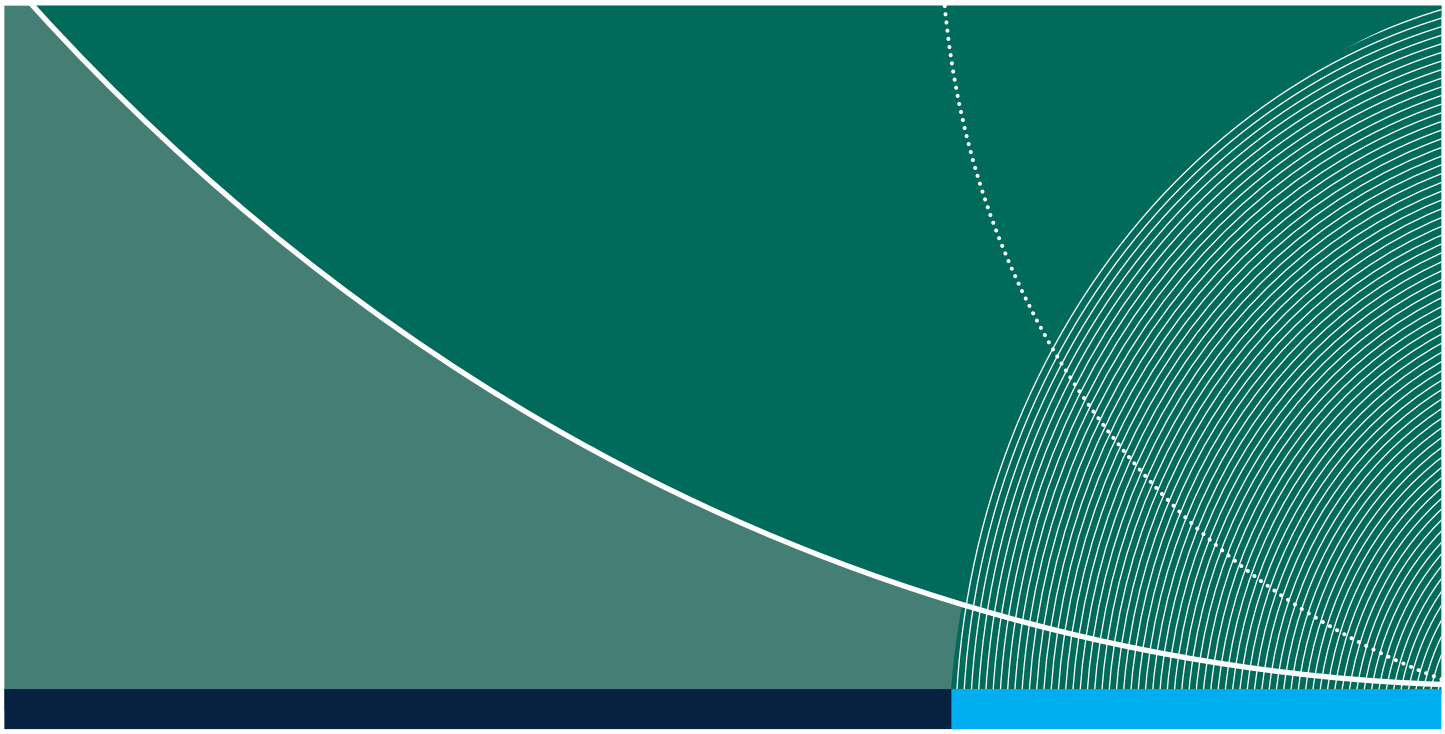

Enabling Health Technology in Emerging Markets

A briefing paper from the International Finance Corporation (IFC) Health Technology Think Tank discussion at the 2019 Global Private Healthcare Conference

DECEMBER 2019

WRITTEN BY:

The Economist INTELLIGENCE UNIT

IFC International Finance Corporation WORLD BANK GROUP

Creating Markets, Creating Opportunities

IFC's Global Private Healthcare Conference took place in March 2019, with a primary aim to spark discussion and drive action around the private health sector and its role in meeting critical challenges in emerging markets. The theme of the 2019 conference was *Disrupting the Present, Building the Future—Embracing Innovation to Deliver Results*. Alongside this conference, invited thought leaders, healthcare operators and service providers, government representatives, entrepreneurs, innovators and investors gathered for a think tank session to discuss some of the most pressing challenges, trends and opportunities related to health technology and data in emerging markets. This briefing paper reflects key themes and important points from the discussion that took place, and leverages additional insights, research, and analysis to explore the potential of health technologies in emerging markets.

WRITTEN BY

This briefing paper was written by Amanda Stucke, with guidance from Sook Chen Lee, both of The Economist Intelligence Unit (EIU) Healthcare team. It was written based on the expert opinions from participants of the think tank session, (in which the EIU had input on the themes being discussed, were in attendance, and engaged in the discussion) and additional desk research.

ABOUT IFC

IFC—a sister organization of the World Bank and member of the World Bank Group—is the largest global development institution focused on the private sector in emerging markets. We work with more than 2,000 businesses worldwide, using our capital, expertise, and influence to create markets and opportunities where they are needed most. In fiscal year 2019, we delivered more than $19 billion in long-term financing for developing countries, leveraging the power of the private sector to end extreme poverty and boost shared prosperity. For more information, visit www.ifc.org.

ABOUT EIU

The Economist Intelligence Unit is the research and analysis division of The Economist Group, the sister company to The Economist newspaper. Created in 1946, the EIU have over 70 years' experience in helping businesses, financial firms and governments to navigate the ever-changing global landscape.

DISCLAIMER

The findings, interpretations, views and conclusions expressed herein are those of the author and do not necessarily reflect the views of the Executive Directors of the International Finance Corporation (IFC) or of the World Bank or the governments they represent. While IFC believes that the information provided is accurate, the information is provided on a strictly "as-is" basis, without assurance or representation of any kind. IFC may not require all or any of the described practices in its own investments, and in its sole discretion may not agree to finance or assist companies or projects that adhere to those practices. Any such practices or proposed practices would be evaluated by IFC on a case-by-case basis with due regard for the particular circumstances of the project.

RIGHTS AND PERMISSIONS

Enabling health technology in emerging markets

More than half of the global population resides in emerging markets.[1] The resources required to provide healthcare in these and other low- and middle-income countries means that patients are often left with high out-of-pocket costs. While some emerging markets have made significant strides in expanding coverage and access, the World Health Organization (WHO) estimates about 12 percent of people globally spend more than 10 percent of their household income on healthcare, and about 100 million people per year are still being pushed into extreme poverty by financing their own care.[2] Although these challenges are also encountered in more developed markets, low- and middle-income countries must often overcome them with fewer resources and weaker infrastructure.

In addition to access and infrastructure challenges, emerging markets are facing notable demographic and economic shifts that lead to greater demands on health systems. An ageing population, the rise of non-communicable diseases, and a growing middle class seeking more quality and value from healthcare services are driving the need for health systems to evolve.[3,4] The United Nations estimates that, between 2010 and 2050, the combination of declining fertility and increasing longevity will raise the proportion of people over the age of 65 between two- and three-fold in Brazil, China, India, and Russia.[5] As a result, health spending is expected to double over the next decade and outpace overall economic growth in emerging markets.[6,7] Health spending in India and China particularly are expected to surpass all other emerging markets combined in the coming years.[8]

Technology has helped to address challenges related to access and efficiency in emerging markets across a number of industries, such as banking, retail, and hospitality. The health sector is no exception as technology has contributed to improved care quality, safety, life expectancy, treatment adherence, efficiency and collecting and processing actionable data.[9] Technologies like mobile health (mHealth) have created new avenues to access health information and care for vulnerable and hard-to-reach populations, while developments in point-of-care diagnostics have led to opportunities for earlier diagnosis and better outcomes.[10,11]

A distinct subset of health technologies that largely facilitates diagnosis, treatment, and monitoring is that of medical technologies (medtech). Medtech represents a US$400 billion global market, and while companies in developed countries have dominated this subsector in markets like Brazil, China, and India for the past decade or more, a growing domestic market among emerging economies is increasing competition.[12,13] The Economist Intelligence Unit (EIU)'s 2019 report on medtech in emerging markets highlights five key trends and barriers that are currently shaping the landscape, and are relevant to health technology more widely:[13]

1. ***Data and connectivity:*** There is growing expectation among consumers and providers that medtech will facilitate the collection of improved data, with technologies that connect over a common platform. A reported 76 percent of healthcare organizations surveyed across different emerging markets are planning to invest heavily in big data and analytic capacity, which enables ongoing development of artificial intelligence-enabled applications and devices. More widely within health technology, connected health initiatives and platforms are being pursued to help harmonize disparate sources of data in clinical and other environments, which can help to improve care.

2. ***Political influences:*** Shifting political landscapes can deeply affect industry and trade, and medtech is no exception. United States and China tariffs implemented in 2018 were expected to affect more than US$1.1 billion of medical imaging products in 2019. Beyond trade-related impacts in medtech, policy makers are looking to health technology more widely to help build more sustainable and effective health systems under increasing pressures to do so.

3. ***Emerging market growth:*** Although companies in developed markets and large multinational corporations have historically dominated the medtech supply in emerging economies, some domestic companies are more competitive in similar markets that face common barriers to implementation, cost, and use of medical devices and equipment. Emerging markets are also growing their footprint in other areas of health technology, such as wearables and other innovations, which best solve context-specific challenges.

4. ***Remote monitoring and telehealth:*** Platforms for adoption of tools aiming to boost patient access to care and health information are growing. In India, for example, telehealth has played an important role in expanding healthcare access and managing the effects of insufficient infrastructure for the estimated 63 percent of Indians who reside in rural areas.[14]

5. ***Increased interest from traditional technology companies:*** With global players launching new products and services in health, traditional health technology companies are facing new forms of competition. However, healthcare providers also see this as an opportunity to bring new perspectives on redesigning care models, streamlining workflows and supply chains, and implementing consumer-focused services.

This briefing paper discusses three key themes from the think tank discussion around creating an enabling environment for health technology in emerging markets, considering these trends:

- *Primary gaps and challenges in emerging market healthcare;*
- *The ability of health technology to address these gaps;*
- *Mechanisms for health technology to succeed and scale up.*

PRIMARY GAPS AND CHALLENGES IN EMERGING MARKET HEALTHCARE

As health sectors across emerging markets continue to expand, significant barriers exist that can threaten sustainable growth and optimal use of limited resources. Discussion participants raised a number of these interconnected challenges across five domains within the context of areas of opportunity for health technology: (1) capacity and access; (2) infrastructure and data; (3) health workforce; (4) patient education and awareness; and (5) quality and safety.

Capacity and access. Gaps in health infrastructure, lack of a qualified workforce, disparities between urban and rural care, and limited point-of-care resources were commonly cited as barriers to effective healthcare in the think tank discussion. Wider infrastructure challenges, such as poor road quality, limited transportation options, and unreliable energy and water supply, can amplify these challenges and inhibit access to care for vulnerable patients that need it most. In India, for example, more than two-thirds of the country's healthcare infrastructure was confined to the top 20 cities in 2014, leaving rural areas heavily underserved.[15] Telemedicine has shown promise in scaling up access to care, particularly in rural environments, but requires the right functional platforms and reliable connectivity to reap its benefits.

Digital infrastructure and data. High-quality, local data is critical to providing evidence-based care, implementing sound resource allocation, and reaching optimal health outcomes. However, even when data is readily available, common platforms and effective infrastructure to process the data are required. Governments and health systems are often tempted to push toward digitization without standards or a regulatory framework in place. This can prompt drawn-out litigation and ultimately limits the effectiveness of these efforts. The promise of provider-augmented artificial intelligence, for example, is something that many emerging markets are looking to explore, but as one think tank participant noted, "artificial intelligence won't work until you have good data, and good data won't work until you have good awareness."

The health workforce. Even in markets with more developed health infrastructure, growing and maintaining a qualified workforce is a common challenge. Physicians from emerging markets are often incentivized to practice in markets abroad, where they may achieve better pay and quality of life. In 2004, it was reported that three-quarters of physicians in Ghana and Zimbabwe emigrate within a few years of completing medical school; similarly, there were more Ethiopian-trained doctors practicing in Chicago than in all of Ethiopia.[16] For providers that work within emerging markets, high turnover makes it challenging to maintain adequate staffing and quality of care—one participant noted that it is not uncommon to have a 50 percent turnover rate among nurses. Digital technologies aiming to boost system efficiencies and provider workflows may help to streamline care and mitigate some of these workforce challenges.

Patient education and awareness. Patients are able to access more health information than ever before through increasing connectivity. This not only empowers patients to practice greater self-care, but has also shifted the role of providers as patients seek treatment with self-diagnoses in hand. Despite this, it is estimated that 85 percent of preventable, premature deaths from non-communicable diseases (NCDs) occur in low- and middle-income countries, partly due to lack of health literacy among patients.[17] Health technologies can present new avenues to ensure patients are able to participate more effectively in their own health through efforts to increase sources of valid health information.

Quality and safety. In 2015, 96 percent of the eight million deaths that could have been prevented by high-quality healthcare occurred in low- and middle-income countries.[18] This staggering number may be driven by gaps at the system, clinician, or patient level, and likely vary greatly across all three in emerging markets. This may include gaps in evidence, infrastructure, or monitoring of safety. Efforts to improve quality and safety can be supported by enabling technologies, including those designed to boost workforce capacity and skills, engage patients, and facilitate platforms for solving common challenges across different markets. One example of this is interoperable electronic health record systems, which can help improve quality of care and outcomes.

ADDRESSING THE GAPS: TECHNOLOGY AS A TOOL (NOT A SOLUTION)

Digital and technological interventions show promise in helping to address many of the barriers and challenges emerging market health systems face.[9] This is especially true in instances where people developing health technologies understand the context and complexities of the problem they aim to solve. Regardless of how sophisticated technology is, it tends to be more successful and more widely adopted when it is designed around augmenting user efficiency or capacity.[19] Discussion participants raised the importance of understanding the role of technology as a tool to support capacity and efficiency in the health sector as a critical basis for development.

When it comes to the workforce, well-implemented technologies may help to bridge training gaps, meet administrative and clinical capacity needs, and support clinical decision-making. In areas where there is heavy reliance on a highly skilled workforce, health technology like artificial intelligence or telemedicine can triage and centralize physician functions so that the most appropriate and effective care can be provided. Health systems are already looking to artificial intelligence to augment diagnostic capabilities and other functions in emerging and developed markets alike, with bodies like the U.S. Food and Drug Administration (FDA) developing new mechanisms to evaluate and regulate its use. This kind of technology can also be particularly helpful in remote areas where providing adequate access to care can be challenging.

Enabling patients

In addition to improving efficiencies and capacity, health technology can also help patients navigate health systems, facilitating better access to care that meets their needs. One participant noted that the greater availability of information online has empowered patients in India and Africa, for example, to gain greater visibility on care cost and quality. Additionally, some markets are seeking to address the underutilization of online payments for care, offering patients access to mobile payment gateways. Better internet literacy and improved technologies can be leveraged to boost awareness and bring care to people that have not traditionally interacted with the health system. The rollout of 5G networks may also provide advanced opportunities to enable health systems to expand the application of health technologies and use of health data where there are traditionally bandwidth limitations.

One way to ensure that patients are best equipped to get the care they need is to give them more ownership over their health data. Though simple in concept, this can be challenging to implement. One discussion participant mentioned growing up in a small town where patients would carry a notebook with them to each clinical visit. This proved to be an effective way to collate information across providers and keep the patient more aware of their health status through easy access to their health record. As more sophisticated technologies seek to achieve better

management of health information, it is valuable to consider the importance of bringing data to the source: the patient.

Through the use of mHealth tools, or tools using mobile technology, patients are able to monitor, track, and transmit health information in real time. This can drive more effective care through increased patient engagement and greater availability of localized data at the individual level.[10] More broadly, mHealth data, when leveraged at the policy level, can serve as real-world evidence to help decision makers more effectively allocate limited resources based on health behaviors and needs of the patients they serve. Technologies such as digital therapeutics or clinically-validated, software-based treatments may also augment existing treatment options to address the behavioral and health literacy aspects of successful care. Experts noted that possible applications of mHealth and how it is integrated into the health system is in its infancy.

The importance of local data and solutions

Emerging and developed markets alike face a number of common challenges, but root causes of these challenges can vary significantly between regions, countries, and perhaps more importantly, within different population segments at the local level. A study looking broadly at drivers of success for affordable innovations in emerging markets found that either having operational presence in the country or strong partnerships with local entities was critical due to this variability.[20] The same study found that simply re-selling standardized products from western markets is ineffective, as emerging markets tend to value innovations that are tailored to their specific needs.

When technology does not take into account the local context, it often highlights a gap between the priorities and perspectives of those that produce them and the end-users, and can affect the traction a technology may have in a given market.[20] Providers can often be an important resource to help bridge this gap. For example, rural providers in Peru prioritized innovations that helped to integrate community resources and address social and policy challenges, given that these were some of the greatest pain points in their communities.[21] Governments can also help to create greater understanding of local needs. In partnership with the Institute for Health Metrics and Evaluation in the United States, the government of India has leveraged state-level data on disease burden within India to guide subnational health planning and resources allocation.[22] Similarly, other companies have worked with governments across different markets to synthesize different data sets to help illuminate gaps and facilitate pragmatic solutions. These types of initiatives create opportunities to make health technology more useful in addressing needs across different populations.

However, technology does not need to be particularly complex or advanced to be effective; the definition of innovation includes finding novel ways of using existing materials. One participant described a recent visit to Kaiser Permanente's Innovation Center in the United States, where high-tech tools are being developed. When the participant asked Kaiser about the most important innovation they have created to date, they described a simple orange vest. More than 10 years ago, a quality forum at Kaiser South San Francisco prioritized reducing medication errors, and recommended implementing colorful vests for nurses during the medication administration process to make clear that they should not be interrupted. Over five to six months, the facility saw a 47 percent decrease in medication errors, simply due to fewer interruptions and distractions. Once the pilot program expanded, medication errors decreased across all units by an average of 20 percent.[23-25] Non-interruption protocols for medication administration have been widely implemented since and show that low-tech solutions can be an important contribution to improving patient safety and healthcare more broadly.[25]

MECHANISMS FOR HEALTH TECHNOLOGY TO SUCCEED AND SCALE UP

Emerging markets are playing a larger role in the health technology landscape, both as consumers to address the growing burden on health systems, and as producers. Taking an example from the medtech sector, India's approximately 800 medtech companies typically produce low-value consumables for the local market, while the country often imports more specialized products.[13] However, these companies are beginning to enter mid- and higher-end product segments, with expectations that this trend will continue to expand. Companies in China have already entered some of the most lucrative market segments, and currently represent four out of ten of the companies with the largest share in in-vitro diagnostics.[4,8] Under the Made in China 2025 plan, China set a target to domestically produce 50 percent of mid- and high-end medical devices used in hospitals by 2020, and for this to increase to 70 percent by 2025.[4,26] However, alongside these goals, companies in China and other markets are also seeking ways to drive down costs of new technologies to benefit other low- and middle-income countries.

Discussion participants noted three important areas for development for successful production and growth of health technologies in emerging markets: fostering stronger partnerships between the public and private sectors, defining business models that support innovation, and harmonizing requirements and platforms.

Bridging the public and private sectors to support health technology

Conflicting priorities between the public and private sectors can make meaningful collaboration challenging. However, successful partnerships have created opportunities to bring innovation and new technology to scale across different sectors. Development within the financial technology (fintech) sector, for example, has primarily been driven by private sector stakeholders, with governments playing a supporting role. On the other hand, government-led partnerships may address interoperability needs among a competitive market most effectively, where the government determines protocols to collect and store data. Whether driven by industry or governments, strong alignment can facilitate an enabling environment for technologies, including interoperability of the data that comes from and supports them.

Partnerships between the private and public sector may also boost opportunities to reach public sector goals for improving health outcomes.[27] For these goals to be achieved, stakeholders must share objectives beyond financial matters, valuing the learning and development that comes from these activities equally.[28] This is a fundamental goal of a public-private partnership, or a long-term contract between a private party and a government entity for providing a public asset or service. To promote high-value partnerships, an enabling legal and regulatory environment, appropriate infrastructure for technical capacity growth, and political will are critical.[29]

Throughout the health system, there are different mechanisms through which partnerships between the public and private sectors can improve a health system's ability to meet patient needs. In one participant's view, mandated health insurance may be a particularly strong vehicle, as it can help achieve the private sector's volume-related goals. In turn, health technology from the private sector can solve some of the most burdensome aspects of the industry for the government, such as administrative processes. In some cases, governments have also helped the private sector reach goals more effectively through innovation grants that fund domestic health technology.[29]

These programs can spur the development of contextually appropriate and effective technology within the market, versus relying on organic adoption.

However, in many cases, the government in an emerging market may not have the capacity to drive or support these kinds of initiatives. One participant discussed that, in many emerging markets, governments are not leading progress in areas like data privacy, interoperability, or quality standards, and are struggling to develop effective digital health policy and subsequent oversight of implementation. While regulation can be helpful in creating a level playing field and establishing clarity on how the private sector can operate, governments may impose requirements that disincentivize the private sector to participate, particularly as regulatory efforts may be viewed as placing a burden on providers. Also, where systems include large volumes of patients paying out-of-pocket, it becomes more challenging to centralize efforts to improve care and scale technologies. Without effective policy to incentivize interoperability of tools like electronic health records in both government and private healthcare sectors, the utility of this technology is diminished since it does not reach full potential if not interoperable.

Any mandate and regulation placed upon the private sector from a government must ensure that quality, safety, and privacy objectives are met, while still being able to accommodate different types of innovations.[29] This signals that a flexible, case-by-case strategy with strong shared mandates can foster the kind of innovation needed to transform healthcare. Regulatory 'sandboxes' are already in use in a number of emerging markets aiming to present controlled environments to test compliance with new regulations.[29] Additionally, opportunities for self-regulation may play a role, particularly with new technologies where the private sector must prioritize user trust and confidence.

Defining enabling business models

Within large, multinational corporations, emerging market segments are sometimes categorized as philanthropic due to low expected returns on investment. However, business models that consider the wider environment in which technologies are being deployed can often boost success, particularly when leveraging resources like community engagement, strategic partnerships, economies of scale and cross-subsidization.[28] According to the WHO, most middle-income countries will have the ability to finance universal coverage for their populations, including essential and affordable medical technology.[30] This may mean that firms need to shift to innovations and models that create high value at low cost, which differ from common developed market priorities of product novelty and disruptiveness.[15] There are three elements that underpin the success of this kind of value proposition: 1) efficiency gains at the healthcare systems level; 2) affordability and operations requirements at the provider level; and 3) providing a solution for an urgent need and addressing availability and affordability at the patient level.[15]

One participant raised electronic health records as a worthwhile example of why targeting each level of a value proposition is critical. In the United States, many incentives were structured to reward the developers of health information platforms. However, this created a disincentive to contribute to interoperability, because there was no business model that rewarded data sharing. If developers took into account the critical role of interoperability and aligned it to appropriate incentives, perhaps some of the commonly cited interoperability and portability barriers could have been mitigated.

Harmonizing requirements and platforms

Discussion participants identified the need for increased harmonization among requirements and platforms for electronic health records and other digital health tools in order to improve data interoperability. The International Telecommunications Union, for example, developed common standards that underpin the mobile telephony industry. In this sense, under-resourced governments may not need to be the primary driver of this harmonization; they could adopt standards developed or recommended by other stakeholders that may be best placed to drive the necessary processes to create them.

One such area where common standards and interoperability are further along in the health sector is among clinical research platforms.[31] Collaborators and researchers have recognized both efficiencies and cost savings by creating hubs for collective findings and information around the world. While more challenging with real-time clinical data, the processes used to create these networks may yield valuable learnings for health technologies. Additionally, health systems that have adopted interoperable electronic health record systems, though few and far between, recognize the opportunity to leapfrog past more developed markets, which may have legacy systems that hinder this kind of growth. Until interoperability is achieved, the opportunity to improve access and affordability with health data from electronic health records will be limited in emerging markets.

CONCLUSION

This briefing paper brings together relevant trends and challenges throughout health systems in emerging markets, explores opportunities for technology to address them, and discusses key mechanisms that enable health technologies to be successful. Developers of health technology can strengthen their value proposition by ensuring local evidence and context is considered, including addressing challenges in the workforce related to training gaps and ensuring care is rightly sized for the patient. Technology can play a unique role in activating patients to be more participatory in their own care, and help health systems reach new vulnerable patients. High-functioning partnerships between the public and private sector that enable innovation, while ensuring quality and safety, present a noteworthy opportunity across emerging markets to optimize resources. Important lessons can also be learned from other sectors, such as mobile telephony and fintech, about interoperability and creating functional networks that underpin successful technologies across sectors. Ultimately, there is a growing opportunity for technology to support better health outcomes and ensure that more people in emerging markets have access to care and reduce costs through increasing efficiencies in health systems.

ENDNOTES

1. EIU. Data Tool. London: Economist Intelligence Unit, 2019.
2. WHO. Universal Health Coverage (UHC). World Health Organization, 24 Jan 2019. Accessible from: https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)
3. Bollyky TJ, Templin T, Cohen M, Dieleman JL. Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared. Health Aff. 2017 Nov 1;36(11):1866-75.
4. Kharas H. The unprecedented expansion of the global middle class: an update. Global Economy and Development Working Paper 100. Washington, DC: Brookings Institution. Available from: https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf
5. The Emerging Markets Symposium. Ageing in emerging markets. Oxford: Green Templetion College, 2015. Available from: https://www.ifa-fiv.org/wp-content/uploads/2015/07/Ageing-in-Emerging-Markets-2015-Report.pdf
6. Jakovljevic MB. BRIC's growing share of global health spending and their diverging pathways. Front Public Health. 2015 May 6;3:135.
7. Berrisford C, Lopez S. Longer term investments: Emerging market healthcare. Chief Investment Office Americas, Wealth Management, UBS. 26 Apr 2018. Accessible from: https://www.ubs.com/content/dam/WealthManagementAmericas/documents/emerging-market-healthcare.pdf
8. Jakovljevic M, Getzen TE. Growth of global health spending share in low and middle income countries. Front Pharmacol. 2016.
9. Wamble DE, Ciarametaro M, Dubois R. The Effect of Medical Technology Innovations on Patient Outcomes, 1990-2015: Results of a Physician Survey. J Manag Care Spec Pharm. 2019 Jan;25(1):66-71.
10. Steinhubl SR, Muse ED, Topol EJ. The emerging field of mobile health. Sci Transl Med. 2015 Apr 15;7(283):283rv3-.
11. Vashist S. Point-of-care diagnostics: Recent advances and trends. Biosensors. 2017: 7(4), 62.
12. Herman P, Horowitz J, Torsekar M. Competitive conditions affecting U.S. exports of medical technology to key emerging markets. Economics working paper series (2018-08-A). Washington, DC: U.S. International Trade Commission, 2018. Available from: https://www.usitc.gov/publications/332/working_papers/competitiveness_of_medtech_exports.pdf
13. The Economist Intelligence Unit. MedTech in emerging markets 2019: A market access trend report in emerging markets. London: Economist Intelligence Unit, 2019. Available from: https://www.dii- healthcare.com/fileadmin/user_upload/upload_misc/eiu_whitepaper/2019_MedTech_Emerging_Markets_Access_2019.pdf
14. Mathur P, Srivastava S, Lalchandani A, Mehta JL. Evolving role of telemedicine in health care delivery in India. J Prim Health Care. 2017;7(260):2167-1079.
15. Winterhalter S, Zeschky MB, Neumann L, Gassmann O. Business models for frugal innovation in emerging markets: The case of the medical device and laboratory equipment industry. Technovation. 2017;66-67.
16. Africa's health-care brain drain. The New York Times (National Edition). 13 Aug 2004: A00020. Available from: https://www.nytimes.com/2004/08/13/opinion/africa-s-health-care-brain-drain.html
17. WHO. Factsheets: noncommunicable diseases. Geneva: World Health Organization, 1 Jun 2018. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
18. Alkrie BC, Peters AW, Shrime MG, Meara JG. The economic consequences of mortality amenable to high-quality health care in low- and middle-income countries. Health Aff. 2018;37(6).
19. Mathews SC, McShea MJ, Hanley CL, Ravitz A, Labrique AB, Cohen AB. Digital health: a path to validation. NPJ Digit Med. 2019 May 13;2(1):38.
20. Ernst H, Kahle HN, Dubiel A, Prabhu J, Subramaniam M. The antecedents and consequences of affordable value innovations for emerging markets. J Prod Innov Manag. 2015 Jan;32(1):65-79.
21. Huaynate CF, Travezaño MJ, Correa M, Malpartida HM, Oberhelman R, Murphy LL, Paz-Soldan VA. Diagnostics barriers and innovations in rural areas: insights from junior medical doctors on the frontlines of rural care in Peru. BMC Health Serv Res. 2015 Jun;15(1):454.
22. Indian Council of Medical Research, Public Health Foundation of India, Institute for Health Metrics and Evaluation. India: Health of the nation's states – the India state-level disease burden intiative. New Delhi, India. 2017. Available from: https://www.healthdata.org/sites/default/files/files/policy_report/2017/India_Health_of_the_Nation%27s_States_Report_2017.pdf
23. Anthony K, Wiencek C, Bauer C, Daly B, Anthony MK. No interruptions please: Impact of a no interruption zone on medication safety in intensive care units. Crit Care Nurse. 2010;30(3).
24. Nurse.com. Keep Away. Nurse.com, 14 Jul 2008. Accessible from: https://www.nurse.com/blog/2008/07/14/keep-away
25. Moore J. Low-tech safety. Health Leaders Magazine, 4 Feb 2009. Accessible from: http://www.hcpro.com/HOM-227686-3749/LowTech-Safety.html
26. With focus on new regulatory rules: The Chinese medtech sector. Switzerland Global Enterprise, 2017. Available from: http://www.iberchina.org/files/2017/chinese_medtech_sector.pdf
27. Angeli F, Jaiswal AK. Business model innovation for inclusive health care delivery at the bottom of the pyramid. Organization & Environment. 2016 Dec;29(4):486-507.

28. Odero P, Sable S, Cook J, Udayakumar K. Healthcare innovation in east Africa: Navigating the ecosystem. Center for the Advancement of Social Entrepreneurship, Duke University. Durham, North Carolina. 2016. Available From: https://centers.fuqua.duke.edu/case/wp-content/uploads/sites/7/2017/09/east_africa_landscape_report_-_sead.pdf

29. Walden I, Christou TA. A Report for the World Bank on Legal and Regulatory Implications of Disruptive Technologies in Emerging Market Economies. London: Queen Mary University of London, 2018. Available from: https://www.researchgate.net/profile/Theodora_Christou/publication/327013729_Legal_and_Regulatory_Implications_of_Disruptive_Technologies_in_Emerging_Market_Economies/links/5b72a956a6fdcc87df7983e4/Legal-and-Regulatory-Implications-of-Disruptive-Technologies-in-Emerging-Market-Economies.pdf

30. WHO. New perspectives on global health spending for universal health coverage. Geneva: World Health Organization, 2018. Available from: https://apps.who.int/iris/bitstream/handle/10665/259632/WHO-HIS-HGF-HFWorkingPaper-17.10-eng.pdf?sequence=1

31. Harding K. Global health innovation technology models. Nanobiomedicine. 2016 Jan 1;3(Godište 2016):3-7.

SESSION PARTICIPANTS

The following participants dedicated their valuable time and insights to the Health Technology Think Tank session at the 2019 Global Private Healthcare Conference:

- Olapeju Adenusi, General Manager, Lagos State Health Insurance Scheme Management Agency (Nigeria)
- Waqas Ahmed, Founder and CEO, American Telephysicians (USA)
- Eren Bali, Founder and CEO, Carbon Health (USA)
- Matthew Guilford, Chief Growth Officer, Telenor Health (Bangladesh)
- Eyal Gura, Co-Founder and CEO, Zebra Medical Vision (Israel)
- Hendri Hanekom, Group Strategy and Innovation Executive, Intercare Group (South Africa)
- Liesel Hargens, Director of Emerging Markets Innovation, Medtronic (USA)
- Seemant Jauhari, Partner, HealthXCapital (Singapore)
- Joel Krikston, Managing Director, Merck Global Health Innovation Fund (USA)
- Javier Lozano, Co-Founder and CEO, Clínicas del Azúcar (Mexico)
- Yousef Mazhar, Managing Partner, Transforming Equity and Access in Medtech (TEAMFund) (USA)
- Felix Olale, Parter, LeapFrog Investments (USA)
- Gaurav Rekhi, Managing Director and CEO, Manipal Hospitals (Malaysia)
- Vishal Sharma, Associate Vice President for Corporate Investment and Strategy, NMC Healthcare (UAE)
- Viren Shetty, Executive Director and Group COO, Narayana Health (India)
- Kannan Subramaniam, Medical Lead for NCD Strategy for Emerging Nations, Upjohn - a Pfizer division (Australia)
- Frank Zhong, CTO, BGI Research (USA)

IFC REPRESENTATIVES

- Ann Casanova, Global Health and Education Consultant (USA)
- Atul Mehta, Senior Director of Telecom, Media & Tech, Venture Investing and Funds (USA)
- Biju Mohandas, Head of Health & Education Investment team in Sub Saharan Africa; Global Sector Lead for Medical Devices (Kenya)
- Monique Mrazek, Senior Investment Officer & Health Tech Lead, IFC Venture Capital (USA)

ECONOMIST INTELLIGENCE UNIT (EIU) REPRESENTATIVES

- Chrissy Bishop, Senior Analyst, EIU Healthcare (UK)
- Amanda Stucke, Health Policy Associate, EIU Healthcare (USA)

For more information about IFC's investments in health please contact:

Elena Sterlin
Global Manager, Health and Education
Email: ESterlin@ifc.org
Washington, D.C., USA
www.ifc.org/education
www.ifc.org/health

Chris McCahan
Global Lead, Health Care
Email: CMcCahan@ifc.org
Washington, D.C., USA
www.ifc.org/health

2121 Pennsylvania Ave. NW
Washington, DC 20433