Published in final edited form as:

Lancet. 2008 September 13; 372(9642): 873–874. doi:10.1016/S0140-6736(08)61377-X.

Technology in global health: the need for essential diagnostics

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Technology opens opportunities to address the components of primary health care described by the Alma-Ata Declaration, namely health education, proper nutrition, safe water, maternal and child care, immunisation, prevention and treatment of local diseases, and provision of essential drugs. But the Declaration used the word just once, describing primary health care as being based on “scientifically sound technology made universally accessible at affordable cost”.

To us, “scientifically sound” and “universally accessible” are the key descriptors, each requiring separate calls for action. Development of scientifically sound technologies is an upstream process involving laboratory research and field assessment. Certain technologies, such as an effective HIV microbicide or new supplements to combat malnutrition, can provide enormous improvements in health by leapfrogging more intractable challenges. Since Alma-Ata we have seen the proliferation of public–private partnerships that aim to develop such “leapfrog” technologies, particularly drugs and vaccines for HIV, malaria, and tuberculosis.¹ These products are undoubtedly needed, but we should recognise that technology development can be serendipitous and its effects surprising. To take one example, a recent analysis predicted that better enteropathogen diagnostics could deliver the world’s greatest improvement in disability-adjusted life years, reducing stunting and its long-term consequences by 12.5%;^{2–4} a simple, elegant test to detect faecal contamination could be transformational. But this huge potential may be difficult to achieve because priorities such as the UN Millennium Development Goals, which drive much of biomedical funding, target childhood mortality, not morbidity. New technologies might also help awaken the will for change.

Then there are the health technologies that are already scientifically sound but for which Alma-Ata’s goal of universal accessibility is the hurdle. Accessibility can fail for diverse reasons, from poor acceptance to shortcomings of provision or infrastructure. Clean water can be delivered with technology as simple as boreholes and latrines, but 1.1–2.6 billion people lack access to these.⁵ In terms of provision, witness the cryptococcal antigen test, a highly sensitive diagnostic method that identifies the need for treatment of cryptococcal meningitis, a fungal disease common in AIDS. This technology has existed since the 1960s in a straightforward latex-agglutination form,⁶ but it is unavailable throughout most of Africa, which is a sad irony because the treatment for the infection, fluconazole, is available in much of the region through a donation programme.⁷ Cost of technology is of course one issue: no matter how efficiently produced, products from developed countries are simply unaffordable in the poorest countries. Notably, HIV assays used in much of Africa are manufactured in Ireland, Korea, Japan, and so on and incur high costs and erratic supply. Philanthropic donation can help meet high costs and has increased since Alma-Ata (for example, Pfizer’s donation of fluconazole and Merck’s of ivermectin), but these exceptional programmes are few and insufficient.

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We declare that we have no conflict of interest.

A more sustainable solution is to augment production of health technologies locally which, although well underway with booming biotechnology industries in India, China, and Brazil, has generally not trickled down to the poorest areas. An exception comes from bednets: in Arusha, Tanzania, a local textile manufacturer has retooled itself, now profitably making 18 million bednets each year with longlasting permethrin granules provided royalty-free from Sumitomo Chemical (figure). This venture both supplies a crucial health-improving technology and provides wages that can pay for good-quality health care if needed. Such technology-transfer schemes are needed to improve the supply of and demand for health products in the next 30 years, but they will require innovative relations between the health-care and business sectors.

Historically, the emphasis for health technology has been on drugs—starting in 1977 when WHO published the Model List of Essential Medicines, a valuable document that provides countries and organizations with vetted guidance on drug choices.⁸ Alma-Ata maintained this emphasis, describing the need for provision of essential drugs, as did UN Millennium Development Goal 8e. Mention of other technologies, such as diagnostics, was lacking. Yet our knowledge of pathogens and diseases has expanded, and better diagnostic resolution is needed for 21st-century health care. Much of the problem of drug-resistant tuberculosis ironically stems from the insensitivity of sputum smear for diagnosis and unavailability of culture and drug-resistance testing. Interestingly, one expert panel ranked tests for infectious diseases as the most important biotechnology for improvement of health in developing countries, ahead of drug discovery, vaccine development, and genetically modified crops.⁹ In this new era, we could use a WHO Model List of Essential Diagnostics to guide policy and research and to advance Alma-Ata's aspirations of better health for all.

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Figure.
Local production of insecticidal bednets to prevent malaria in Arusha, Tanzania