Vaccines for the Third World

by Dr Barry R. Bloom

Department of Microbiology and Immunology, Albert Einstein College of Medicine, New York, USA.

Where there is no vision, the people perish ...

Proverbs 29:18

Clearly, the easy vaccines have already been made; new vaccines pose greater challenges for research.

"It's only a matter of implementation." There are few more portentous words than these to be found in any health document. For most scientists engaged in the development of new health interventions, the fulfillment of their research is a product that goes through clinical testing and is eventually licensed for use. In international health, the historical record belies such optimism. For example, all of the vaccines in the EPI programme were available before 1974, but only 5 per cent of the world's children received them - it was clearly only a matter of implementation.

The Third World is the place where three-quarters of the people of this planet live, where 86 per cent of all births and 96 per cent of child and infant deaths occur. At both a national and a human level the diverse problems of the developing countries are of staggering proportions. Most have heavy foreign debt and, as a consequence, these countries now transfer more currency than they receive. Most are burdened by disease; the reality is that millions of people are sick because they are poor, and poorer because they are sick. The trends have not been encouraging. Per capita income has declined over the past five years and the percentage of national budgets spent on health has been unchanged or has diminished for eight years.

Yet one aspect of life there has improved profoundly. The number of children receiving immunizations has risen from 5 per cent in 1974 to over 60 per cent in 1989. WHO's Expanded Programme on Immunization (EPI) prevented the deaths of 2.2 million children last year. Through the efforts of 25,000 professional national and international staff and hundreds of thousands of field workers, 60 million children are now vaccinated annually against diphtheria, pertussis, tetanus (DPT), polio, measles and tuberculosis. The number of cases of paralytic poliomyelitis has declined in the Americas from 4,500 ten years ago to fewer than 200 this year, and WHO has just made the eradication of polio one of its goals.

Immunization is the most cost-effective weapon for disease prevention in developing countries, and new molecular and genetic technologies are making new types of vaccines feasible. The eradication of smallpox demonstrated that they can be effective everywhere. What is lacking is the will to make the advances of modern biomedical science available to the poorest people of the world.

Certainly, the main limiting factor is cost, but it is not the only one. The scientific infrastructure for evaluating new drugs and vaccines relevant to Third World diseases is also limiting. It is difficult and expensive to carry out clinical trials in industrialised countries in which the diseases do not occur. From the beginning of the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, a component was mandated in addition to the scientific research programmes for "institutional research strengthening" in the countries worst afflicted. This support, representing 25 per cent of the budget, has been used to set up and modernise laboratories, and to train bright students abroad (and, occasionally even to make it sufficiently attractive for them to return home.) As a consequence, in many developing countries there are laboratories that are able to tackle tropical diseases.

What has been largely overlooked, however, is the role of field and epidemiological research in developing countries. Almost all incentives - financial, working conditions and personal recognition - motivate people to go into medical practice, laboratory-based research or, most commonly, administration. There are few rewards for health workers in the field. Yet the field worker is the mainstay for acquiring information about local health problems, for evaluating new interventions and for integrating, maintaining and monitoring them in control programmes. Recognition of their importance through the development of appropriate career structures and educational and material incentives is a major challenge to the developing countries.

At the same time, the development of new drugs and vaccines (38 new products that have resulted from the TDR programme are currently in field trials) provides a unique opportunity for building scientific and field infrastructures in the Third World. Field research and control infrastructures need no longer be tied directly to one drug or vaccine, but can be continuing mechanisms to assess different health strategies and disease-control activities. Much of the same technology can be used in the same place to assess the distribution of parasites in mosquitoes and the incidence of multiple infections by multiple pathogens in the population. The epidemiological tools for testing different drugs against one
disease are often applicable to trials against another and can be adapted to evaluating vector control and vaccines as well. The result of this research is not papers; it is the control of disease.

Much ink has been spilled on “appropriate technology” for the Third World, but there has been almost no consideration of “appropriate science.” Research on vaccines involves a knowledge of molecular biology, genetics, immunology and epidemiology, and could serve as a stimulus to the educational and scientific advancement important to development. Even the poorest countries have need for expertise and access to biomedical science; they cannot afford to squander their resources on iron lungs.

Programme costs

It is ultimately a matter of priorities. The annual budget for the entire World Health Organization is US $327 million. The TDR Programme for six tropical diseases has a budget of $35 million, and the budget for the programme for vaccine development amounts to $2.8 million. The annual cost of childhood immunization is some $500 million, averaging about $10 per immunized child. The vaccines themselves represent less than 10 per cent of the cost of immunization; of the remaining costs for personnel, transport and logistics, 70 per cent is borne by the countries themselves.

The major advance in vaccine coverage has been accomplished largely through the combined efforts of the EPI of WHO, UNICEF, the World Bank, and the UN Development Programme, with support from non-governmental organizations, particularly the Rockefeller Foundation, Rotary International and the Save the Children Fund, which together coordinate their efforts through the Task Force for Child Survival. Behind the scenes, scientists trying to develop new or improved vaccines scramble for support, most of it coming from the US National Institute for Allergy and Infectious Diseases or the Department of Defense, or from WHO’s Special (extrabudgetary) Programmes for Research and Training in Tropical Diseases, for Human Reproduction, or for vaccine development. A decade ago, some foundations were generous
...while in the Philippines, a child protests vigorously at the needle.

contributors to research on diseases of the Third World, but their interest seems more to have reflected fashion than a serious commitment to the problem. And one must add that, regrettably, few Third World leaders have made health a high priority.

There has been only limited interest by the private sector in development of vaccines for the industrialised world, and virtually none in vaccines for the Third World. The reasons are simple. Vaccines account for only one per cent of the profits of the pharmaceutical industry, and a greater percentage of their liability. Because of the numbers of people involved there must be incentives to develop and deliver vaccines and essential drugs to the Third World. It should at least be possible to establish cost-plus agreements with international agencies to develop potentially useful interventions, or joint ventures or affiliations in developing countries.

The imagination and resources of the private sector that were so instrumental in developing biotechnology should be engaged, and the private sector may find that it has something both to contribute and to gain. Failing that, developing countries that can afford it will have to rely on their own abilities, intellectual and material, for developing their own biotechnology. This is already happening in Brazil, Cuba, India and Mexico.

Several new vaccines now in field trials have, in fact, been developed by scientists in the Third World – vaccines against leprosy (developed in Venezuela and India), leishmaniasis (Venezuela and Brazil) and dengue haemorrhagic fever (Thailand). Finally, many Third World countries have enormous foreign debt, much of which will clearly have to be written off. If even a small portion of that debt were restructured to be spent in local currency for health and education, several of the problems affecting the quality of life in the Third World could be addressed.

**One world**

The First World is the place where 13 per cent of the world's people consume the major part of the planet's crude resources, most of which come from the Third World. In the United States we spend annually over $300 billion on "defence," a single B-2 "stealth" bomber costs $532 million. In terms of personal consumption, $55 billion ($287 per adult) is spent annually on alcohol, $38 billion on tobacco and $22 billion on toys. We can afford to do more for health in the Third World. Conscience should motivate us to do so, and self-interest supports the claims of conscience. In the first place, good public health translates into good economics. We save over $0.5 billion per year in no longer having to control smallpox (the global figure is $2.5 billion). Second, in our world there is nothing which is truly remote and no one from whom we are disconnected. AIDS has again demonstrated that; another example, dengue haemorrhagic fever, which has been ravaging the Caribbean, and for which an effective vaccine has not yet been marketed, is predicted to spread in epidemic proportions to parts of the United States.

Finally, it is becoming more and more clear that poverty and disease have not only a moral impact but a political price. Ultimately, what is the cost of political turmoil? We have the resources to make vaccines and essential drugs available to the people of the Third World; what we need are the imagination and the will.

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