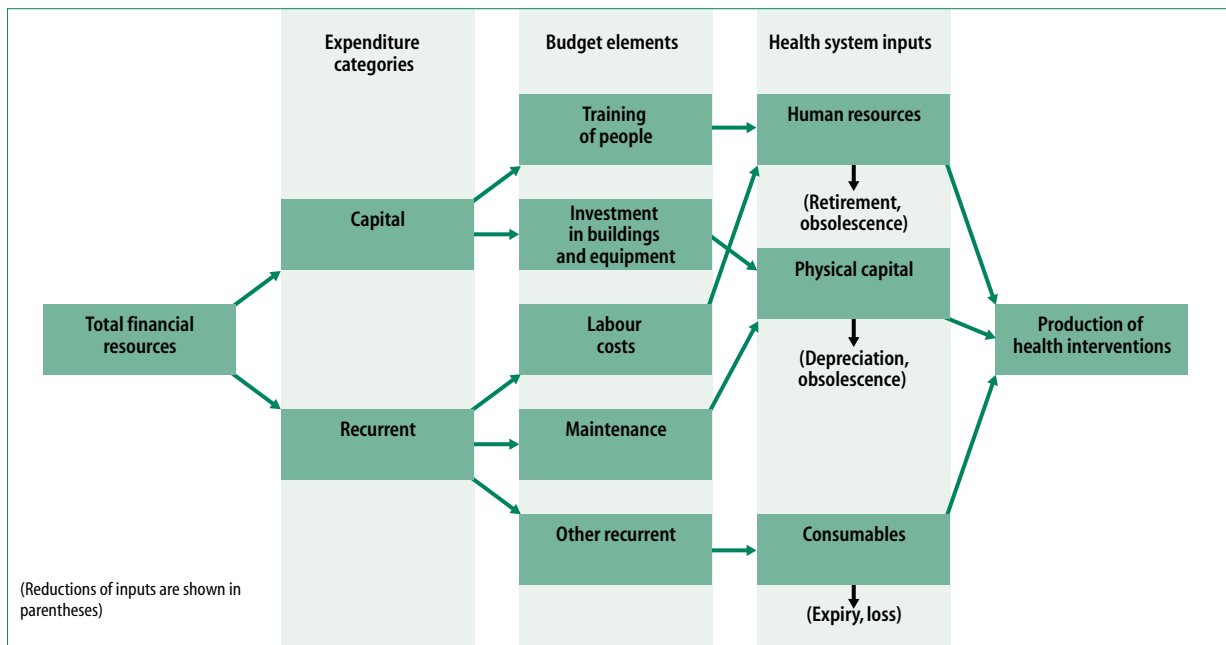
WHAT RESOURCES ARE NEEDED?

BALANCING THE MIX OF RESOURCES

The provision of health care involves putting together a considerable number of resource inputs to deliver an extraordinary array of different service outputs. Few, if any, manufacturing processes match the variety and rate of change of production possibilities in health. Figure 4.1 identifies three principal health system inputs: human resources, physical capital, and consumables. It also shows how the financial resources to purchase these inputs are of both a capital investment and a recurrent character. As in other industries, investment decisions in health are critical because they are generally irreversible: they commit large amounts of money to places and activities which are difficult, even impossible, to cancel, close or scale down.

The fact that some investment decisions lie outside the authority of the ministry of health makes the achievement of overall balance even more difficult. For example, the

Figure 4.1 Health system inputs: from financial resources to health interventions



training of doctors often comes under the ministry of education, and there may be private investment in facilities and equipment.

Capital is the existing stock of productive assets. Trained health workers and mobile clinics, as well as fixed assets, are part of the capital stock of the health system. Investment is any addition to this stock of capital, such as more pharmacists or additional vehicles. The typical productive lifetime of different investments will vary from as little as 1–2 years for certain equipment to 25–30 years or more for buildings and some kinds of professionals.

Technological progress influences the economic lifetime of a piece of capital: old investments quickly become outdated as new and improved technologies emerge. The way in which assets are managed also affects their lifetime. With proper handling and maintenance, buildings and vehicles lose their value more slowly. Without care and maintenance, health capital deteriorates rapidly. The planning of maintenance also needs to take the physical environment into account. For example, bad roads reduce the average lifetime of vehicles; so the planning of maintenance, operation and replacement of vehicles should allow for this.

Human capital can be treated conceptually in the same way as physical capital, with education and training as the key investment tools to adjust the human capital stock and determine the available knowledge and skills (1). Unlike material capital, knowledge does not deteriorate with use. But, like equipment, old skills become obsolete with the advent of new technologies, and human capital needs to be maintained too. Continuing education and on-the-job training are required to keep existing skills in line with technological progress and new knowledge. Human capital is also lost through retirement and death of individuals.

Investment also refers, in a broader sense, to any new programme, activity or project. Capital investment costs are all those costs that occur only once (to start up the activity), while the recurrent costs refer to the long-term financial commitment that usually follows from such an investment. If the available medical technology is seen as “capital”, and research and development as the investment tool to expand the technology frontier and develop new ideas, these concepts may also be applied to diagnostic equipment, medicines and the like.

Investment is the critical activity for adjusting capital stock and creating new and productive assets. Such adjustments typically occur gradually over time. Thus, the current physical infrastructure of hospital buildings and facilities in many countries is the product of an evolution that has taken many years. Among OECD countries, expenditures for investment in buildings and equipment are typically not more than 5% of total annual health care expenditures and are usually somewhat lower than they were 15 or 20 years ago: cost control has been enforced partly by controlling additions to capital.

In low income countries, however, there is greater variation. Investment levels can be substantially higher than the OECD figures, especially when physical infrastructure is being created or restored with the help of donor agencies. Countries such as Burkina Faso, Cambodia, Kenya, Mali and Mozambique report capital expenditures of between 40% and 50% of the total public health care budget in one or more years (2). A large percentage of the remaining recurrent budget usually pays for health care staff. This means that only a small fraction of the total budget is spent on the maintenance of physical and human capital and on consumable inputs, including pharmaceuticals. The balance between investments and other expenditures is more critical in low income countries as there is little room for mistakes. In general, however, very little is known about health investments in low income countries, even in the public sector. For the private sector, the available national health accounts estimates often have no data, or present implausibly high ratios of invest-

ment to total spending, maintained over many years. Not to know how much is being invested, and in what kinds of inputs, makes it nearly impossible to relate capital decisions to recurrent costs or assure that capital is not wasted or allowed to drain off funds needed for other inputs.

Even less data are available on the size of annual investments in education and training. These investment costs include medical and nursing schools, on-the-job training in different forms, and clinical research. Many players are involved and investments are often neither controlled by a single ministry nor guided by a common purpose. There is reason to believe that the sum of investments in human capital is far greater than investment in physical capital, at least in high income countries. As is the case for investment in physical capital, additions to human capital usually occur slowly over time. The training of a specialist, for example, can take 10 years or more of studies in medical school and on-the-job training. New investments in human capital also have long-term consequences, similar to investments in physical capital. The creation of a cadre of health workers with new skills, for example, will require a long-term investment in new curricula for basic and continuing education as well as a long-term commitment to paying their salaries.

HUMAN RESOURCES ARE VITAL

Human resources, the different kinds of clinical and non-clinical staff who make each individual and public health intervention happen, are the most important of the health system's inputs. The performance of health care systems depends ultimately on the knowledge, skills and motivation of the people responsible for delivering services.

Furthermore, the human resources bill is usually the biggest single item in the recurrent budget for health. In many countries, two-thirds or more of the total recurrent expenditures reflect labour costs. But people would not be able to deliver services effectively without physical capital – hospitals and equipment – and consumables such as medicines, which play an important role in raising the productivity of human resources. Not only is a workable balance between overall health capital formation and recurrent activities needed, but the three input categories shown in Figure 4.1 should also be in equilibrium.

What treatment alternatives should be used for a certain illness or medical condition? Should services be offered at hospitals or primary care facilities? What is the level of skills and knowledge required to deliver this set of services? These questions have one thing in common. They are concerned with the degree of flexibility that exists in delivering health services, i.e. the possibility of substitution between one type of input and another, or the substitution of one form of care for another, all the while maintaining a constant level and quality of output. From a societal point of view, such positive substitution to achieve cost-effective delivery of services should be encouraged. A balanced combination of the different resource inputs will depend on identified health needs, social priorities and people's expectations.

Health systems are labour intensive and require qualified and experienced staff to function well. In addition to a balance between health workers and physical resources, there needs to be a balance between the different types of health promoters and care-givers. It would be an obvious waste of money to recruit physicians to carry out the simplest tasks. As a particular health system input is increased, the value added by each additional unit of input tends to fall (3). For example, where there are too few physicians, the arrival of another physician will have a positive effect on health care; but where there are already too many physicians, an additional physician is more likely to increase costs than improve care.

Some ways of dealing with imbalances among health care providers are outlined in Box 4.1.

A health system can have plentiful human resources, with excellent knowledge and skills, but still face impending crisis if future health needs, priorities and available resources are not taken into account. For example, where the education and training for junior doctors and nurses functions poorly, or where senior staff lack adequate time and resources to update their knowledge and skills, future shortfalls can be expected. Similarly, a health system with a skewed age distribution among staff towards the point of retirement poses a real problem. Thus, a health care system must balance investments in human capital to cover future needs as well as present demands. Some of the most critical and complex input problems relate to human resources (see Box 4.2).

Without functioning facilities, diagnostic equipment, and medicines, it does not matter if the knowledge, skills and staff levels are high. The delivery of services will still be poor. A lack of complementary inputs will also have a negative impact on staff motivation, a factor that influences the capacity of human resources. Motivation, however, depends not only on working conditions. Financial incentives and compensation, i.e. income and other benefits, are also important, as are the overall management of staff and the possibilities for professional advancement.

Inadequate pay and benefits together with poor working conditions – ranging from work in conflict zones to inadequate facilities and shortages of essential medicines and consumables – are frequently mentioned in less developed countries as the most pressing problems facing the health care workforce (4). In some countries, for example Bangladesh and Egypt, a clear majority of all publicly employed physicians see private paying patients to supplement income from their regular jobs. In Kazakhstan, “informal payments” are estimated to add 30% to the national health care bill (5). Possibilities for doctors to work privately in public institutions are being offered in some countries to neutralize an ongoing brain drain of qualified staff from the public sector. This strategy is considered successful in Bahrain, but experiences from Ghana and Nepal show that such incentives can lead to the diversion of scarce resources from public services and can induce professionals to engage in independent private practice (6).

People, as thinking creatures, are very different from machines and human capital cannot be managed in the same way as physical capital. First of all, human resources, and in

Box 4.1 Substitution among human resources

A large number of countries face an overall shortage of physicians. Other countries that are following a long-term strategy to shift resources to primary care find that they have too many specialists and too few general practitioners. Many are dealing with the problems by substituting among various health care-givers.

Reorientation of specialist physi-

cians. While limiting admissions to specialist training and changing internship programmes is a long-term strategy to balance the professional distribution of physicians, the reorientation of specialists into family practice is a short-run substitution strategy being used, for example, in central and eastern Europe.

Substitution for other health professionals. The training of a physician

may cost three times more than that of a nurse.¹ As a result, training of more nurses as well as other health professionals may be a cost-effective substitute for physicians. In Botswana, training of more nurse practitioners and pharmacists has offset the lack of physicians in some areas.²

Introduction of new cadres. Ensuring a closer match between skills

and function may demand the creation of new cadres. In Nepal, an educational programme allowed health assistants and other health workers in rural areas to train for higher professional postings.³

¹ World development report 1993 – Investing in health. New York, Oxford University Press for The World Bank, 1993.

² Egger D, Lipson D, Adams O. Achieving the right balance: the role of policy-making processes in managing human resources for health problems. Geneva, World Health Organization, 2000 (Issues in health services delivery, Discussion paper No. 2, document WHO/EIP/OSD/2000.2).

³ Hicks V, Adams O. The effects of economic and policy incentives on provider practice. Summary of country case studies using the WHO framework. Geneva, World Health Organization, 2000 (Issues in health services delivery, Discussion paper No. 5, document WHO/EIP/OSD/2000.8 (in press)).

particular physicians, determine the use of other available inputs. An oversupply of physicians will almost certainly mean an oversupply of the kind of services that physicians provide. The high density of private physicians working in urban areas of many middle income countries, such as Thailand, usually correlates with frequent use of expensive equipment and laboratory testing, and with more services of sometimes doubtful value being provided to the urban population. In Egypt, the high ratio of physicians – for every occupied bed in Egypt there are two physicians – combined with extensive self-medication explain the very high use of drugs. According to estimates, the poorest households in Egypt spend over 5% of their income on drugs alone (2).

Incentives and management related to human resources have an indirect impact on the use of other resources as well. For example, many payment systems provide physicians and providers with incentives to use more or less medical equipment, laboratory testing and medicines. In Bangladesh, physicians get 30–40% of the laboratory charges for each referral generated, creating a clear interest to expand the volume of such services (2). In both China and Japan, many physicians derive part of their income from the sale of drugs which they prescribe. In many countries, the use of branded drugs instead of generics is still common, and this can to a large extent be blamed on the incentives offered to physicians and pharmacists by pharmaceutical producers. Lack of the skills needed to assess technology and control quality is an additional factor causing imbalances among resources.

Another difference between human and physical capital, which affects how people are managed, is that physicians, nurses and other health workers are not motivated only by present working conditions, income and management. They are also influenced by what they believe those conditions will be in the future, based on past experiences, views expressed by others and current trends. If qualified staff believe that future payment, benefits and working conditions will deteriorate, their job-related decisions and motivation will reflect that belief. This “shadow of the future” can easily result in a continuing negative spiral towards lower motivation and performance.

A first step to prevent such a development is to find a sustainable balance among the different types of resources and between investment and recurrent costs. Perhaps the most

Box 4.2 Human resources problems in service delivery

Numerical imbalances. A recent study of human resources in 18 low and middle income countries, one or more in each of the WHO regions, indicates that most countries experience varying degrees of shortages in qualified health personnel. In sub-Saharan Africa in particular, the limited training capacity and low pay for qualified health workers causes severe problems in service delivery. Elsewhere, for example in Egypt, oversupply is a problem. Generally, shortages and oversupply are defined relative to countries in the same region and at similar levels of development. Oversupply, thus,

may be absolute, as is the case for specialist physicians in many countries of eastern Europe and central Asia, or relative to geographical location.

Training and skill mix imbalances. Health care workers are often unqualified for the tasks they perform because of a shortage of training opportunities, as in many African countries, or a mismatch between available skills and the needs and priorities of the health care system, as in eastern Europe and central Asia. The number of physicians and other health personnel with a certain type of training or qualification, however, tells only part of the story.

Neither formal training nor professional affiliation necessarily equates with skill in dealing with specific problems.

Distribution imbalances. Almost all countries have some urban/rural imbalances among their human resources and face problems in meeting the needs of specific groups such as poor or handicapped people or ethnic minorities. It is almost universally true that providers tend to concentrate in urban areas. In Cambodia, 85% of the population live in rural areas, but only 13% of the government health workers work there. In Angola, 65% live in rural areas, but 85% of health pro-

professionals work in urban areas. In Nepal, only 20% of rural physician posts are filled, compared to 96% in urban areas.

Failure of past public policy approaches. Although progress has been made in recent years to develop national policies and plans for human resources for health, they are not fully implemented in most countries. Moreover, very few countries monitor and evaluate the progress and impact of policy implementation.

important part of such a balance is to ensure that there are individual incentives to invest in human capital in the form of improved earnings, career opportunities and working conditions. Indeed, many low and middle income countries have increased pay or benefits as a key strategy for developing human resources and improving delivery of services to meet health needs and priorities (7). Public sector pay in Uganda rose by 900% (in nominal terms) between 1990 and 1999, which represents a doubling in real terms (8).

In general there are no easy answers in the area of human resources development. Left unmanaged, human skills markets take years, even decades, to respond to market signals.

And, unlike physical capital, human resources cannot be scrapped when their skills are no longer needed or obsolete; even laying off public sector health workers is often so difficult that it can only be achieved as part of a broader policy to reform the civil service.

Public intervention to produce the required balance is thus essential to reduce waste and accelerate adjustment. Some successful experiences are summarized below but many problems remain (7).

Utilization levels, mix and distribution. The relative prices of different skill categories should guide decisions about their most efficient mix, where labour markets are functioning. There are no absolute norms regarding the right ratio of physicians or nurses to population; rules of thumb are often used. Generally, shortages or oversupply are assessed on the basis of need and priorities combined with comparisons with neighbouring countries or those at a similar level of development. Such assessment requires sound data about available human resources and their geographical and professional distribution: such information is often lacking. In Guinea-Bissau, 700 "ghost" workers were removed from the payroll of the Ministry of Finance, following an inventory of the health care workforce. Cambodia's 1993 survey of health workers revealed a poorly distributed and largely unregistered workforce, with widely differing competencies (2).

Three types of human resource strategy have been pursued with some success:

- making more efficient use of available personnel through better geographical distribution;
- greater use of multiskilled personnel where appropriate;
- ensuring a closer match between skills and functions.

The latter strategy responds to a widespread problem. Formal training of health workers, particularly for more highly skilled staff, too seldom reflects the actual tasks being performed. This is both wasteful and demoralizing.

Some success has been recorded with mandatory service and multiple incentives (financial, professional, educational, etc.) to make otherwise unattractive technical or geographical areas more appealing, as has been done in Canada and the Scandinavian countries to deploy staff in their northern regions. Countries such as Fiji, Oman and Saudi Arabia have successfully recruited foreign workers to fill critical gaps, as an interim strategy. This strategy can, however, create other difficulties and tensions. Oman at present has a policy to recruit primarily a domestic workforce, as the pool of potential medical students has increased.

Intake training and continuing education. A clear case can be made for strong public sector involvement in training and in monitoring the quality of continuing education to stimulate the development of human resources in targeted areas. New public health schools have recently been established in Hungary and Jamaica to meet needs for professionals with skills in epidemiology, statistics, management and health education. They aim to integrate initial formal training, subsequent continuing education, and actual service provision.

This has two potential benefits. It ensures that training has strong practical foundations, and it continually exposes service providers to new thinking and development. In countries with large rural populations several strategies have been used to recruit staff to rural areas. Examples are intake of medical students from rural areas and training in the locations where physicians will later practise.

A related problem concerns the brain drain of trained staff from low income countries to wealthier countries or from the public sector to the private sector within a country. The more successful trainees often emigrate, tempted by higher standards of practice and living abroad. Many Jamaican nurses have migrated to the United States. Physicians migrate from Egypt and India to other countries in the Middle East and to the USA and Europe. Inadequate pay and benefits rank as the most serious problem confronting the public sector health workforce in many countries, with growing formal and informal private practice as a consequence. Service contracts that require a certain number of years in public service, especially when the training is state sponsored, have been implemented in the Philippines and the United Republic of Tanzania, and are common in Latin America but there are attendant difficulties. The staff concerned are usually junior, placements are short term and unpopular, mentoring arrangements are seldom adequate, and overall geographical imbalance is little affected. Globalization has led to greater mobility of staff and opportunity for overseas training, and students who qualify abroad may wish to stay in the country where they were trained.

ADJUSTING TO ADVANCES IN KNOWLEDGE AND TECHNOLOGY

Growth in the available knowledge or advances in technology – such as new drugs or diagnostic equipment – can substantially increase the capacity of human resources to solve health problems, and thereby improve the performance of a health care system. New knowledge is also a challenge to each country's existing input balance, as relative prices change and the efficient mix of resources alters (9). In the past few decades, revolutionary advances in medicine and technology have shifted the boundaries between hospitals, primary health care, and community care (10). Corresponding resource shifts in health systems have been much slower to emerge.

Antibiotic drugs provide one example of new knowledge affecting cost structures. Since their introduction in the 1940s, patients suffering from a bacterial infection have most often been cared for at home or at outpatient clinics rather than in special hospitals, significantly reducing costs and improving outcomes. The recent growth of unregulated self-treatment and the increasing incidence of drug-resistant bacteria have compromised some of these gains. There is now a need for active stewardship to regulate the quality of diagnosis, prescribing and compliance. Vaccines have similarly altered the strategy and costs of tackling epidemic diseases such as measles and poliomyelitis, and new vaccines will continue to necessitate re-thinking to ensure an efficient mix of inputs in national health strategy.

All countries – rich as well as poor – need to find and maintain a reasonable balance between inputs. The choices involved in finding this balance, however, vary depending on the amount of total resources available. In a poor country, the possibilities of investing in modern medical technologies or paying for modern medicines are very limited. Moving from the use of essential drugs to new and expensive drugs for cardiovascular diseases would mean an enormous opportunity loss in terms of health outcome for a poor country. This difference in opportunities across countries also has an impact on the optimal balance

between resources (see Box 4.3).

Some input prices are determined locally; others are set in international markets. In most countries, prices for human resources (incomes for physicians, nurses and other health care personnel) are determined nationally, and the general income level for each country or region will be an important determinant. Prices for such items as patented drugs and medical equipment, on the other hand, are determined in a global market. Although differences in income levels across countries will induce manufacturers and distributors of medicines and equipment to differentiate prices somewhat, stewards of individual country health systems are far less able to influence these prices than the prices of human resources. International stewardship is needed to represent the interests of consumers in low income countries that face heavy burdens of infectious and parasitic diseases. This type of stewardship, led by agencies such as WHO and the World Bank, will assume increasing importance as globalization of the economy continues and free trade agreements are implemented.

PUBLIC AND PRIVATE PRODUCTION OF RESOURCES

With the exception of skilled human resources, most inputs used for health services are produced in the private sector, with varying degrees of public stewardship over the level and mix of production, distribution, and quality. For example, local markets successfully produce most consumables and unskilled labour. Government intervention is needed mainly to ensure that quality and safety standards are met, that reliable information is available about the products, and that a fair competitive environment exists.

Other inputs, such as manufactured pharmaceuticals and specialized medical equipment, often face barriers to entry into the market in the form of patents and licensing requirements, manufacturing standards, large initial investment costs, expensive research, and long development periods. This gives the manufacturers of these inputs considerable market power to abuse by manipulating prices and demand. Strong policy measures are therefore needed, such as anti-trust legislation, limited formularies, generic drug policies, bulk purchasing, and formal technology assessments (11–13). Furthermore, by procuring

Box 4.3 A widening gap in technology use?

A vast quantity of valuable medical technologies and innovative clinical methods have been developed over the past decades and many more are on the way. Unfortunately, the new possibilities are not open to all because of the lack of available income in some countries. Diseases that are treated effectively in rich countries by professional staff using modern technology are handled by unskilled staff or informally at home in less developed countries. Moreover, some

of these diseases are more prevalent in the poorest countries.

Medicines are now available for *HIV/AIDS* that can, at a huge cost, at least postpone further development of the disease. But treatment patterns and resource inputs for *HIV/AIDS* currently follow different paths in different countries. In poor countries, *HIV/AIDS* is still a disease without treatment alternatives. The sick are mainly taken care of informally at home or in institutions with predominantly unskilled staff. South Africa has improved the availability

of *HIV* treatment by obliging insurers to cover its cost for members of insurance schemes.

Malaria transmission can be prevented by means of house spraying, insecticide-treated nets, chloroquine prophylaxis, and so on, but such measures are not always available to the people who need them most. Several different projects to develop a malaria vaccine are under way.¹ A breakthrough in this research would present a tremendous opportunity to improve quality of life and prevent death. Such a tech-

nological breakthrough would also demand a new mix of resources, but only for those countries that could afford the new vaccine.

For *tuberculosis*, the incidence of bacterial resistance to first-line drugs is increasing. It is of major concern, for example, in the Russian Federation. Lack of effective medical treatment and improper use of medicines continue to create obstacles to dealing with this escalating problem.²

¹ *The world health report 1999 – Making a difference*. Geneva, World Health Organization, 1999.

² *Global tuberculosis control: WHO report 2000*. Geneva, World Health Organization, 2000 (document WHO/CDS/TB/2000.275).

medicines and medical technologies on the international market, countries can ensure that local producers remain competitive (14, 15).

Publicly subsidized production of consumables, pharmaceuticals and medical equipment often leads to low quality, lack of innovation, outmoded technology, inefficient production modalities and distribution delays. The most striking example of this occurred in the former Soviet Union. Most countries that have followed this model have quickly fallen behind in productivity and production technology. Many Western firms that entered the pharmaceutical and medical equipment market in central and eastern Europe during the early 1990s found it cheaper and easier to build new factories than to convert and modernize the old capital stock (16–18).

Decisions on physical capital, such as hospitals and other large facilities, require more public attention. Ambulatory clinics, laboratories, pharmacies, cottage hospitals, and other small clinical facilities often have small capital requirements, and private providers may be able to finance these themselves or through small personal loans in parallel to public investments. In the case of large hospitals, most countries have in the past relied heavily on public investments. Investment decisions in this area have consequences that may last for 30–40 years or more. Once built, hospitals are politically difficult to close. The need for strong public policies, however, does not necessarily mean the public financing of the entire capital stock. Increasingly, many countries are looking to the private sector to support investments in their health system even when the resulting facilities will not have for-profit objectives, and the running costs will be publicly financed (19). Chapter 6 illustrates some pitfalls of developing joint venture investments, and the different skills required for compe-

Box 4.4 The Global Alliance for Vaccines and Immunization (GAVI)

Every year, nearly three million children die from diseases that could be prevented with currently available vaccines, yet nearly 30 million of the 130 million children born every year are not receiving vaccinations of any kind. The great majority of unreached children – 25 million – live in countries that have less than US\$ 1000 per capita GNP.

The Global Alliance for Vaccines and Immunization (GAVI) is a coalition of public and private interests that was formed in 1999 to ensure that every child is protected against vaccine-preventable diseases. GAVI partners include national governments, the Bill and Melinda Gates Children's Vaccine Program, the International Federation of Pharmaceutical Manufacturers Associations (IFPMA), research and technical health institutions, the Rockefeller Foundation, UNICEF, the World Bank Group, and WHO.

GAVI is seeking to close the growing gap of vaccine availability between industrialized and developing countries. Beyond the six basic vaccines of the Expanded Programme on Immunization (against poliomyelitis, diphtheria, whooping cough, tetanus, measles and tuberculosis), newer vaccines, such as those for hepatitis B, *Haemophilus influenzae* type b (Hib), and yellow fever are now widely used in industrialized countries. A major priority is to see that all countries of the world achieve at least 80% immunization coverage by 2005. Based on current assumptions of vaccine delivery costs it is estimated that an additional \$226 million annually are needed to reach this level of coverage in the poorest countries with the traditional EPI vaccines; to cover the same number of children with the newer vaccines, according to the guidelines adopted at GAVI's first board meeting, would require an additional \$352 million.

At the second meeting of the GAVI board, held during the World Economic Forum in Davos in February 2000, the GAVI partners discussed policies for attaining the 80% immunization objective and announced a multimillion-dollar global fund for children's vaccines. Governments, businesses, private philanthropists, and international organizations are working together to manage these resources so as to provide the protection of immunization to children in all countries, under the campaign title of "The Children's Challenge". Members of GAVI argue that protecting the world's children against preventable diseases is not only a moral imperative but an essential cornerstone of a healthy, stable global society.

All countries with incomes of less than \$1000 per capita GNP (74 countries worldwide, with the majority in Africa) have been invited to express their interest in collaborating with GAVI in this campaign.

Nearly 50 countries, from all WHO regions, have already provided details of their immunization activities and needs. Resources from the fund will primarily be used to purchase vaccines for hepatitis B, *Haemophilus influenzae* type b (Hib), and yellow fever, and safe injection materials.

It is envisaged that GAVI partners at the country level will collaborate with national governments to help close the gaps identified in the country proposals other than those directly related to the provision of vaccines. By placing more of the responsibility for providing the necessary information and commitment on the countries themselves, the GAVI partners are hoping that resulting efforts will be more country-driven and therefore more sustainable.

tent stewardship of such developments. With regard to the training of specialized labour and the generation of knowledge, the story is similar. There is a need for strong public involvement in setting the policy agenda and ensuring adequate regulation, but private capital can be mobilized to support investments in both training and research activities.

The dominant force underlying the 20th-century revolution in health services has been the new global knowledge made possible by research and development. Chapter 1 echoes *The world health report 1999* in arguing that today's health systems have a clear responsibility to provide the knowledge for the health systems of tomorrow (20). Investment in knowledge which can be used by all has a special merit (see Box 4.4). Although most research and development is, and should be, financed through private capital, there should be public involvement in supporting such endeavours and directing them towards areas of greatest need. Attempts to directly manage the dynamics of research and development from the top, however, often fail. Experience suggests that indirect approaches and providing the research community with appropriate incentives will be more successful. Once again, imaginative international stewardship may make a vital difference.

THE LEGACY OF PAST INVESTMENTS

Past investments in the poorest countries in the world have focused on the accumulation of physical infrastructure. Such programmes have often been supported by multilateral and bilateral donor agencies in the hope that they would lead to improved performance and that the countries themselves would be able to collect sufficient public money to cover recurrent costs (21). In reality, resources to maintain and operate both physical and human capital have often been insufficient. Health facilities are unable to function well because of poor maintenance and shortages of essential drugs and supplies. Vehicles are often immobile for lack of repair and maintenance. For example, in Ghana at one point in 1992, 70% of Ministry of Health vehicles were reported immobile, pending repair at government workshops. Reorganization of maintenance and repair arrangements and budget practice led to rapid improvement, but Ghana's recent experience is widespread. Even in places where vehicles are mobile, fuel is often a scarce resource. These are just some examples of imbalances that all lead to reduced performance, a shorter lifespan of the physical infrastructure and low staff morale. In terms of physical capital, the situation is often irreversible. The cost of renovating is higher than the cost of building anew.

Lack of necessary skills, poor cost information systems, rigid budgeting systems, and fragmentation of tasks – such as separation of responsibility for investment from operating budgets – are further reasons behind input imbalances. If information on needed quantities is not available, it is difficult to estimate reasonable budget levels for inputs such as consumables and fuel for transportation. If providers are then responsible for holding each of these budget lines, serious barriers are created to delivering health services effectively. Shortages of essential production inputs too frequently coexist with unused funds in over-compartmentalized health budgets.

Chapter 6 considers the recent development of formal partnerships, such as sector-wide approaches (SWAPs), between government and groups of donors. On the capital investment front, donors could do much better. External agencies have contributed to unbalanced input mixes by focusing on highly visible investments without adequate consideration of compatibility with other investments (for example, with respect to spare parts), or recurrent costs. Political success in health system investment is seldom the ally of long-term

sustainability. There are often incentives in less developed countries for decision-makers to accept donor support irrespective of the long-term consequences on the balance among existing resources or between investments and recurrent costs. For example, Sri Lanka accepted a donor contribution of a 1000-bed hospital: to operate it took needed resources away from many other activities. Competing agendas among donors have led to further fragmentation in responsibility and short-term thinking (22).

HEALTH CARE RESOURCE PROFILES

Large differences in the mix of resources used by high and low income countries can partly be explained by differences in relative prices. A full system of national health accounts offers the most complete information on health system inputs and their prices, as discussed below. In a poor country, unskilled human resources will be relatively cheap, whereas medical technology, facilities and highly qualified staff will be expensive. As a result, a large percentage of the total public budget is often allocated to investment. Once staff have been paid from the recurrent budget, there will be little left to spend on equipment, medicines, consumables and maintenance of facilities. This is evidence that there are simply too many staff, often reflecting the training of staff relative to population norms or need-based planning, rather than in accordance with resource-based planning. Drug consumption in low income countries – often high in relative terms – is to a large extent financed privately by consumers through out-of-pocket payment. In a more developed country, spending on consumables will be much higher in absolute numbers, but still low in relative terms due to the fact that human resources will be more expensive. But even for countries with comparable income levels there are sometimes wide differences in country-specific resource profiles.

Figure 4.2 shows resource profiles for four high income countries: Denmark, Sweden, the United Kingdom, and the United States (23). Each country's input level, on each of eight inputs, is expressed as a percentage of the highest value for that indicator in the group: the figures do not show "best performance" in the sense of Chapter 2 but simply compare input levels.

The United States is at or close to the maximum on every input. On expenditure and technology it is at the maximum of this group of countries. Sweden has the largest stock of human resources and beds and, with Denmark, the highest drug spending. The United Kingdom is within the boundary set by this group on every input: it is particularly far from the maximum on expenditure per capita and technology (magnetic resonance imaging (MRI) and computerized tomography (CT) scanners). However, in terms of beds and drugs the UK is comparable to the rest of the group and higher than the USA.

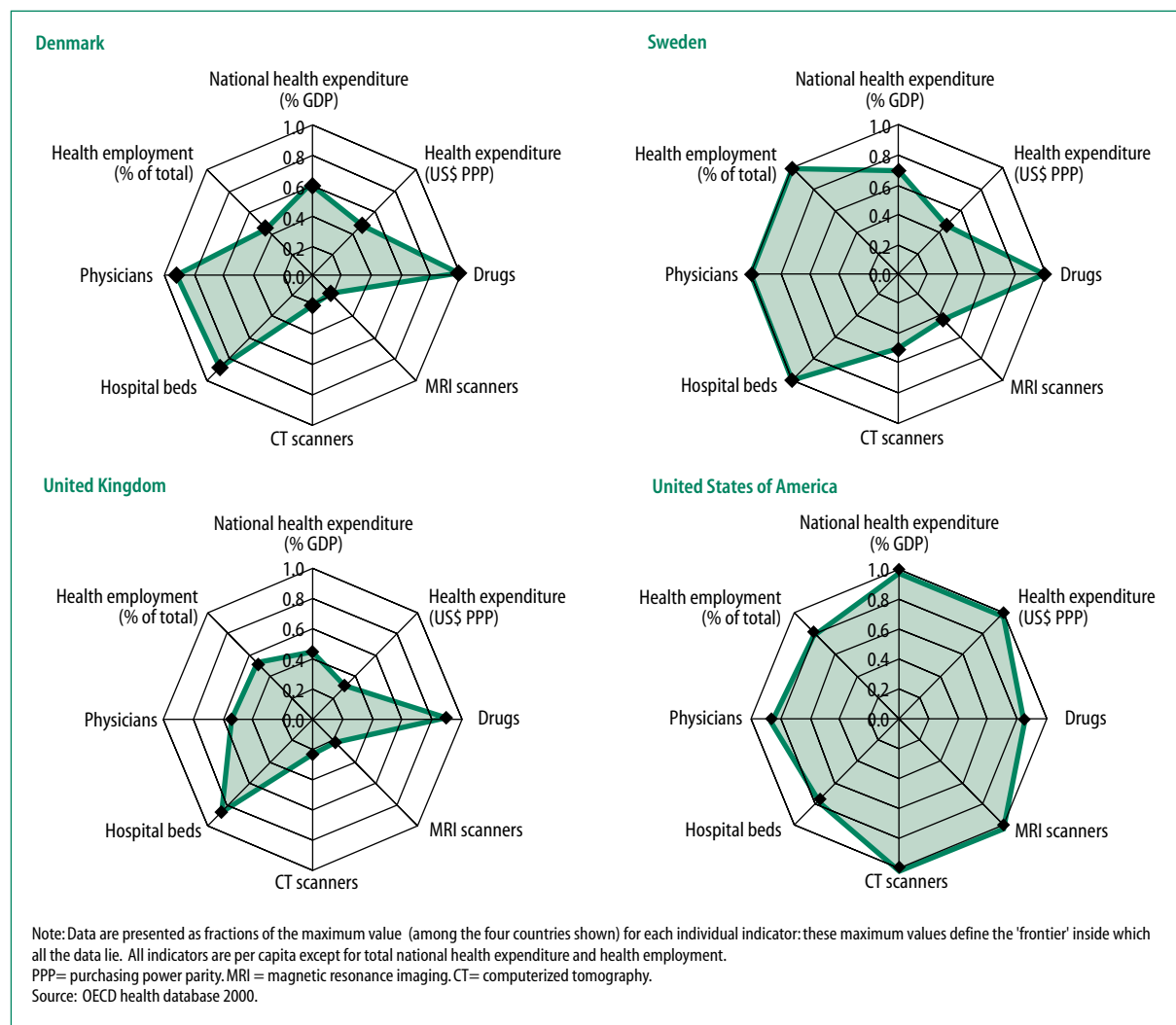
This simple comparison between countries shows clear differences in terms of input mix. The differences can in part be explained by past conditions of competition and payment methods among US hospitals, which have focused more on quality than on price and cost-effectiveness. Relative price differences also play a role. The 'medical arms race' in Sweden and particularly in the UK has been more restrained under global budgets. This also means that the US health system (and ultimately US tax-payers and health insurance payers) pays a larger share of the global costs involved in bringing new medical technologies and medicines to the market. Trend data (not in the diagrams) show that, with respect to MRI and CT scanners, both Sweden and the UK are catching up with levels in the United States. This supports the view that the US health system is an early adopter of new

medical technology. The relative price of physicians and nurses in Sweden is low compared to that in the United States, and the different input mixes illustrate a degree of substitutability between human resources and other health inputs.

Figure 4.3 shows similar resource profiles for Egypt, Mexico, South Africa and Thailand. These four middle income countries spend substantially less on all types of health care resources than the group of high income countries. As is the case for the group of high income countries, there are considerable contrasts in the mix of resources and these differences do not seem to be due primarily to differences in income or prices.

South Africa is at the maximum of the group for expenditure, nurses, beds and MRI scanners, while it is furthest from the maximum for drugs and physicians (with Thailand). Egypt has the lowest total health expenditure per capita within the group, but the highest ratio of physicians and the second highest level of drug consumption. Both physicians and drugs in Egypt are mostly paid for directly by patients out of pocket. Some 80% of physicians' income is estimated to come from private practice, and households finance close to 60% of total drug costs through direct payments (2). Doubts have been raised about skill

Figure 4.2 Health systems input mix: comparison of four high income countries, around 1997

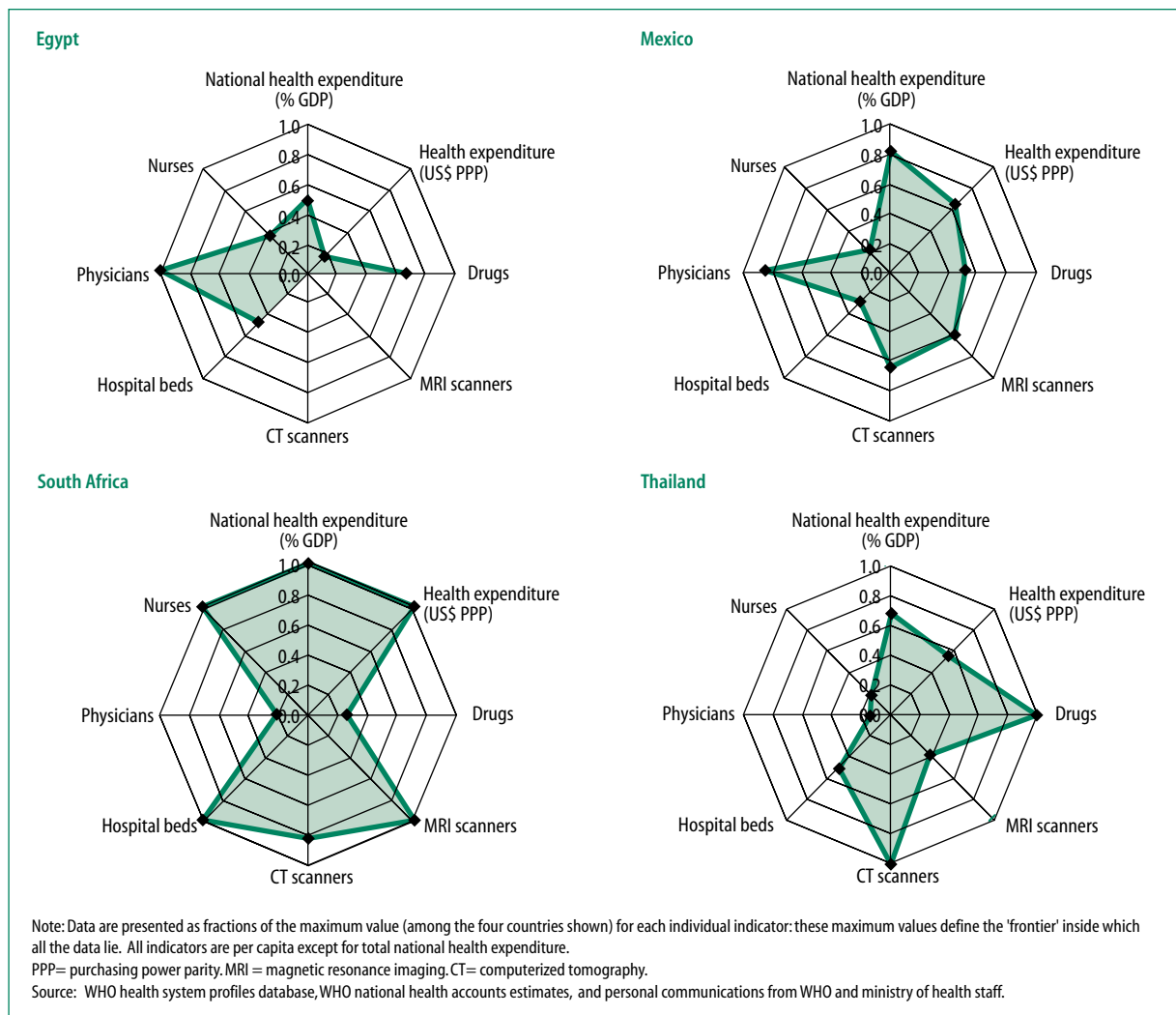


levels of physicians. There is extensive use of branded as opposed to generic drugs. In part this pattern of drug use is explained by little knowledge and poor perception of generic drugs by consumers, combined with extensive self-medication. Irrational prescribing by physicians and dispensing by pharmacists of expensive drugs are other important explanatory factors.

Mexico has a high ratio of physicians and, together with Thailand, the lowest ratio of nurses within the group. It is estimated that about 15% of all physicians in Mexico are either inactive, underemployed or unemployed (2). Despite this evidence of surplus, there are a large number of unfilled posts in rural areas. In contrast, Thailand and South Africa have a low ratio of physicians. Indeed, Thailand's health authorities estimate that at least another 10 000 physicians are needed (2). The ratios of physicians to nurses show great contrasts: in South Africa nurses greatly outnumber physicians, possibly due to greater international mobility of doctors, but in Egypt and Mexico the proportions are reversed.

The distribution of available resources between urban and rural areas is a major problem in all four middle income countries but is not illustrated by the figure, which presents

Figure 4.3 Health systems input mix: comparison of four middle income countries, around 1997



only averages. Physicians mostly work where health status levels are highest. The distribution of resources across ethnic groups is a particular problem in South Africa. In Thailand, most of the high technology equipment is concentrated in urban hospitals, whereas the use of technology at the primary care level is scarce. Most of the about 900 physicians produced annually in Thailand remain in urban areas, and shortages of qualified staff in rural areas are expected to persist.

CHANGING INVESTMENT PATTERNS

Experience points to political difficulties in changing existing investment patterns and resource profiles. Every euro, bhat or kwacha spent on health service delivery or investment is income to someone and therefore creates a vested interest (24). If the income is large, this “someone” will lobby for more resources and resist changes that do not match his or her particular interests. Such lobbying and resistance come from both the medical industry and from labour groups. Attempts to reform systems for paying providers are often highly controversial, as are changes in medical school admissions or educational programmes. Lobbying also comes from interest groups and politicians. Health care investments usually attract popular support and it can be difficult to rearrange investments in favour of a new balance. This will often be the case even if large imbalances exist compared to social priorities. Vested interests and lobbying related to the distribution of cost and benefits are important factors in the inertia that has to be overcome in order to change the existing capital structure and mix of resource inputs.

The predominant investment emphasis in the health system over past decades has been on hospitals and specialist care. In addition to the other forces opposing primary health care, discussed in Chapter 1, investment decisions played a part. The allocation of investment capital to hospital buildings is not the main reason. More importantly, the focus on specialist care entailed investments in the employment and training of human resources to staff hospitals. The focus on hospital care led to a rapid accumulation of beds. In high income countries, the accumulation of beds was accompanied and driven by rapid technological change, resulting in a greater intensity of care and increasing costs. Population ageing, and the accompanying higher health systems utilization rates by elderly people, maintained this upward pressure on bed supply.

In less developed countries the accumulation of beds has been accompanied by much slower technological change and slower cost increases, but also by less intensity of care, inadequate maintenance of facilities and lower quality of services because of a lack of funding for recurrent costs (24). In many middle and low income countries, occupancy rates at public hospitals have been low. In Mexico, for example, occupancy rates at Ministry of Health hospitals have been 50% on average, because of inadequate staffing and maintenance, with consequent inefficient use of existing resources (25).

During the 1990s, many countries started to reduce the size of their hospital sector and many small hospitals, in particular, were closed or used for other purposes (see Box 4.5). Reflecting technical progress and lower costs in ambulatory care, the number of beds has declined and the average length of stay has been reduced. Closure of small hospitals and emergency wards and a declining number of beds mean that new strategies will have to be developed to respond to fluctuating demand, with greater integration among providers, transport of patients, pooling of resources and information as key components.

With fluctuating demand, there is a need for some surplus capacity to absorb changes in demand. The influenza epidemic that swept across Europe in 1999–2000 revealed that sur-

plus bed-capacity to deal with sudden changes in health need is limited in many countries, for example in the UK (26). In other industries (electricity supply, public transport) temporary surges in demand can be met through peak-load pricing. As discussed more fully in Chapter 3, rationing by price is not an acceptable allocation mechanism in the health system. Excess demand that cannot be repressed by higher prices must be accommodated by other means of rationing – postponing non-emergency care, transferring patients, shortening inpatient stays and so on.

In countries with a hierarchical planning structure, resource allocation and investment planning is often incremental. Last year's budget is often the starting point for next year's planning. Ongoing activities are usually not questioned: this greatly reduces the country's scope for shifting to a more cost-effective overall allocation of inputs. The planning process can be described as a game in which ministries that deliver services (such as ministries of health) call for increased resources, while the guardians of the treasury try to maintain expenditure at its previous level (27). This approach is attractive because of its simplicity but it demands growing budgets. If budgets are declining, departments should really scrutinize the full range of ongoing programmes and activities, prioritizing activities for possible cutting or elimination. Public bureaucracies typically try to maintain the status quo by cutting costs across the board without changing overall priorities, and without taking special account of the need to protect targeted geographical areas or sub-groups of the population.

Agencies will try, for as long as possible, to maintain what they judge to be critical expenditure such as salaries and cut down on expenditure that does not immediately damage health system performance (22). Planned investments are delayed and ongoing constructions are left incomplete. In the hope that financial crises are short-lived, health systems may decrease their spending on long-term investments in human and physical capital and even on recurrent costs for maintenance, medicines and other consumables. This will eventually constrain severely the capacity of human capital and health system performance. Investments, by their nature, tend to be more volatile than recurrent expenditures: they occur in discrete chunks and then require smaller but regular operating expenditures. Short-

Box 4.5 Investment in hospitals in countries of the former Soviet Union prior to policy reform

The majority of health care resources in the former Soviet Union were controlled from the top by ministries of health. Central government managed investments and the consequent accumulation of resources in physical and human capital. The structure of service delivery was determined by such norms as beds or physicians per thousand inhabitants. The result was high hospital capacity.

In the early 1990s the bed ratio for most of the former Soviet Union was considerably higher than that in many western European

countries. The number of physicians per capita, most of them allocated to the hospital sector, was also high in comparison with many western countries. Indications of inefficiency were given by long lengths of stay and moderate occupancy rates, especially in small hospitals. The effectiveness of hospital services was also influenced adversely by the poor quality of facilities and medical equipment. Many of the small district hospitals had no more than 4–5 m² per bed, and some of the smallest hospitals had no radiology services, and inadequate heating or water.

For example, a 1989 survey found that 20% of Russian hospitals did not have piped hot water, 3% did not even have piped cold water, and 17% lacked adequate sanitation facilities. The survey also found that every seventh hospital and polyclinic needed basic reconstruction. A similar survey of facilities in 1988 found substantial underinvestment in maintenance of polyclinics and hospitals, with 19% of polyclinics and 23% of hospitals rated as either being in a "disastrous" condition or requiring full reconstruction.

In the 1990s, reductions in the number and use of hospitals were

an essential part of reforms. A combination of overcapacity and poor quality of physical resources had become a major distortion in the input mix of these countries. Where facilities were not closed, or used as nursing homes or for other functions, they were upgraded and used more effectively in the referral system. In many cases, however, changes have been modest because of political difficulties in transferring resources from one use to another.

term postponement or cutting of investment may be an appropriate response to a crisis, but it requires an overall picture of capital and recurrent resources as well as a likely time horizon for the crisis. Without these, ad hoc chopping of planned investments will create imbalances and inefficiency.

THE WAY FORWARD

Clear symptoms of imbalances between resources include poor performance, deteriorating facilities, and low working morale among staff. Often, skilled human capital moves to the private sector or to wealthier regions. Physical capital deteriorates in a more visible way. The patient turns to the private sector in search of better quality care.

Whatever a country's income level, there exist efficient ways to allocate health system inputs that will allow the health system to function at its best. The efficient mix will vary over time and across countries, depending on relative prices among inputs, country specific health needs and social priorities. In less developed countries, setting priorities will surely be much harder, and the balance between investments and recurrent costs more critical. Health care systems face major challenges when there is a rapid change either in technology or in available financial resources as a result of a turbulent macroeconomic environment. The failure of health care decision-makers to respond to such a shift in conditions will lead to suboptimal health system performance.

For very different reasons, both developed and less developed countries record imbalances between the available inputs. Because of the rapid technological changes in health services, imbalances have been the rule rather than the exception in developed countries. Problems are much more visible in less developed countries, where imbalances have often been caused by lack of management skills and a decline in the available financial resources. Although some imbalances are likely to exist even in well-functioning health systems, much more could be done to correct them rapidly or even prevent them.

A first step is to create a general awareness of the problem by documenting the various resources used and the performance of health systems. Sound data on the existing numbers and distribution of human resources, especially when linked to data on health system performance, can also contribute to the formulation of policies and plans to address problems. Figures 4.2 and 4.3 present fragments of information on inputs. But they do not reveal how input mix affects performance.

National health accounts (NHAs) offer a more comprehensive framework for bringing together data on inputs and for communicating with various stakeholders on future investment policies. NHAs give a broad picture, which enables ministries to lead health care services through reforms and difficult times. When Finland's economy went into crisis with the loss of its export market with the Russian Federation in the early 1990s, health policy-makers were able to use their NHA information to restore productivity in the health system.

More appropriate cost information and accounting systems would also make it easier to achieve a balance among inputs, for example by establishing more reliable budget estimates. A general awareness and improved information through NHAs and accounting systems will not result in any change, however, without a parallel and widespread commit-

ment by health care decision-makers to address the fundamental problems.

Such commitment is best supported by a combination of stewardship – oversight and influence – and more scope for decentralized decision-making by purchasers and providers. Central authority over major investment decisions is essential. This does not mean that all such decisions need to be made centrally. But central policy and guidance, through a bidding or certification process, are necessary to ensure overall coordination between public and private investment decisions, and with the recurrent funding capacity of the public sector. The worst mistake is to promote or allow investments when their running costs cannot be met. Central policy on drugs and major technology registration, the development of essential drugs lists and treatment guidelines, quality assurance and bulk tendering will continue to be necessary. Purchasers and providers need incentives and opportunities to challenge the prevailing allocation of inputs in order to discover the best way to respond to health needs, social priorities and expectations. Rigid hierarchical approaches to balancing resources usually result in reactive rather than continuous change; shortages of essential inputs on one hand and unspent funds on the other are likely to be common problems. But decentralized decision-making among providers must be controlled and guided through active purchasing and appropriate payment mechanisms to meet overall priorities. Decentralized decision-making on the details of service and intervention arrangements also requires new strategies for human resources and investments in planning and management skills at all levels.

Without such explicit stewardship of all input sources and monitoring of developments, there will be too much discretion among decentralized units to engage in opportunistic behaviour. Such behaviour, either at central or decentralized levels, will also deter donor agencies from supporting decentralization, for example through sector-wide approaches and common funding pools. It will also be a reason for aid recipients to mistrust attempts to bring about donor coordination (22). Decentralization does not mean a lack of accountability in resource management, nor that central government should opt out of planning and monitoring. It should be designed to increase accountability and should give central government and ministries a new role, focusing on overall regulation and monitoring.

As part of that new role, the impact of new medical technologies should be assessed and regulatory practice developed in consultation with the important stakeholders. Such assessment of new technologies requires documentation on existing practice and use of resources. This further emphasizes the importance of monitoring. For the less developed countries, donor agencies need to take existing and possible imbalances into account when drawing up support strategies. The information base provided by a consistent use of NHAs will provide a good starting point for a common understanding of existing imbalances.

In both rigid hierarchical systems and in decentralized systems without accountability, proper incentives and stewardship, imbalances among resources will be more difficult to correct and prevent. Such imbalances often create huge problems in their own right, but they will also induce further problems by giving wrong signals to the health care labour market and the industry that supports health services. Well-performing, cost-effective health systems that respond to health needs based on explicit priorities will give both the medical industry and medical schools the incentives to invest properly in research and development, in educational programmes and in the physical inputs essential to the production of better health.

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