

Being healthy: the role of research



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Living a healthy life is the ultimate common desire of human beings and is what has driven individuals and communities to search for medicines and other health remedies. Improvements in health research methodologies have helped us to test beliefs, myths and theories for their validity and reliability, which has led to the generation of new knowledge and in turn to new or improved tools. As a result of better research and innovation, we have accumulated vast knowledge about the determinants of disease and ill health, prevention measures and cures of diseases. Our medicines and health interventions are unquestionably better and safer than they were 50 years ago. It is indeed scientific research that has continuously transformed or revolutionized the way we live and has been a key determinant of the rate of modernization and human development.

Access to and utilization of the new knowledge and the resultant new or improved tools has not been equal among the countries that form our global community. Because technology has greatly influenced economic power, countries with greater technological advancement and greater research capacity have conspicuously better health status than countries in transition towards acquiring technology and with weaker research capacities. There is vast heterogeneity of health status today between continents, countries and even within countries. Whether measured by life expectancy at birth, infant and child mortality, maternal mortality, malnutrition, or disease patterns, the health status of a country's population reflects the status of its technological and economical advancements, which in turn reflect its capacity to effectively access and use new knowledge and tools for human development.

Risks for ill health

Health research has greatly advanced our knowledge of risk factors for diseases and ill health. Health risk as a measure of the probability that an adverse event for health will occur following exposure to a certain factor has been used to measure the health status of individuals and communities. It is well known that although there are no individuals or communities devoid of health risks, and risk factors are widely distributed globally, there are global differentials in the level or position of individuals and populations on the risk scale for a particular factor^{1,2,3}, along the divide of developing and developed countries.

The pattern of morbidity and mortality differs remarkably among countries at different levels of technological and economic status, such that low-income countries, or least developed countries, bear higher mortality from preventable conditions, while high-income countries bear the burden of higher consumption and lifestyle risks².

Risks of dying at different age categories from birth, and the causes of such risks, differ greatly among low-, middle- and high-income countries. In low-income countries, the majority of deaths occur at very young ages, before reaching age five. Once individuals have avoided death at this level, they are almost assured to survive the adolescent period between five and twenty years, where the risk of dying is lowest. With the current levels of spread of HIV/AIDS, the previously most fit and productive age between 15 and 45 years has now become highly risky. Mortality in this age group has increased remarkably, bringing down previous gains in life expectancy. In contrast, the majority of deaths occur after the age of 60 years in high-income countries³.

In low- and middle-income countries, the main risk factors for death are: underweight, resulting mainly from malnutrition and infections; unsafe sex; unsafe water; poor sanitation and hygiene; and smoke from solid fuel³. Most of these are avoidable due to availability of knowledge and effective tools to prevent them. Recent studies have shown that 87% of mortality occurring in children below the age of five in low- and middle-income countries is avoidable⁴. In the same category of countries, 63% of males and 84% of females aged 5–29 years die of avoidable factors. The higher proportion of deaths among females is due to avoidable pregnancy-related and child birth-related causes. Avoidable deaths due to communicable diseases account for 90% of all mortality in all sex and age classes, excluding middle-aged men in whom their contribution is 80%.

In high-income countries, mortality is mostly at old age. The relatively few deaths that occur in younger life are concentrated in the neonatal period and are mainly due to congenital malformations. Mortality risk factors are mainly tobacco use, high blood pressure, obesity and alcohol consumption. Road traffic accidents have a significant contribution, and this trend is also increasing in middle-income countries¹.

The picture is reflective of the power of knowledge ownership and capacity to both generate and utilize available

Developing countries	%	Developed countries	%
High-mortality countries		Tobacco	12.2
Underweight	14.9	Blood pressure	10.9
Unsafe sex	10.2	Alcohol	9.2
Unsafe water, sanitation and hygiene	5.5	Cholesterol	7.6
Indoor smoke from solid fuels	3.7	Overweight	7.4
Zinc deficiency	3.2	Low fruit and vegetable intake	3.9
Iron deficiency	3.1	Physical inactivity	3.3
Vitamin A deficiency	3.0	Illicit drugs	1.8
Blood pressure	2.5	Unsafe sex	0.8
Tobacco	2.0	Iron deficiency	0.7
Cholesterol	1.9		
Low-mortality countries			
Alcohol	6.2		
Blood pressure	5.0		
Tobacco	4.0		
Underweight	3.1		
Overweight	2.7		
Cholesterol	2.1		
Indoor smoke from solid fuels	1.9		
Low fruit and vegetable intake	1.9		
Iron deficiency	1.8		
Unsafe water, sanitation and hygiene	1.7		

Adapted from The World Health Report 2002. Preventing Risks and Taking Action, pp. 161-163

Table 1: Leading 10 selected risk factors as percentage causes of disease burden measured in DALYs

knowledge. Those with greater ownership and hence easier access to knowledge and tools because of their technological advancements are at a different level of risk than those who depend to a greater extent on knowledge and tools developed elsewhere. Such goods are not readily available and accessible in many low- and middle-income countries, due to low purchasing power and basic infrastructure for their effective application.

With better technologies and greater research participation, access to information and its use is greatly enhanced. Preventable diseases and ill health conditions are significantly reduced and therefore deaths or disabilities due to preventable conditions such as vaccineable infections and sanitation-related diseases, like cholera and diarrhoeas, are totally absent or occur at very minimal levels.

Similar differentials can be found between populations and communities within a country. Although the general health status of individuals and communities in high-income countries is generally better than lower-income countries, the rich and poor within each of the above communities enjoy a different level of health status. Education status also has a strong influence on individuals' and communities' power to access and use new knowledge.

Success and failure stories

Smallpox eradication stands today as one of the greatest human achievements in the fight against agents of disease. This journey of discovery ensued from the curiosity-driven experiments of Edward Jenner. His experiments were probably triggered by the knowledge he acquired from a peasant who told him, "I cannot take that disease", meaning smallpox, "because I have had Cow Pox"⁵. This took him through what may appear today as a dangerous experimentation period of trying to validate the acquired knowledge and improving the methods, until it was possible

to proceed to mass introduction and adoption of vaccination as a public health tool. It took effort and determination to demonstrate the effectiveness of the new knowledge to the extent of influencing governments to support vaccination, through the enactment of legislation and provision of funds for intervention. It also required a high level of advocacy to raise awareness and funding of the global campaign for the purpose of eliminating a major killer disease. This campaign was a good demonstration of the power of concerted action to avail resources for the application of new knowledge globally, without any discrimination, and regardless of economic status. Smallpox was a major global threat in the form of epidemics with widespread distribution that terrorized the global population. It was difficult to eradicate, but eradication became possible because of the availability of an effective tool and the willingness of the global community to put together resources towards its elimination. The terror it caused was probably a highly motivating factor. Global commitment ensured that the tool was availed in sufficient supplies to reach effective coverage levels, and sustained sufficiently until total eradication was achieved.

The knowledge generated from understanding the mechanism of action of the vaccine approach opened many doors in immunology and extended the use of this knowledge to the protection of populations, not only from infections caused by other viruses, but also by bacteria.

Onchocerciasis elimination in West Africa and current efforts to eliminate it from other parts of Africa and the Americas is another example of the good will and commitment of the global community to eliminate a terrible health problem, even when it was affecting African and Latin American populations and none of the developed world^{6,7}. Here the value of public-private partnerships in research is demonstrated by the willingness of a rich patent holder to donate freely a tool to help poor populations, which would have otherwise never been able to afford the costs of purchasing and sustaining use of the tool, to have sustainable access to it. The drug was actually developed for other uses in rich countries and it continued to make a profit to the patent holder through its sale and use in such countries. In 2002, WHO reported that 18 million people had grown up free of the threat to river blindness, in the Western African countries, where the disease had previously been endemic⁷. In this case, the participation of endemic countries' governments has been critical. Had this problem been left solely to the low-income endemic countries, we would never have achieved this success to date because, given their economical status, they would not have been able to mobilize sufficient resources for the task. However, the world provided the financial and technical support and endemic countries' governments provided the political commitment and established the programmes, contributing their own resources. The programmes were built within the health systems, strengthening them in the process and providing sustainability.

The failed effort at malaria eradication provides an example of premature, nonevidence-based decision-making by the global community, against a noble commitment at a time

when much progress and achievement had been made towards global malaria control. The global community had seized the opportunity to use concurrently two very effective vector control tools: the newly discovered DDT and drainage of swamps, in conjunction with mass prophylaxis and prompt case identification, and treatment using chloroquine. It was the first time malaria was being attacked globally with multiple tools and the operations were military-like. Within a short period, malaria had been eradicated in Europe and America and transmission had been reduced significantly in many parts of Africa and India, with some countries coming close to eradication. However, following the disease eradication in Europe, and considering the costs of maintaining the operations in the remaining parts of the world, quick, nonevidence-based decisions were taken and the eradication campaigns were abandoned followed by abrupt withdrawal of the funding support to countries. It was believed that malaria eradication in the developing world, and in particular Africa and India, was not achievable given the vastness of the terrain and there was a global atmosphere of despair and loss of direction. This is an example of poor monitoring of activities. It was as if the world had given up on malaria, leaving the plight of the poor to themselves now that the rich countries had rid themselves of the disease. The ensuing results were catastrophic, and malaria came back in the form of epidemics in countries which had achieved good transmission reduction and were near to eradication. We learnt later that this was a result of loss of natural immunity following the transmission reduction and that, in such cases, withdrawal of vector control activities should not have been effected so abruptly.

Lessons learnt

The above examples have taught us that global problems require globally concerted efforts. When such efforts are directed at evidence-based interventions, and are given sufficient resources to reach and maintain high levels of coverage, success is assured. The decisions to continue or stop an intervention should be guided by evidence. The cost of making the wrong decisions in public health are very high. It is important to integrate programmes within existing health systems to ensure governments' commitments and long-term sustainability.

Had research been applied to evaluate the achievements made in large parts of India, Madagascar and Africa, and in particular the cases of projects like the Pare-Taveta Scheme⁸, malaria eradication efforts would probably have not been abandoned. The research would have revealed that it would have been totally unethical to do so, and would likely have led to further research on how to maintain the operations at lower costs.

Current challenges

The new millennium has brought with it new determination and commitment by the global community, in face of the still intolerably high disease burden and preventable deaths, despite huge technological advancements. The ambitious Millennium Development Goals² (MDGs) indicate the sense of

urgency and anxiety that the global community is experiencing over the continuous suffering of the majority of the global population. Regions have risen to the occasion and made serious commitments to work together, while countries have set their own targets and committed themselves to allocating sufficient resources to achieve the targets.

Africa has also responded by forming its own mechanism to enhance research and technological developments as means for achieving the MDGs. New Partnerships for Africa's Development (NEPAD) is a promising innovative mechanism, capable of accelerating African achievements.

The challenges facing all these efforts include ensuring:

- ❖ availability of effective and affordable tools which are accessible to those who are at greatest risk (those who need them most);
- ❖ accessibility and utilization of such tools by populations of endemic countries;
- ❖ research on the effective application of multiple tools;
- ❖ integrating strategies within the health systems;
- ❖ strengthening health systems to allow rapid scaling-up of interventions;
- ❖ research capacity-strengthening in endemic countries to enhance discoveries, knowledge utilization and ownership of new and improved tools.

Conclusions

While the above challenges are formidable, there are promising opportunities for making the world a healthier place to live in. In the first place, effective interventions and tools are available for the conditions causing the greatest disease burden. Effective vaccines for childhood diseases are available. Water sanitation technology has been there ever since the cause of cholera was discovered. Safe delivery methods are available to prevent maternal mortality. Secondly, there are signs of increased awareness of inequities in health. The risk of spreading infections to the rest of the world is real and imminent, given current climatic changes, freedom of movement and the persistence of highly endemic infectious diseases in low-income countries. As a result of this fear and good will from the global community, more funds are being provided to help improve the health of the poor. Indeed current key concepts, such as "funding poverty-related diseases", "providing support towards neglected diseases" and "global health approach" are fast gaining momentum. Debt relief has been widely accepted as a strategy to allow better funding of health and education, and enhancing accountability and good governance by countries.

These are therefore promising moments and good opportunities for making populations healthier; however, as previous experiences have shown, the availability of a tool per se may not be sufficient to make a difference. The key is to ensure that endemic countries do own the means to solve their own problems and have the capacity to participate actively in global efforts targeting those who need them most. If the current funds do not flow to the targeted endemic countries to support capacity strengthening, there is great danger that health care systems will remain weak and endemic countries will continue to have weak research

capacities. It is indeed weak health care systems that prevent high vaccination coverage and the reduction of maternal mortality. Effective innovative skills are necessary to bring about the creation of health care systems that are closer and accessible to the client.

In addition, effective ways of disseminating knowledge for behavioural change requires research capacities for support. To accelerate the pace of current achievements, create greater certainty that new knowledge becomes a public good accessible to all, and ensure that new and improved tools are utilized effectively by those that need them most, we must encourage real partnership in the process of knowledge generation. This can be the case only if deliberate efforts are made to support research capacity development in disease-endemic countries.

Achieving the Millennium Development Goals should go hand in hand with developing capacities to sustain achievements and make even greater progress in future. Health and development are achievable. They must be linked to the capacity to generate and utilize effectively

generated knowledge⁹. The role of research in being healthy is unquestionable. Hence, capacity for research and development is a prerequisite for empowering countries to participate actively in solving their priority problems, and contribute effectively to making a healthy global community. □

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