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Dr Ann Aerts, head of the Novartis Foundation, discusses the role the Novartis Foundation plays within low and middle- income countries across the world and how integrating digital health solutions can strengthen health systems and contribute to global health.

Your career is quite atypical, shifting from an institutional background to a corporate career. What attracted you to Novartis, and this role in particular?

Having chosen to study medicine to either work for humanity or to make an impact through science, I started my career as an emergency physician, working in conflict areas. This kind of work was very rewarding but also exhausting. I gained valuable experience not only as a physician but also becoming a team leader, responsible for large medical teams. Working in global health, I felt I was serving people across the world, but ultimately I wanted to go back to science and that is how I ended up joining Novartis, working in drug development. When compared to my prior role, the impact of developing innovative medicines can be considerably greater. For example, my mother suffered from cardiovascular disease at a relatively young age, and she would not have survived till now – she is 92 – if it weren't for the many innovations in cardiovascular care over the past decades. Earlier generations who were not so lucky to benefit from innovative therapies, unfortunately had worse outcomes. The field of medicine has evolved tremendously thanks to contribution of many motivated individuals and organizations, including researchers, academics and pharmaceutical companies. And it is fantastic to be able to contribute!

After working in drug development for around seven years, a new opportunity came up, combining my two passions: global health and science. Again, the impact of working in global health with the Novartis Foundation is very different to that of working with an NGO or an international organization. We at the Novartis Foundation can leverage the expertise of the employees of our parent company, Novartis, to bring additional value to our partners; for example in cardiovascular health, business management, finance and human resources.

Novartis is already embedded in saving lives. Why does a company such as Novartis need a foundation?

Novartis will do all it can to reimagine medicine with its innovative products, but also to make sure those innovations reach people in low-and middle-income countries. Here at the Novartis Foundation we complement this by pioneering innovative ways to deliver healthcare in order to support healthcare systems in low-and middle-income countries to address the high disease burden they face. Both infectious- and non-communicable diseases rage in such settings and health services are generally overburdened. Medicines alone are not enough as the drugs will only benefit a small proportion of the people who need them, because of many reasons: either patients are unaware of their condition and do not seek care early enough, or when going to a health facility, patients may be misdiagnosed or not prescribed the right treatment. Finally, even when patients who do get properly diagnosed and prescribed the right treatment, access to the medicines can still be complicated. For example, patients may abuse a doctor's instructions by sharing pills amongst family members. It speaks for itself that in such settings, quality drugs will not improve patient health outcomes unless the health system is strengthened. This is what the Novartis Foundation seeks to do: innovate the way health services are delivered to enable health systems to address the needs of both patients requiring acute care and those with chronic conditions.

How do you evaluate health systems and quantify the places where change is actually possible?

We leverage our contributions through partnerships. We can't operate alone; the first thing we do in a country is seek a dialogue with the local authorities. Based on their priorities, we then design our interventions jointly. We aim to strengthen healthcare for patients who really need it. For example, we have programs in urban areas of Ghana and Vietnam where no services are available and patients cannot easily access hospitals. In these settings, we aim to bring healthcare closer to the

communities and maximize opportunities to measure blood pressure outside the health system.

This way of working can accelerate the diagnosis of hypertension and avoid complications at later stages in life; it also makes those services available to more people in urban areas. We work with shopkeepers, licensed chemical sellers, gas stations, and post offices to establish screening stations. Shopkeepers are trained to provide the correct information according to a person's blood pressure and refer for treatment when necessary. This is just one way of innovating healthcare delivery, but we also integrate digital health in our programs, as digital technology has really revolutionized the way healthcare can be delivered and is a strong enabler to help improve patient outcomes.

When I first worked in Africa, we didn't have mobile phones and I would have to cycle from village to village to see my patients; I often arrived late and sometimes faced quite dangerous trips. Nowadays, community health workers can be coached in their patient care by mobile phone! This is what we are currently doing in the Ghana telemedicine program.

This Novartis Foundation-supported program centralizes expertise from doctors and nurses in call centers located at the referral hospitals, and is now being implemented and scaled by the Ghana Health Service. They have 24/7 staff on duty so that community health workers in remote and hard-to-reach areas can easily seek advice. Other examples focus on monitoring the quality of care through digital applications. A digital quality assurance tool that was validated in Tanzania in partnership with the Swiss Tropical and Public Health Institute, has been scaled in several regions of Tanzania and is now also adapted for use in Mali.

In the context of healthcare, digital tools can help remove barriers to care and expand access, improve quality of care by centralizing expertise and remotely coaching frontline health workers, empower patients through targeted health education messages, and collect real-time data to optimize resources and decision-making.

On what criteria do you pick the countries where you operate?

The first pillar of our strategy aims to innovate around the delivery of healthcare for cardiovascular disease, particularly hypertension. The countries we select have populations with high levels of hypertension, which is evident by the significant cardiovascular morbidity and mortality. This is why we chose places such as Ghana and Vietnam, and why we are assessing cities in Mongolia, Brazil and Senegal. Moreover, we consider the likelihood of success to pioneer innovative models of healthcare delivery and also include an aspect of feasibility and potential to build robust local partnerships in the selection of our intervention areas

In all of our programs we measure what we do: to document what works and what doesn't. We then use that evidence to help governments translate it into policy and implement at scale. Currently we are exploring other approaches to accelerate the impact of our work, by bundling expertise and resources through new types of partnerships.

The second pillar of the Novartis Foundation strategy aims to eliminate leprosy, a disease with still over 200,000 new diagnoses per year. The drugs to treat leprosy are donated by our parent company, Novartis, to all leprosy patients worldwide through the World Health Organization (WHO). The widespread availability of free treatment has helped decrease leprosy prevalence by 96 percent. However, as diagnosis mainly relies on clinical symptoms, it is often delayed, leading to continued transmission of the disease but puts the patient at risk for neurological damage and irreversible disabilities. For the world to really interrupt leprosy transmission and reach the goal of zero new

patients globally, it is important to detect patients as early as possible. Consequently, the Novartis Foundation is now working, on the one hand, to accelerate the diagnosis of leprosy through digital technology, and on the other hand, through the development of a diagnostic test. With the LEARNS digital health tool in the Philippines, frontline healthcare providers can send pictures of suspected lesions to reference centers so that specialists can evaluate the probability of a leprosy diagnosis. For the diagnostic test, we are launching a new collaboration with the Global Health Group at the EPFL (Swiss Federal Institute of Technology Lausanne) to use state-of-the-art technology in molecular diagnosis, to design a test for leprosy.

The world of philanthropy has changed and evolved immensely. Can you reflect on the changes as someone who has been active on the field and is currently involved in not-for-profit projects?

Some of the earlier philanthropists may have failed to listen to governments, to understand their needs and priority issues; many initiatives were based on good intentions. Digital health applications are no exception to that: often designed by impressive talents, digital health applications may not be designed for scale and integration into health systems from the onset. This leads to a relatively high failure rate, with some apps not having a significant impact on population health. It also results in countries facing a fragmented landscape of digital health applications, sometimes referred to as "pilotitis", which then requires governments to take action and develop a national strategy for institutionalizing digital health within the health system. Only then can digital health really help address national health priorities.

At the Novartis Foundation we believe that every solution should be co-designed with the end-users on the ground and based on the reality of everyday life of patients and their families. Therefore, our digital tools and interventions are coordinated with both the end-users and the local policy makers. As a member of the Broadband Commission for Sustainable Development, we are working with digital experts around the world to produce recommendations and advising governments on how best to institutionalize digital technology into their health systems.

Today we live in a world where technology plays a huge part in our lives. Coming from a scientific background, do you believe that technology can solve everything and what are the limitations of e-health?

Digital health has to be well coordinated and managed. It is challenging to find digital applications that are scaled appropriately. I do believe that technology plays a huge role when a patient's reality is considered. For example, you can better understand the situation in urban areas around the world through better data collection on health parameters of the populations living in those areas. However, when considering the reality of life in those settings, where people seek to survive every day, it is easy to understand that looking for a job can have priority over taking care of your health. Waiting for hours in line at the health facility is out of question, and in such settings, digital tools can really offer different opportunities to deliver healthcare.

To design appropriate digital applications for specific populations, we interview patients on what they want, how they like to communicate or use information and how they feel empowered. For example, in Ghana, our hypertension program uses voice messages to better reach patients and advise them on managing their disease, through reminders and healthy living tips.

How has the fact that The Novartis Foundation is based in Switzerland helped you in your development?

We have access to very credible academic institutions in the country, including the Swiss Federal Institute of Technology and the Swiss Tropical and Public Health Institute. Partnering with global institutes is instrumental to our operations and a privilege that we do not take for granted.

Do you have any final message for our readers?

Independent philanthropic institutions such as the Novartis Foundation are well positioned to drive impact in critical areas such as strengthening health systems in low- and middle-income countries and enable them to address the dual disease burden.

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