

to define what it is that students should know, from broad disciplines like epidemiology, biostatistics and health management, to new categories of competencies, such as informatics, communications, cultural competency, global health, policy and law, and ethics.¹

My view is simpler: it is that in contrast to most graduate or postgraduate programmes organized around disciplines, professions, skills or sectors, our overarching aim in public health is to train our students to solve problems affecting the public's health. Our vision at Harvard is to encompass a continuum of scientific disciplines and programmes, from fundamental science to application locally and globally, in order to address most effectively the big problems in public health. To do so, we place great emphasis on multidisciplinary and interdepartmental approaches to problems and education. Education should not stop with satisfying the disciplinary or credentialing requirements. BRAC has brilliantly immersed the students directly in the health problems in villages. We are revising our curriculum to include, in addition to a practicum experience in the community, more case-based learning and analytical thinking. In both schools, the aim is to provide our students with the best skills in solving problems in public health.

What is the knowledge that is important? I believe there are three kinds: "public knowledge" accessible to everyone, as in published scientific literature; "contextual knowledge", namely how to apply public knowledge in a particular place or health context; and "tacit knowledge", the knowledge that cannot be taught but is learned by example, that breaks down barriers of culture or training, and is transformational in the lives of people.² These are the great challenges, as I see them, in public health education. ■

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Producing a capable workforce

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Public health education must be viewed in the context of globalization and practical plans applied to the current situation. Disease knows no border; the developed and developing worlds are united by one scourge – the shortage of a public health workforce. Therefore the issue is not about whether the emphasis should be about the art or science of the discipline, but about public health schools producing a workforce that is capable of protecting the public's health.

The capacity of public health schools differs vastly, both inter- and intracountry. The argument could be: who deter-

mines quality? Clearly, a core curriculum which includes strong leadership training is a useful base from which the different strands of public health can be launched. However, the burden of disease and health of the population within each region and country will influence the emphasis in each focus area. Private, public, academic and other institutions that could contribute to the improvement of public health should collaborate. This innovative approach is being encouraged in public health schools as best practice for community engagement. There is evidence that such practice is beneficial to the community, trainees and the public sector.¹

Public health as a discipline requires broadening and should include non-medical disciplines that could contribute to, and thus enrich, the workforce. The health sector can no longer manage and deliver public health without contributions from these other sectors. The type and quantity of the public health workforce is rarely mapped, therefore graduates could be mismatched and may not meet the population's health requirements. The Essential National Health Research model established by the Commission on Health Research for Development,² currently used in 60 countries, can be expanded to map health needs against human resources for health supply.

In Africa, the AfriHealth project has endeavoured to map the capacity of institutions offering public health education and training. Regrettably, South-South collaboration, which could help to establish a robust sandwich programme using inter- and intracountry expertise, is uncommon.

The use of technology needs to be exploited to address ways of meeting the needs of a modern world in a resource-poor setting. The Knowledge Management for Public Health (KM4PH) project of the WHO should be considered and analysed as to whether it can benefit public health alumni in rural settings in developing countries.

Supportive links with alumni and purposeful mentorship graduate programmes should be established. These are known to be powerful tools for networking, and for retaining and informing the workforce post-training. ■

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The challenges of scaling-up

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Petrakova and Sadana make an important distinction between the science and the art of public health, where the art is concerned with application. However, while it is correct to say there is still much to be learned about how to deliver public health interventions, there is a growing body of research on health systems and policies that helps to guide the delivery of preventive and curative services at different

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levels of socioeconomic development.¹ Schools of public health should therefore aim to address health systems and policies through research and teaching as well as through the traditional public health approaches to understanding the causation of disease, the determinants of health and the evaluation of specific interventions.

Interdisciplinarity

Modern public health is an interdisciplinary endeavour that needs to integrate within broader development policies, requiring closer linkages with a range of sectors and disciplines such as agriculture, education, veterinary sciences and development economics. While schools of public health clearly need to maintain their focus on improving population health and reducing inequalities, they also need to reach out more broadly into the academic community. At London School of Hygiene and Tropical Medicine (LSHTM), for example, we have been engaged in setting up the London International Development Centre (LIDC), which will bring together staff in a range of disciplines from six colleges of the University of London (<http://www.bloomsbury.ac.uk>) to promote interdisciplinary research, teaching and capacity-building to address international development from an intersectoral perspective.

Scaling-up research and teaching

Meeting the growing needs for more public health professionals, including the expansion of the research workforce, will require international cooperation, increased resources and long-term commitment. LSHTM's experience of free licensing materials for course development in low-income settings has assisted in establishing local teaching programmes. It has often been difficult to get research funders to support long-term capacity-building initiatives but the situation is changing, and several major research funding bodies are now actively discussing how best to provide support. It will be essential to develop strategies for expanding masters' and doctoral training programmes, and also to ensure that able researchers can be sustained in their country of origin through the use of postdoctoral fellowships and international collaborations that allow them to develop as independent researchers.²

Governments and multi- and bilateral donors must also prioritize the development of human resources to underpin the attainment of international goals such as the Millennium Development Goals (MDGs). In addition to the formation of large numbers of new public health professionals, a further challenge is the need to improve the retention and performance of the existing public health workforce. Schools of public health need to respond to the needs of 21st-century students and to think ambitiously about scaling-up access to appropriate education and training. This should include how they can provide on-going support for lifelong learning, conducted as far as feasible in the workplace, which in turn will require provision of learning opportunities that are flexible in terms of location, time, approach, pace and content. Information technology used appropriately can support the necessary changes, which should capitalize on both distance and classroom-based learning to create new opportunities for scaling up access to education and training throughout the careers of public health professionals. ■

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Strategic training for health in Brazil

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Brazil's Unified Health System (*Sistema Unificado de Saude – SUS*) is probably the largest public health system in the world today.

In 1988, the Sergio Arouca National School of Public Health of the Oswaldo Cruz Foundation (*Fundação Oswaldo Cruz – FIOCRUZ*) set up the School of Health Governance (*Escola de Governo em Saúde*), and embarked on a substantial "reorientation of its teaching and research programmes with a view to helping expand health governance capability and quality in Brazil". This new school has had a history of health achievements and social results including health improvements for citizens in large and previously often marginalized portions of the population. It is now imperative to managerial capability and quality, and to make health care effective, humane and comprehensive. In future, the challenge will be to consolidate the school as a centre for intersectoral policies and foster a new leading role for society and citizenry in the social production of health and well-being.

The school provides ongoing training and is directed to the production and large-scale dissemination of new professional and institutional competences to meet the challenges of the SUS. It gives special priority to the 100 000 managers at different spheres and levels of the SUS.

The school has expanded, and now involves some 40 000 practitioner-students in new teaching programmes as well as around 50 institutional partnerships in Brazil. The new model sees training as a component of the work process, directly oriented to the health system environment.

The school works within an agenda agreed with the SUS management, and developed from a shared perception of the deficits in managerial competence and resultant training needs.

The school proposes an educational path that fosters competence in mobilizing scientific knowledge for management practice. In view of the regional inequalities in existing training capacity in Brazil, the School of Governance model is being set up progressively as a single training system for the SUS. It is organized as a network of government schools, and the extensive use of new information, communication and distance-education technology allows these institutions to combine efforts and share resources in an appropriate time frame and at a tolerable cost. For FIOCRUZ, it has been stimulating to develop and coordinate, using this School of Governance model, Brazil's network of Schools of Public Health (about 30), SUS Technical Schools (about 50) and the Public Health

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