Artificial intelligence (AI) and digital health technologies are expanding rapidly. As we will see today, potential applications are everywhere… in health system strengthening, epidemic and pandemic prevention, infectious disease and noncommunicable diseases (NCDs) management, access to Universal Health Coverage (UHC), telemedicine, diagnosis and intervention targeting, supply chain management including to tackle substandard and falsified medicines, and so on.

However, as we saw with drugs, vaccines, PPE during the COVID-19 pandemic, the way technology is handled can reinforce inequities. If AI and digital health tools are developed to prioritise the needs of the wealthy over the needs of the poor – including in LMICs where very profitable sections of the population exist alongside many more who are poor – the pattern will repeat. Yet, a distinguishing feature of AI and digital health tools is their ability to work in low-resource settings;
low-resources can be a spur to innovation if the right support is in place.

We will see lots of examples today, many of them very exciting. But we will also hear, the process of translating advances in digital health and AI-for-health technologies into sustainable scaled-up health applications in any setting, not least in resource-limited settings, is complex, risky, poorly understood. It is challenging. It is not easy. A piece of "naked AI or digital health technology" is not on its own a solution.

To frame thinking, here are three thoughts to guide us.

First, the nature of the innovation process is different from other areas of health

Developing drugs or vaccines involves large, resource-intensive, randomised controlled clinical trials of essentially homogenous products. Decision-making on vaccine research programmes and allocation of resources is made by research funders, foundations, committees of the WHO, GAVI, UNICEF, and others; local populations are involved in the sense that they participate in trials. For drugs and vaccines, knowledge is embedded in products, diffused by sales (often very large).

In the case of digital health and AI-for-health, 'use' and 'innovation' go much more hand-in-hand. Knowledge diffusion is variable by context, and changes over time. Whether a proposed AI or digital health innovation is a good innovation in a particular low-resource setting at a particualt time is best understood by those with local knowledge. To fully reach their potential, we need a different kind of innovation model, one that is much more tailored from the start to local innovators and local intelligence, with allocation of resources driven by LMICs themselves…as a complement to top-down decision-making processes and funding mechanisms.

Second, we need a different value proposition, a different investment model to guide us

The current notion of potential high returns on initial equity investments based on expected profits in the marketplace often does not align well with the most critical global health needs. There is little profit to be made from many high-impact global health interventions. If a test for an infectious disease already cost only 10 cents, it is difficult to earn even a small profit per purchase.

There is a bias also towards rewarding headline-grabbing software innovators, ignoring the risks and needs of innovators of the, possibly more 'boring',

hardware components which take much longer to get to market and to yield profits.

Attracting investors is harder still if pay-out of innovations comes in the shape of global health public goods or hard-to-value (or even not at all valued) health outcomes such as prevention of ill health.

While not excluding the potential for profit in high-income economies as a motivation for innovation, we need an investment model based much more on expected global health returns, such as Disability Adjusted Life Years (DALYs) prevented over future horizons, and wider health and development impacts of innovations. Part of a possible investment metric might be the contribution of digital health technologies to achieving Universal Health Coverage (UHC), proposed by the World Bank and WHO as "everyone – irrespective of their ability-to-pay – gets the health services they need in a timely fashion without suffering any undue financial hardship as a result of receiving the care".

It has also long been known – but recently become much more prominent – that human health is shaped by the natural environment, planetary health, climate change, and biodiversity under the One Health mantle, and by broader social and economic forces which affect accessibility and equity. Conventional competitive market mechanisms don't easily reward innovations to tackle such phenomena. Any long-term vision of human health at the heart of digital health and AI-for-health technology challenges has to be holistic with a concomitant broad notion of health technology innovation to capture these systemic planetary health aspects.

Incidentally, we also need a new investment framework because, quite likely, the financial support seen for prior global health initiatives is not going to be available. Some global initiatives responded to the lack of profit derivable from

low-resource settings by creating subsidies to top-up the prices to sellers (or to drive prices down for buyers) to make markets more attractive. Implementing top-down centrally-determined subsidies for a myriad of bottom-up context-adapted AI and digital health tools would be even more practically challenging. In consequence, many digital health innovations to tackle global health challenges will need to rely on the resources available in low-resource settings, only occasionally benefitting from external investments.

THIRD: Sustainability is key. This means good implementation science, supportive 'venture building structures', strengthened equitable data-sharing infrastructures, and human capital.

Turning innovations into high-impact global health interventions is not easy. Brilliant ideas don't just happen; they require lots of testing, mistakes, and failures on the way to success. There exist hundreds of thousands of failed digital apps. There is, even, a high risk of the bad driving out the good, making it risky for innovators of high-quality innovations. Implementation challenges differ radically across settings, with especially big differences between health systems that are publicly funded and those that are privately funded. Good implementation science should be at the heart of any digital health technology innovation, otherwise, there is a risk that new technologies will not fit health-delivery workflows nor help those providing or receiving care in their own day-to-day activities. Many innovations have no value to end users even if they have a logical value for developers. Local context and on-the-ground realities that make the difference between failure and success, are often much better understood by practitioners and innovators with years of experience in local settings and human-centered design.

To ensure any digital health technology is developed in a sustainable and scalable framework, needs supportive 'venture building structures', ecosystems able to

incubate and champion locally-driven digital health and AI innovators, that engage all stakeholders, including those collecting data, academic institutes, government, private sector, and civil society actors. Innovation is not a solitary venture. Commercialisation of innovation coming out of such an approach is a necessary part of a sustainable response. The key insight is to align commercial incentives with public health priorities. Service providers, local innovators, and patients in routine settings also becoming partners in a digital-health and AI-for-Health learning enterprise rather than just passive recipients or 'consumers'. Their engagement, and their sense of control and ownership, increasing the chance that solutions are appropriate and sustained after any initial development of a piece of tech or a 'pilot' stage.

A sustainable ground-up design-driven process is dependent on the availability of data to local on-the-ground innovators, which means strengthened equitable data-sharing infrastructures to underly the evaluation and implementation of solutions. Without data for AI models to learn from, there can be no AI. This means improving health data in LMIC hospitals in terms of skills and the organisation of people to meaningfully use such data, and health systems that are continuously learning and improving. This will need strategies to strengthen human capital across a range of areas in local innovation, implementation-science, and in health services. To build a global community of practice around digital health and AI-for-health.

The global health outlook has been severely tested by the COVID-19 pandemic. The risk to public health of being inadequately prepared for future health crises is high. Adoption of new innovations in care is as urgent as ever.