

Engineering and public health: An interdisciplinary approach to addressing water quality in Compone, Peru

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Background: University of Maryland undergraduate students, graduate students, and faculty from the Schools of Engineering and Public Health conducted field water tests and a health needs assessment in a traditional farming community in the Andean mountain region of Southern Peru. This innovative project focuses on health as a cross-cutting issue best addressed as an interdisciplinary team. The project provides an opportunity to develop relationships among different fields and expands leadership capacity through multi-level teams of undergraduate students, graduate students, and faculty.

Structure/Method/Design: The first phase was a multi-method needs assessment to examine health issues and priorities among residents and to assess water quality. The public health team used principles of cultural competency and health literacy to develop a qualitative questionnaire. Fourteen interviews were conducted with health clinic staff, school personnel, community leaders, and community members. The teams worked together to conduct seven field tests of the local water supply at various points in the distribution system.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Residents and leaders identified animal contamination, flooding, and standing water as health priorities. Some residents objected to neighbors' overuse of water, particularly at the end of the distribution branch. Without a consistent water supply, the community risked financial sustainability.

Common health problems identified by residents and leaders were diarrhea, acute respiratory infections, cold/flu, alcoholism, and skin problems. Other issues were nutrition, general hygiene, and disorganization within the community. Social mapping analysis revealed that communication between residents and leaders is not prioritized.

Total coliform results revealed that after incubation, contamination ranged from ~10-108 CFU (EPA MCL = 0), indicating high fecal coliform and *E. coli* contamination. Community leaders expressed interest in chlorination of the existing water supply system. While community members prioritize water quantity and reliability, they were aware of contamination. One resident boils water "because it is bad for us." Another resident noted that boiling water was practical, for "if we don't, there are little bugs and sand." However, researchers observed use of tap water to wash vegetables.

Summary/Conclusion: Qualitative data from a representative sample of community members, school personnel, and health providers along with field water tests substantiated speculation by Engineers without Borders that health problems may be related to contaminated water. These data provided information to guide design of a water disinfection system and curriculum addressing the health issues identified by community members. This case study illustrates the opportunities of cross-discipline collaborations to simultaneously address technical, infrastructural, and behavioral challenges in sustainable global health projects.

Guidelines for global health experiences in postgraduate medical education: Development, content, and implementation

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Background: Global health experiences (GHE) are both potentially valuable educational opportunities and potentially dangerous undertakings for medical trainees, patients, and communities. Some of the practical, ethical, and educational aspects of these experiences at the undergraduate level have been discussed and debated in the literature, and many universities have developed policies, structures, and predeparture training programs. However, the literature regarding postgraduate GHE's is limited. Postgraduate medical trainees are graduated physicians in 2- to 6-year specialty training programs. While these individuals may be able to more meaningfully contribute to global health than their undergraduate counterparts, their participation in global health activities raises even more weighty ethical, legal, and educational dilemmas. Furthermore, the significant diversity of skills and knowledge between specialties and years of training makes development of predeparture training programs challenging.

Structure/Method/Design: A global health education subcommittee was struck to develop a set of guidelines for global health experiences for postgraduate trainees. The committee consisted of global health leads of clinical departments and was chaired by the postgraduate global health lead. The committee's work was informed by a literature review, extensive consultation, and by the Guidelines for Global Health Electives produced by the Canadian Association for Interns and Residents. The guidelines were iteratively reviewed and modified, including solicitation of comments from global health partner organizations and individuals.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): The "Guidelines for Educationally and Ethically Sound Global Health Experiences in Post-Graduate Medical Education" apply formally to global health electives abroad and informally to global health experiences locally with marginalized/vulnerable populations. Detailed sections include registration and logistics, educational integrity and supervision, ethics, health and safety, and predeparture training and post-travel debriefing. Several provisions of the guidelines, such as those requiring due diligence regarding local needs assessment, detailed educational objectives, and both home and field site supervision might be considered burdensome by some, but committee members felt these were educationally and ethically non-negotiable.

A predeparture training framework was developed which involves five elements: basic health and safety abroad, comprehensive principles of global health, discipline-specific knowledge and skills, stage-of-training specific training, and project/location-specific briefing. The guidelines were approved by the Post-Graduate Medicine Education Advisory Committee, and will be implemented using the Post-Graduate Online Web Evaluation and Registration (PO-WER) System, and a dedicated global health lead faculty and manager.

Summary/Conclusion: The guidelines fill a critical gap in policy and practice within our institution and can be adapted for use at other universities and health sciences centres.

Interdisciplinary approaches to global health: A cross-sectional cluster sample survey examining health risks at the human-animal interface in Madagascar

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Background: In 2012, Madagascar scored in the bottom quarter of all countries in the Global Hunger Index. The majority of the population depends on subsistence agriculture to meet nutritional needs and infectious disease remains a major cause of morbidity and mortality in children under 5. This study describes the human–animal interface in villages surrounding the Ranomafana National Park in southeastern Madagascar, and discusses components of this interface that have potential to contribute to regional cycles of illness and food insecurity. The study was completed as part of a larger project titled “The ecology of infectious disease in Madagascar,” funded by the Emory Global Health Institute (EGHI). EGHI was established with the goal of fostering scholarship in global health and provides funding for multidisciplinary student teams to conduct health research internationally.

Structure/Method/Design: A cross-sectional cluster sample survey was performed over an 8-week period from June 14 to August 9, 2013. Six villages bordering the Ranomafana National Park (RNP) were selected for the study. Ten households from each village were randomly selected and all household members were asked to participate. Collection methods included in-person surveys, as well as physical assessments to acquire anthropometric data. Livestock ownership, animal husbandry practices, frequency of animal protein intake, and nutritional indicators were assessed. Statistical analysis was conducted with SAS-callable SUDAAN 10.0.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Approximately 78% of people in the RNP region live in households that own livestock, however, less than 50% of the population includes animal protein in their diet more than once a month. Nutritional indicators for the population are consistent with reported overall indicators for the country. The majority of households owning poultry and pigs reported significant annual morbidity and mortality of their animals as barriers to increased animal production for household consumption. Husbandry practices associated with livestock, specifically the practices of housing and slaughter of poultry within the home, allowing pigs to roam freely, and using animal manure as fertilizer for improved rice production are identified as targets for future studies on zoonotic disease transmission.

Summary/Conclusion: The population within the RNP region is highly dependent on livestock for food, income, and agricultural production. Improvements in livestock management should be directed to improve food security and decrease the risk for endemic zoonotic disease transmission. Universities involved in research and program implementation in the areas of zoonotic disease and global food security will benefit from the participation of animal health professionals and others with interest in the human–animal interface.

The role of international partnerships in building the capacity of health professional programs in Kenyan and Tanzanian universities

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Background: International partnerships are a commonly applied approach to education and research capacity building of tertiary health institutions in sub-Saharan Africa. However, comprehensive, critical, and contextualized assessments of how such partnerships support the host universities to provide human capital for service, education, and research within the health systems of the countries are scarce.

The overall objective of this study is to analyze the means and extent to which international partnerships identified as important by selected universities in Kenya and Tanzania strengthen and/or weaken the universities' capacity to train health workers (service providers), educators, and researchers in three key health professions (medicine, nursing, and public health) for health systems.

Structure/Method/Design: This study includes two universities in Kenya (Moi University and the University of Nairobi) and two in Tanzania (Kilimanjaro Christian University Medical College and Muhimbili University of Health and Allied Sciences).

Review of documentation by universities, partners, and government ministries (published and grey literature). Key informant interviews, focus group discussion with students and faculty, and participant observation. Interviews and discussions were audiorecorded and transcribed. Transcriptions and observation notes were analyzed.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): The characteristics of over 90 partnerships were mapped and analyzed. More than three-quarters of partnerships (>75%) linked the African universities with European and North American universities. These high-income to low-income partnerships were also the most highly prized. A small number of partnerships linked the African universities with universities in Africa, Asia, and the Middle East. Partnerships consisting of a consortium of universities were rare but often rated highly. The rated value (high, medium, or low) to the African university of each partnership varied greatly depending on an array of factors, including duration of partnership; extent to which PhD training was supported; integration of service delivery; and ability of a partnership to be reciprocal in practice.

Summary/Conclusion: The rated value (high, medium, or low) to the African university of each partnership varied greatly depending on an array of factors, including duration of partnership; extent to which PhD training was supported; integration of service delivery; and ability of a partnership to be reciprocal in practice. While long-term partnerships often yield the most significant results, short-term partnerships that are focused and well designed can be very high value to host institutions.