

*Opinion*

## Challenges and Opportunities of a Budding Vaccinologist in Low- and Middle-Income Countries (LMICs)

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### **Abstract:**

**We highlight a young vaccinologist's struggles upon returning to a resource-limited country after training abroad. Despite the urgency of vaccination against endemic, epidemic, and pandemic diseases, daunting obstacles persist. We also propose suggestions and opportunities for meeting these challenges – making vaccines and vaccination more accessible for global public health.**

When one of us (HJS) returned from his three-year clinical training in Infectious Diseases in New York City, back to be a resident at a university hospital in Germany in late 1989, professional life was just miserable: There was no online access to current laboratory data on each ward, scientific journals were not readily available and were prohibitively expensive for a resident, and even worse, in the German medical system, there was no place for an Infectious Diseases specialist. Funny from today's perspective, the German Research Community (DLR) decided in 2007 that infectious diseases no longer play a relevant role and stopped funding our newly created respiratory infectious diseases network (PID-ARINET). At that time, I joined the industry and had an international career in vaccine development. While many of my peers told me similar stories on their "painful way back home" to their countries from research programs at top-performing institutions abroad, the situation for researchers and physicians returning home to LMICs like Uganda is even more difficult.

Uganda with a population of about 45 million has about 4,800 physicians and health care spending of € 31.- per capita per year.<sup>1</sup> In comparison, Germany, with a population of around 83 million, has 400,000 physicians and health care spending about € 5,300.- annually on health care per person.<sup>1</sup> At the same time, like other LMICs especially in Sub-Saharan Africa, Uganda suffers

from the highest overall burden of diseases in the world<sup>2,3</sup> while it owns only a weak public health care system with at best slow or even no capability to detect, prevent, and respond to existing, or emerging diseases of endemic, epidemic, and pandemic potential. Research and Development on affordable vaccines, drugs, and other preventive, lifesaving measures needed at a local level, literally do not exist. As a result, catastrophic outbreaks and epidemics – Ebola Uganda and COVID-19 as the last example – cause high morbidity, mortality, and extreme disruptions of daily life. They are addressed with suboptimal public health responses. International support is needed and most welcome – but without local structures for implementation it can only be partially effective, and it is certainly not sustainable.

With a strong wish to make a difference, as a young scientist (AC) from Uganda enrolled in a one-year Master Course in Vaccinology and Drug Development at the Institute for Global Health at the University of Siena.<sup>4</sup> The huge unmet medical need – specifically for well-trained physicians – brings up many motivated young individuals who want to close the gap and who wish to help eliminate unnecessary suffering and deaths of patients in their country. They are looking for specialty training, courses, and degrees abroad and they apply for scholarships and manage the many roadblocks that come along with studying abroad. Most students are successful

and after years of hard work and personal suffering, they return home with new skills, abilities, knowledge, and a high motivation to make a difference.

I graduated from the one year-course in December 2020, passing all exams as per the Italian academic rules including the writing and defending of a thesis. Despite excellent education and high motivation, my professional success to date in Uganda is rather limited. My goal had been to become a key opinion leader in vaccinology locally and ultimately to become a seed for Uganda in particular. However, scientific specialty training abroad gives only the scientific part of the knowledge and skills needed to be successful upon return. New knowledge and innovation cannot easily be implemented into existing hierarchical structures of the national health care system. The most challenging gap in LMICs for a successful return of internationally trained specialists, however, is the lack of opportunities to apply their knowledge: There are no adequate positions to implement the science learned. Most stakeholders had never heard of a “vaccinologist”. There were no specific positions for returners, and there even was a fight for available public resources on other priorities. Finally, and that is different from the situation described for Germany, it is almost impossible to find a job in the industry.

First, most companies avoid visa sponsorship and related administrative troubles and costs of relocation and settlement. Second, innovative pharmaceutical companies developing high-tech new products have little incentive to run clinical studies in countries where people fight for food, clean water, and survival on a daily basis. Still, exactly for these populations, the much-needed scientific evidence on the efficacy and safety of many medical products and interventions is lacking. Third, available research grants require years of experience as part of eligibility which eliminates “early career researchers” from the application process. Research grants preferentially go to groups that have in the past shown their capabilities to deliver, not to young unknown investigators. This bias against young investigators leaves as the only option for the returner to work as a “secretary” for established researchers and their ideas; innovation is excluded.

Deep frustration immediately and mid-term after training abroad emerges when returners realize this lack of career positions and research opportunities. Despite excellent training in a new field with top skills and knowledge upon return to their country, they are forced to take their old job in order to sustain a living. This is an incredible waste of time, money, energy, and even: life years lost for societies that could have benefited.

Not to be negative all the way through, the positive side of the difficult situation is that when one overcomes all these challenges, the returner may have an attitude to break through walls, knock on shut doors, and tread on rocky ground – which are specialties on their own. As complaining is no solution, here are some suggestions about what can be done for a change (Table 1). In the future, to ensure the successful spending of training money and life years of top talents in LMICs, we urgently request these changes, as the current situation results in either frustration with little impact of the investment for training abroad or in the relocation of trained specialists back to developed countries with better recognition and payment. This would be a loss for the respective country, and it would significantly reduce any future improvement of global public health.

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- Infectious Diseases and Vaccinology should become a recognized medical specialty globally in order to fill the public health gap seen in LMICs, but at no lesser degree in many industrialized countries alike.
- LMIC governments should create two-year academic positions for Vaccinologists, Infectious Disease specialists and other “abroad-trained-experts”, with sufficient salaries to allow a head-start upon return of trainees.
- Local bureaucracies should open their doors for returners and use existing local networks and connections to catalyze innovation.
- Governments and Non-Governmental Organizations (NGOs) should sufficiently fund research by young scientists, specifically, when returning back home, particularly with a focus on public health interventions.
- Universities aimed at training scientists from LMICs may include networking and “back home visits” and should negotiate with authorities in LMICs, how to best re-integrate upon the new experts into local structures.
- Contract Research Organizations (CROs), pharmaceutical companies, local governments, and NGOs should be obliged to establish opportunities for young investigators.
  - offer vaccine development programs for neglected / emerging diseases;
  - Consider LMICs for phase one to four vaccine or drug research and development activities;
  - Commit funds dedicated to support early career researchers from developing countries.
  - Develop a “safe landing platform” for specialists who trained abroad and return into LMICs.

**Table 1.** Suggestions about what can be done for a change.

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