The Use of Health Technology in Emerging Markets: China Telemedicine Market Analysis

by

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Abstract

The global demand for health technology solutions has increased due to COVID-19. Phone or video consultations and remote patient monitoring allow for the continuation of vital healthcare services without the risk of virus transmission. This has influenced policy in various markets. On the other hand, developing economies confront unique issues in terms of cost and accessibility, with substantial parts of the population lacking access to physical and even digital infrastructure critical to healthcare. This study examines trends and difficulties in emerging market health systems and Telemedicine as an option. There will be a review and analysis of literature, survey data, and research from public health organizations, government resources, and telehealth platforms. With its enormous population, increasing health expenditures, and quick economic expansion, China has the potential to replace the United States and Japan as the leading telemedicine market and will be the focus of a case study to support and highlight significant results from the literature review. The current state of China's telehealth market and the business case for expanding its activities will be examined. Various studies, white papers, and webinar conversations will be used as sources of knowledge for this essay.
Table of Contents

1.0 Introduction .................................................................................................................................................. 1

2.0 World Telehealth Initiatives .......................................................................................................................... 4

3.0 Institutional Voids .......................................................................................................................................... 6

4.0 Institutional Voids in Emerging Market Healthcare ..................................................................................... 9

4.1 Population and Access ................................................................................................................................... 9

4.2 Infrastructure ................................................................................................................................................. 10

4.3 Health Workforce ......................................................................................................................................... 11

4.4 Education and Awareness .............................................................................................................................. 12

4.5 Supply Chain ................................................................................................................................................. 12

4.6 Political Unrest ............................................................................................................................................... 13

4.7 Telemedicine .................................................................................................................................................. 13

4.8 Critical Considerations for Global Setup ..................................................................................................... 14

5.0 Public Health Relevance .................................................................................................................................. 17

6.0 China Telemedicine Market Overview ........................................................................................................ 18

6.1 Market Growth Drivers ................................................................................................................................... 20

6.2 Access Disparities .......................................................................................................................................... 21

6.3 Clinical Workflow .......................................................................................................................................... 22

6.4 Additional Market Drivers in China’s Telehealth Market ........................................................................... 23

6.4.1 Technological Advancements .................................................................................................................. 23

6.4.2 Increased Healthcare Spending ............................................................................................................... 24

6.4.3 Demographic Changes .............................................................................................................................. 24
6.4.4 Skewed Distribution of Medical Resources ...................................................... 25
6.5 Government Initiatives .......................................................................................... 26
6.6 China Telemedicine Market Growth Restraints ..................................................... 26
  6.6.1 The Cost of Remote Consultation .................................................................. 27
  6.6.2 Strict Guidelines Against Personal Information Protection ......................... 27
7.0 Implementation of Telemedicine in China: West China Hospital of Sichuan University .................................................................................................................................. 28
  7.1 Collaborations between WCH and other hospitals ............................................ 29
8.0 Conclusion .............................................................................................................. 32
9.0 Opportunities and Recommendation .................................................................... 33
Appendix A Emerging Markets Sector Breakdown ..................................................... 35
Appendix B China Telemedicine Market Use Segmentation ....................................... 36
Appendix C Telemedicine Competitive Landscape in China ...................................... 37
Appendix D APAC Telemedicine Market by Country ................................................. 38
Appendix E Opinion on the Usage of Telemedicine in China in 2018 ......................... 39
Appendix F Competitor Profile .................................................................................. 40
Appendix G Country Classification .......................................................................... 42
Bibliography ............................................................................................................... 43
List of Tables

Appendix Table 1 ............................................................................................................................................. 42
List of Figures

Figure 1 Integration pathway of telehealth technology with partner organizations (World Telehealth Initiative) .................................................................................................................. 4

Figure 2 Telemedicine Growth in China (2018 Asia Briefing) ........................................ 18

Figure 3 China Telemedicine Market .................................................................................. 20

Figure 4 CAGR of telemedicine in China (Med device online.) ........................................ 22

Appendix Figure 1 (MSCI Emerging Markets) ................................................................ 35

Appendix Figure 2 ............................................................................................................. 36

Appendix Figure 3 ............................................................................................................. 37

Appendix Figure 4 (The Brainy Insights) .......................................................................... 38

Appendix Figure 5 (Statista) ............................................................................................ 39

Appendix Figure 6 ............................................................................................................. 40

Appendix Figure 7 ............................................................................................................. 41
1.0 Introduction

COVID-19 has wreaked havoc on health systems and economies in recent months (Jensen et al., 2021). COVID-19 has exposed the healthcare limits that emerging countries face, from a lack of hospital beds and medical equipment to severe deficiencies in national surveillance systems, supply chains, and laboratory capacity. However, there are significant distinctions between the parallels in our collective predicament: what has become increasingly apparent is the severely unequal distribution of the pandemic's health, social, and economic dangers (Jensen et al., 2021). As consumers and providers explored safer ways to access and deliver healthcare, telehealth adoption exploded. Although the phrase "emerging market" is vaguely defined, countries that fit into this category, regardless of size, are usually considered emerging due to their progress and reforms. As a result, China is grouped with relatively smaller economies with limited resources, such as Chile (Emerging Market Economy (EME), n.d.). Both China and Chile fall under this category since they have begun to open up their markets and "emerge" onto the global stage after embarking on economic development and reform plans. Emerging markets are classified as transitional, indicating they are transitioning from a closed to an open market economy while establishing systemic responsibility. The former Soviet Union and Eastern bloc countries are two examples (Emerging Market Economy (EME), n.d.). Emerging markets are home to more than half of the world’s population (Muller, 2018).

Patients in these and other low- and middle-income nations face substantial out-of-pocket payments due to the resources required to deliver healthcare. Although some developing economies have made strides in expanding access, the World Health Organization (WHO) estimates that about 12% of people spend more than 10% of their household income on healthcare.
and that about 100 million people are still pushed into extreme poverty each year as a result of the cost of their care' (Universal Health Coverage (UHC), 2021). Even though these issues also exist in more established economies, low-income countries have no option but to tackle them with even fewer resources. As a result, the temptation exists to incorporate Western technology into health systems unfamiliar with Western health care techniques. Telemedicine could undermine the well-being of those countries if it is not based on the historical foundations of each country's current health system. And until we understand each country's and healthcare practitioners' technology and cultural readiness, a lot of effort can be wasted. Lack of access, lack of openness regarding service costs, and poor-quality care are global healthcare challenges. Digital resources are now at everyone's fingertips, thanks to the Internet and the fast-rising availability of cellphones, with 85 percent of the world's population having access to commercial wireless signals (WHO Global Observatory for eHealth, 2011). Furthermore, widespread access to mobile and institutional wireless can significantly improve Telemedicine in emerging nations.

In underdeveloped countries, health technology, particularly telehealth, offers enormous potential. It can help with logistical issues, public health system support, and connecting healthcare personnel to worldwide networks. Furthermore, Telemedicine programs can address long-standing concerns with quality treatment by providing a cost-effective and dependable option.

The development of mobile health initiatives and solid country-wide infrastructure to create Telemedicine in resource-constrained rural areas are two areas where Telemedicine in emerging markets could improve ("Telemedicine in Developing Countries," 2020). Nonetheless, health technology can significantly impact many healthcare elements in underdeveloped countries. When properly implemented, health technology has the potential to assist developing countries in catching up to their developed counterparts in terms of successful health care delivery. Local
practitioners in Middle Eastern regions, such as Pakistan, may be able to provide the finest advice to their patients without having to send them from tiny towns to huge urban areas (Edworthy, 2001). Outposts in the highlands of Papua New Guinea may be able to replace their 1970s radio communications with internet connectivity for a small fee (Edworthy, 2001). Trainees from the United Kingdom, Canada, and the United States may discover fantastic possibilities to gain experience in Bangladesh, Guatemala, or Nepal while working with mentors from their home universities to achieve their learning objectives (Edworthy, 2001). These trainees can work with local students to build long-term relationships, paving the path for a more equitable distribution of information and medical treatment around the globe.

This essay aims to educate the reader and examine the major concepts behind creating a conducive environment for health technology in emerging markets, particularly Telemedicine. It will also look at the potential of Telemedicine in emerging countries, with a focus on China, including identifying gaps and hurdles in emerging economies and the possibility of health technology (health-tech) to bridge these gaps.
2.0 World Telehealth Initiatives

There is a common misperception that Telemedicine is exclusively useful in hospitals. Telemedicine, however, can also be helpful in public health organizations; for example, it allows Doctors Without Borders/Médecins Sans Frontières (MSF) employees in distant locations to communicate with professionals worldwide (Telemedicine on the Front Lines, 2017.) Furthermore, by combining telehealth technology with physician experience and cooperating with existing global health organizations, efforts like World Telehealth Initiatives (WTI) have an unprecedented opportunity to provide long-term healthcare to the world's most vulnerable people (World Telehealth Initiative, n.d.) WTI is uniquely positioned to improve global healthcare by partnering with companies like Teladoc Health, a prominent worldwide telemedicine and virtual health provider. Furthermore, it is socially responsible for employing technology to advance healthcare in areas most needed. With a demonstrated value in wealthy countries, getting the technology to the world's poorest countries is critical, where the requirements are significantly greater.

Figure 1 Integration pathway of telehealth technology with partner organizations (World Telehealth Initiative)
A program in Malawi, East Africa, demonstrates the importance of WTI; a technology in a fistula care clinic in Malawi, supported by Baylor College of Medicine specialists, allows a novice practitioner on-site to confer with her mentors on diverse cases regularly. Specialists can observe and guide surgical procedures (Locations, n.d.); they can also speak with patients directly to assess their condition and seek necessary diagnostic tests or develop a treatment plan. When emergencies necessitated her supervision, the on-site physician had also streamed into the device from her home at night. Many women's lives have already been changed due to successful operations and care provided by the WTI program. Due to the initial program's success, WTI has opened a second location in Lilongwe, Malawi's capital, at the "Area 25" Maternal/Child hospital. Surgical mentoring and clinical consultations will be provided as requested by local practitioners (Locations, n.d.).
3.0 Institutional Voids

Several processes, including conducting business in emerging markets, are significantly distinct from mature markets. For instance, markets that have not yet reached maturity frequently lack certain institutions that facilitate more efficient trade. Institutional voids refer to the absence or malfunction of these institutions. Compared to developed countries, developing/emerging countries suffer from a disproportionate number of these holes (Khanna & Palepu, 2010). Institutional voids are defined as the 'lack or underdevelopment of specialized intermediates such as database suppliers, quality certification organizations, regulatory corporations, and control enforcement mechanisms' (Khanna & Palepu, 2010).

![Figure 2 Comparison of institutional dimensions across different regions (Harvard Business Review)](image-url)
When we consider how we approach healthcare in the United States, we usually ask about for a competent doctor, relying on reviews and references. Regardless of the approach taken to choosing a primary care provider (PCP), residents of the United States of America are protected by a range of institutional mechanisms that ensure the quality of doctors and hospitals. This demonstrates that the doctor was not just a qualified professional but also an ethical individual. There are lists of the top doctors in the United States produced regularly, commissioned by various U.S. governments, a veritable cornucopia of diverse ratings.

Regrettably, the reverse problem exists in other regions of the world. There is an alarming scarcity of information, which has inevitably caused a gap in ensuring health care quality. While there are exceptions, for the vast majority of people living in emerging economies, it is extremely difficult to access a doctor, let alone worry about the chance that the doctor has the proper credentials.

Emerging markets are experiencing significant demographic and economic transformations, putting increased strain on healthcare systems. The demand for health systems to develop is driven by an aging population, the prevalence of diseases, and expectations of quality healthcare services (Bollyky et al., 2017). According to the United Nations, between 2010 and 2050, Brazil, Russia, and China's (BRIC) proportion of people over 65 will rise due to increasing longevity (N.W. et al., 2014). Consequently, health spending in emerging nations is likely to increase (Jakovljevic & Getzen).

Despite these challenges, health technology ideas from developed markets may still thrive in an emerging market. However, navigating an environment where most economic activity is hidden from regulatory and institutional monitoring requires ingenuity and a thorough understanding of the local policies and culture (Hruby, 2019). Therefore, to determine if an emerging market is worth conducting business in, developed economy markets must ask specific
questions. Reliable answers to these questions can only be achieved by identifying patient-centered local experts with proven track records in their home markets. These questions include:

• How much impact does this institutional void affect business? - This is, of course, specific to the country.

• Are there ongoing plans to fix these institutional voids? – The voids may not always be voids, meaning health technology may thrive two to four years from now rather than forcing immediate success.

• Are there local health clinics and services that developed nations can partner with instead of trying to maintain central control? – Local subsidiaries can serve as intermediates between developed economy companies and the patients in emerging markets.

• Is there any way to embrace mobile technology to connect with patients?

Answering the above questions can pave the way for success in capitalizing on the increasing potential of health technology in emerging markets. A detailed grasp of institutional voids can equip firms with not only entry strategies but also long-term plans for navigating future uncertainty.
4.0 Institutional Voids in Emerging Market Healthcare

Healthcare information is often missing in emerging markets. When the complexities, ethical dimensions, and human dimensions of healthcare are peeled back, there is a basic elemental need to bring together people who have something to exchange; economists would refer to this as buyers and sellers coming together. The buyer is the patient in health care, while the doctor is the seller of medical services. Emerging markets lack the necessary institutions that ensure that health is reliable, easily accessible, credible, and reproducible. As the healthcare sector expands in emerging markets, institutional voids pose significant barriers to long-term growth. Five voids hinder the healthcare sector and prevent Physicians and health policymakers from expanding access to individuals that live there within the context of areas of opportunity for health technology: (1) population and access; (2) infrastructure (3) health workforce; (4) education and awareness; (5) supply chain and (6) political unrest (IFC, 2019)

4.1 Population and Access

Although a large population does not constitute an institutional void, a distinguishing feature of developing markets is their rapid growth rate. This is concerning since they already lag in several development and institutional competence areas, which a high population growth rate could exacerbate.
Which hospital its residents go to is determined by their financial situation; In most emerging markets, healthcare is a privately paid out-of-pocket expense, and where one receives care is determined by one's financial circumstances.

A typical path for low-income individuals seeking care is to visit a pharmacy and rely on the pharmacist's limited knowledge to diagnose medical disorders or see a doctor but be unable to purchase medication despite paying the consultation fee. As a result, access to reasonably high-quality healthcare is primarily reserved for the wealthy in these regions.

4.2 Infrastructure

High-quality, local data is critical to providing evidence-based care, implementing proper resource allocation, and reaching optimal health outcomes. However, common platforms and adequate infrastructure to process the data are required even when there is readily available information. Unfortunately, governments and health systems are often tempted to push toward digitization without standards or a regulatory framework. This can prompt drawn-out litigation and ultimately limits the effectiveness of these efforts. Other infrastructure issues can exacerbate these concerns, such as poor road quality, limited transportation options, and unstable energy and water supplies. 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.
4.3 Health Workforce

Many emerging markets, for example, are interested in learning more about supplier augmented artificial intelligence. On the other hand, its benefits cannot be realized without reliable data, and crucial data is useless without competent and trained personnel. Finding and keeping trained personnel is challenging even in more developed health infrastructure markets. Additionally, the limited resources available to higher education institutions in emerging nations cast doubt on the quality of health care workers they produce. Having a skilled workforce would imply facing its educational system's shortcomings. Reforming medical education admissions and training methods in low and middle-income countries is an arduous but potentially fruitful strategy for expanding the number of well-trained health workers (Tumlinson et al., 2019).

Physicians from underdeveloped nations are regularly persuaded to work in wealthy countries to increase their compensation and quality of life. According to statistics from 2004, after a few years of medical school, three-quarters of physicians in Ghana and Zimbabwe emigrate; similarly, more Ethiopian-trained doctors' practice in Chicago than in the entire country (Ighobor, 2016-2017). High turnover makes it difficult for providers working in emerging areas to maintain enough staffing and care quality. Nurses, for example, frequently experience a 50 percent turnover rate (Naicker et al., 2009). Digital technologies aimed at enhancing system efficiencies and provider processes could speed up care and lessen some of these issues.
4.4 Education and Awareness

Patients can access more health information thanks to increasing connectivity; however, low health literacy in low- and middle-income countries is the leading contributor to preventable deaths from non-communicable diseases (NCDs) (Non-Communicable Diseases, 2021.) In addition, a person with a low level of health literacy is more likely to make poor health decisions and is less likely to take preventative action against preventable diseases (Low Health Literacy in Developing Countries, 2021).

4.5 Supply Chain

Many low- and middle-income countries suffer from inadequate inventory management. In addition, certain medications used to treat specific disease states have unique storage needs; for example, vaccinations and insulin injections must be kept between 36F and 46F, which is difficult to achieve due to unstable electricity, reducing the drugs' efficacy.

Multinational pharmaceutical corporations may already be hesitant to conduct business in these markets, posing supply chain challenges. Supply chain constraints can jeopardize access to drugs and make medical devices and medication difficult to obtain. In addition, pharmaceuticals and medical supplies, and devices that have expired may be repackaged and sold as counterfeits.
4.6 Political Unrest

Shifting political landscapes can profoundly affect different industries, and health technology is no exception. For example, the United States and China tariffs implemented in 2018 were expected to affect more than US$1.1 billion of medical imaging products in 2019 (IFC, 2019). Moreover, corrupt political/social systems are a reality in an emerging market economy. Unstable and dangerous leadership practices can have significant economic effects on the country or region's businesses, resulting in lower-than-expected returns to shareholders. In addition, the intermingling of politics and business in which bribery and corruption may be involved can compromise a business’ reputation. Russia is an excellent example of how a lack of political stability can influence business; after a corruption crisis occurs, it is usually followed by a period of volatile currency as well as cause fluctuating exchange rates.

4.7 Telemedicine

Telemedicine transforms traditional medical practice by allowing people to obtain medical treatments over the Internet. As a result, Telemedicine creates a new type of relationship between smaller and larger hospitals and between patients and hospitals. Through teleconsultation, telediagnosis, and telemonitoring, patients and smaller hospitals can benefit from the capabilities of larger hospitals (Zhelong Wang, 2009). This is especially advantageous for patients in rural areas, where the healthcare system is less established than in urban areas. Furthermore, the rapid growth of telemedicine equipment and information communication technology has made it a new medical service model available to people worldwide. Regular hospital visits can be costly due to
travel expenditures, especially in rural locations. In addition, people prefer telehealth in this age of the Covid-19 pandemic because physical interactions put them at risk of contracting the virus. Fortunately, in-person medical visits can be reduced when telemedicine services are used via video conferencing or other virtual technologies.

Consequently, Telemedicine saves time and money for both the patient and the health care practitioner. Furthermore, its quick and favorable properties can help hospitals and clinics simplify their process. This innovative technology has the potential to make it easier to monitor discharged patients and manage their recovery.

4.8 Critical Considerations for Global Setup

There are several factors that can affect a provider’s capacity to establish a dominant market position. Regulatory acceptance is critical, but it varies from country to country. The most successful telemedicine groups start in countries with policies that support distant treatment and either adapt their services to local constraints in those markets or recruit local partners. Teladoc, for example, could not offer its full service to locals in Brazil due to regulatory limitations. Therefore, the business model initially implemented in Brazil was only to provide guidance until it partnered with Vivo in 2021(Teladoc Health Partners with Vivo to Improve Access to Quality Healthcare in Brazil - Teladoc Health, 2021).

As a result of the COVID-19 crisis, policymakers worldwide have indirectly been forced to ease the strict rules on Telemedicine. Video consultations are now covered at the same rate as in-person visits by Medicare in the U.S. (Telehealth Insurance Coverage, n.d.). In addition, the Food and Drug Administration (FDA) and the Center for Disease Control and Prevention (CDC)
have taken steps to promote the use of telehealth by providers and patients. A similar program was established in Australia, where public Medicare money is now available, effectively subsidizing consultations in many cases (Taylor et al., 2021). Germany has lifted its provider cap on the proportion of video consultations to in-person visits (Gerke et al., 2020), while China has extended its online consultation laws, including drug delivery and medical payment for online services.

A convincing business case for lower costs and better patient convenience has helped telehealth providers secure funding from payers, employers, and providers. One such partnership is between Doctor Care Anywhere and a large private insurance company in the United Kingdom, which provides enhanced clinician-supported triage that maximizes clinically relevant specialist outpatient consultation and hospitalization for the insurance company members. Consequently, these techniques are local and must be re-evaluated for each new country due to the wide range of healthcare systems and participants involved. If national contracts are hard to come by, it may make sense to begin at a more local level. There has been an increase in the use of telehealth in countries with capitated payment schemes like the United Kingdom or value-based care systems like the United States. Since the outbreak of COVID-19, more extensive public funding arrangements have been implemented. Also noteworthy is the significant increase in funding from the corporate sector, particularly in areas where providers are required to work online because of the COVID-19 infection risk and are willing to pay for these solutions.

If telehealth providers want to succeed, they need to analyze local market features to determine the best ways to enter the market and consider whether they should collaborate with traditional local providers, payers, technology vendors, physician associations or other key stakeholders. It is also a good idea to get involved in the local community, similar to the US
A company’s public image can be seriously harmed by data security and privacy compliance issues. In some cases, telehealth providers may be obliged to divulge patient information to third parties due to a lack of money or technical resources. When starting a new telehealth business or expanding into new countries, there are several aspects to consider, including intellectual property theft and privacy concerns.
5.0 Public Health Relevance

Telemedicine and other types of health technology have the potential to advance one of public health's essential services, which is to 'assure an effective system that enables equitable to the individual services and care necessary to maintain health' (CDC - 10 Essential Public Health Services - CSTLTS, 2021). In developed markets, internet access is taken for granted, and many have the impression that digital health is widespread. However, the Covid-19 pandemic demonstrated that neglecting our peers in low- and middle-income nations can negatively affect global health. Because Telemedicine and other health technologies have the potential to eliminate barriers such as socioeconomic status, solutions are required to assure excellent care in these markets and to close the digital divide.

Furthermore, to address today's public health inequities, local health departments must strengthen their capacity for community engagement; technologies can help improve population-level decision-making. For instance, computerized condition reporting enhances the accuracy and timeliness of data necessary to identify and track illness patterns in communities.
6.0 China Telemedicine Market Overview

China's healthcare industry is the world's second largest in terms of spending, with US$3.5 trillion in 2018. (Lau, 2021). As a result, the Chinese government has embraced Telemedicine as a crucial tool for bridging the gap between urban and rural medical resources. Despite China's rapid urbanization, there are significant medical resource gaps between rural and urban areas.

![China's Healthcare Market Size (2010-2020)](image)

Figure 2 Telemedicine Growth in China (2018 Asia Briefing)
In 1997, China's Jinwei Medical Network (JMN) was established to give remote consultations to patients with severe illnesses (Cui et al., 2020). As a result, Chinese medical institutions began to develop Telemedicine.

Telemedicine has finally reached its pinnacle after years of hard work labor- In 2017, 22 Chinese provinces-built telemedicine platforms that enable teleconsultation and remote medical treatment to 13,000 medical institutions (Cui et al., 2020). China's healthcare system is thriving with such a vast population, and communication is rapidly improving. However, while Telemedicine has been around since the 1980s, it is still relatively new in China. COVID-19 has highlighted the weaknesses in the country's healthcare delivery system, just as the 2003 SARS pandemic exposed the country's disease surveillance apparatus (Threats et al., 2004). Access to top-tier healthcare facilities is also a barrier, according to J.D.'s Health 2020 study (Health, 2020). As a result, the country requires a new way to immediately interact with physicians and specialists.

As rising healthcare expenditures, aging populations, access gaps, and chronic illnesses threaten established healthcare systems, many countries face considerable challenges. China is an excellent example of technological advancements and new mobile health and telemedicine potential. To get the most out of these advancements, China needs to adjust its operations and policies to encourage the expansion of the telemedicine sector and, in turn, reap the benefits of mobile technology. The expense of medical treatment in China is rising. Seven hundred thirty-one million people (54.3 percent of the total population) used the Internet in July 2016 ("How Web-Connected Is China?", 2019).

Furthermore, China accounted for about a fifth of the world's four billion internet users in 2018 ("How Web-Connected Is China?", 2019). On the other hand, China has a lower internet
penetration rate than other Asian countries, South Korea and Japan. Moreover, there is a disparity in medical care between urban and rural locations in China.

![China Telemedicine Market](image)

**Figure 3 China Telemedicine Market**

### 6.1 Market Growth Drivers

China’s government has begun to telegraph its goals for the next age of healthcare transformation, as it is charged with rebuilding and reorganizing its healthcare system. Fighting the pandemic has led China to reconsider its healthcare priorities, placing key health infrastructure, digital services, and public health promotion far higher on the priority list than they would have been if the infectious outbreak had not occurred.
6.2 Access Disparities

Telemedicine is ideal for rural locations with limited hospital access for two reasons. First, it does not place an undue burden on current hospitals to monitor more patients via Telemedicine; no additional employment or overtime hours are necessary. Instead, it's a question of having the proper infrastructure to receive medical data from remote patients. Second, the Chinese government saves money by using Telemedicine. The Chinese government has been adamant about ensuring that tier 2 and tier 3 hospitals have improved healthcare coverage (i.e., places that offer accessible healthcare for the middle and lower classes). Furthermore, installing the central stations/servers is less expensive than constructing a whole hospital.
6.3 Clinical Workflow

Advanced telehealth solutions can assist hospital staff in promptly capturing the cause for each patient's call or visit, prioritize care delivery, recommending the appropriate therapy, and locating further information resources. This is critical for hospitals in China, where wait times are so high that an illegal scalping system has arisen, in which perfectly healthy people register for medical appointments and then sell those appointments to others in need for three times the face value (Trinh & Zamanian, 2017.)
Health policy reform, particularly revisions to the legal guidelines for telehealth services, is a significant driver for the Chinese market (Trinh & Zamanian, 2017.). The leading cause for the lack of national fiber optic connections reaching the villages is the government’s continued refusal to recognize telehealth as a viable healthcare practice, resulting in a substantial backlog. China currently lacks defined telehealth rules, despite the widespread belief that it has little choice but to use telehealth to serve its 1.4 billion people (China Population 2022 - Worldometer, 2022).

6.4 Additional Market Drivers in China's Telehealth Market

6.4.1 Technological Advancements

The market for remote monitoring devices will continue to rise, and acceptance will increase as technologies become more efficient, effective, and safe to use. The growth of telehealth platforms will be aided by the increased availability of wireless data transmission networks. In nations where the wireless infrastructure required for telehealth is already in place, this market is likely to grow rapidly (Trinh & Zamanian, 2017.). In China, for example, 5G base station building is advancing, with 5G networks expected to encompass prefecture-level cities nationally by the end of 2022. (Tomas, 2022). This improved network coverage would ensure that internet connection would be available to everyone, China’s residents will no longer be concerned regardless of their financial situation. Developers of health technologies can rest confident that their apps will be accessible to patients in even the most distant places, as patients will not be required to go to a more urban area.
6.4.2 Increased Healthcare Spending

Due to economic growth, China's monitoring device market benefits from overall increased healthcare spending. Healthcare spending in China was only 4.3 percent of total GDP in 2008, but by 2014, it had climbed by more than 30 percent to 5.6 percent of total GDP (Report Recommends Deeper Healthcare Reforms in China, 2016). During the same period, global healthcare spending climbed by only 3%. According to research, without change, health spending in real terms will rise from 3.5 billion yuan in 2015 to 15.8 billion yuan in 2035, representing an annual increase of 8.4%. (Report Recommends Deeper Healthcare Reforms in China, 2016). In 2035, health spending would account for over 9% of GDP, up from 5.6 percent in 2015. Increased inpatient hospital services would account for more than 60% of the predicted rise in health spending (World Bank Group et al., 2016).

Health technologies including telemedicine frequently incorporate novel solutions and algorithms that are significantly less expensive than devices or medications or even a new hospital. Additionally, these technologies tend to focus on improving the inefficient health care delivery systems, rather than on the creation of novel medicines. Given that the alternative to digital technologies could be a more labor-intensive model of care, one might expect their adoption to take the place of expensive health-care professional time or hospital services.

6.4.3 Demographic Changes

China is well-known for its silver economy,’ with the population over 65 years old reaching 11.9 percent in 2018, according to data issued by the Chinese National Bureau of Statistics (NBS). Furthermore, due to the country's growing demographic transition, the number of people aged 65
and up is predicted to rise from 166 million in 2018 to 250 million by 2030. The growing aging of China's population puts enormous strain on younger generations to care for the elderly who require Telemedicine. Furthermore, if the frequency of cancer and end-stage kidney disease rises, the nation's most prevalent disease among its elderly population, so will healthcare spending, including patient monitoring equipment and gadgets.

6.4.4 Skewed Distribution of Medical Resources

China has a grossly unequal distribution of great medical resources. Chinese hospitals are classified according to the quality and education of its medical personnel, as well as the availability of medical research and/or clinical trials. Each hospital is classified into four tiers: Tier I, Tier II, Tier III, and private with Tier III hospitals being larger, in major cities and frequently connected with medical universities. Over 70% of level three/Tier III grade A hospitals are located in the eastern region, creating a massive potential market for Telemedicine in the central and western regions (Telemedicine in China - Market Research - Daxue Consulting, 2020). Physicians in Beijing and China can see as many as 200 patients per day, highlighting telemedicine providers' big market gap and potential (Wee, 2018).
6.5 Government Initiatives

China's government has been attempting to promote Telemedicine through incentive schemes since 2014 (Lacktman & Yan, 2015). The People's Republic of China's National Health and Family Planning Commission (NHFPC) has issued rules for telemedicine services in China. The NHFPC released the Technical Guidelines for 'Telemedicine Information System Construction' in January 2015, a 200-page blueprint that lays out a plan to create a national telemedicine service network (Lacktman & Yan, 2015). China has built the world's largest 5G high-speed mobile network, with 260 million connections (Adomaitis & Solsvik, 2020). The Chinese government's recent substantial 5G rollout will now reach even the most rural areas, boosting the usage of telehealth services even more. In March 2020, as the pandemic progressed, the National Health Commission (NHC) issued a guideline on health insurance services, stating that eligible "Internet + healthcare" services charges are covered under medical healthcare reimbursement (Yang et al., 2021).

6.6 China Telemedicine Market Growth Restraints

Despite this step forward, many issues and questions remain. It's unclear where telehealth and other internet-based healthcare services draw the line. There are discrepancies between the new telehealth standards and earlier government-commissioned programs covering telehealth use in senior care facilities and inconsistencies between the new telehealth guidelines and previous government-commissioned programs covering telehealth use in senior care facilities. This is good news for worldwide telehealth leaders, but it's still a work in progress. The Chinese market is still
undergoing frequent and significant changes in regulation, influenced by efforts to limit the country's rising healthcare budget and promote market transparency; for example, the government recently announced plans to lower surgical device pricing by 15 to 25% (lt, 2017).

Furthermore, the government directly controls the Chinese inconsistent healthcare tender system, which changes every two to four years. Therefore, should the Chinese government suddenly decide to give more tenders to a local low-cost producer, the average selling price of the entire market segment will decline accordingly (Trinh & Zamanian, 2017).

6.6.1 The Cost of Remote Consultation

Remote consultations are expensive, comparable to VIP outpatient treatment at a public tertiary hospital in a major city. Simultaneously, consultation is not covered by medical insurance, and the number of people who can afford the out-of-pocket expense is minimal. In addition, China lacks the high requirements for clarity, transmission speed, and accuracy of communication and display that are critical for the success of health technology which a simple video system cannot accomplish. In China, mature technologies are still scarce.

6.6.2 Strict Guidelines Against Personal Information Protection

Digital platform providers in healthcare are highly regulated, and China has many policies to protect personal information, which impacts the current operations of Telemedicine.
7.0 Implementation of Telemedicine in China: West China Hospital of Sichuan University

West Sichuan Hospital (WCH) is one of the largest hospitals in China, and Telemedicine was a critical tool for increasing efficiency during the pandemic. In China, particularly in western regions, the disparity in access to high-quality healthcare services between urban and rural communities persists. WCH acts as a pillar, providing remote medical education and consultations to smaller medical institutions to enhance access to high-quality medical care and professionals.

At the onset of the pandemic in 2020, Telemedicine enabled WCH providers to conduct teleconsultations, telerounds, teleradiology, and tele-intensive care unit, all of which resulted in screening, triage, and treatment for COVID-19 and other illnesses. In addition, to encourage adoption during the chaotic period, the government and hospital waived fees. Furthermore, WCH was recognized as an emergency response hospital, and a committee was formed to assist in the transition away from in-person consultations and towards using Huayitong. This telemedicine platform has been in place at WCH since 2015. To promote the platform's use and acceptance, the government and hospitals have agreed to forgo consultation fees for all users. 5G connectivity has been critical in establishing connectivity amongst hospitals designated to handle COVID-19 cases. 5G connectivity has been crucial in establishing connectivity amongst hospitals designated to handle COVID-19 cases. Additionally, WCH recruited technology specialists to schedule multiple appointments every day to enhance operational efficiency. WCH has begun providing virtual triage, consultations, education, rounds, CT scans, therapy, and follow-ups through Huayitong.
7.1 Collaborations between WCH and other hospitals

Additionally, the telemedicine infrastructure has assisted smaller hospitals via teleround, teleradiology, and tele-ICU in guiding less experienced physicians through caring for COVID-19 patients.

CT scans are critical in diagnosing individuals with COVID-19 using the WHO's case criteria and the National Health Commission's treatment guidelines. To make up for the rural areas' scarcity of skilled radiologists, WCH performs remote CT scans on patients with COVID-19.

The pandemic particularly hard-hit inpatient wards and intensive care units at WCH. Physicians working in these facilities were exposed to a high level of viruses, and patients required significant care to cure numerous organ dysfunction. Given the pandemic's urgency, newly graduated physicians and nurses with limited clinical experience were forced to care for patients infected with COVID-19. Thus, telemedicine technology can be employed to assist in physician education.

Since the pandemic began, the online platform has reduced in-person visits to WCH, lowering face-to-face contact between patients and clinicians and reducing virus transmission. Additionally, restricting in-person visits alleviated medical resource constraints, such as personal protective equipment, benefiting both patients and practitioners.

Globally, acceptance of Telemedicine as a safe, convenient, time-saving, labor-saving, and cost-saving means of healthcare delivery has expanded. Medical institutions have responded by increasing its availability, enabling more treatment to be offered to patients at a distance.

The key takeaways from WCH's implementation are a reminder that patients are critical to telehealth's effectiveness. As a result, hospital adoption strategies must place a premium on the usability of their platforms. This can be accomplished by involving and communicating with
patients throughout the development process of the platform, and additionally, despite their increased reliance on healthcare services, elderly patients are less likely to employ health technology. As a result, hospitals must ensure that support is provided to patients who lack technical skills to care for patients from all demographics successfully. Along with emphasizing user-friendliness and giving access to technical support, patients must be aware of online healthcare services. As a result, platform marketing must include methods that reach all age groups and demographics, not simply social media.

Additionally, it's easy to overlook that clinicians require training in utilizing an online platform. When a healthcare system considers using health technology, provisions must be established for sufficient training of the entire health workforce.

Finally, as Telemedicine gains popularity, it is critical to protect data security and privacy. Security, ownership, storage, and traceability of patient data must be considered, much more so for newly constructed online systems created swiftly in response to COVID-19's urgency. For example, when patients registered at WCH in Huayitong, they signed a consent form indicating that their data would be held at WCH and used exclusively for medical purposes. Additionally, engagement with regulatory agencies and the government continues to be critical. Since 2019, WCH's telemedicine services have been connected to and supervised by the provincial medical supervision system, enhancing data security.

Additionally, additional technological barriers to telemedicine utilization persist in WCH, including a lack of data synchronization and interoperability due to the heterogeneity of each hospital's EMR system. Therefore, generalizable strategies for safely interoperating EMR data and patient-reported outcomes require extensive investigation.
Global healthcare systems, particularly those in low- and middle-income nations, can be introduced to the breadth of health technology capabilities and can begin implementing and further developing these practices with this information.
8.0 Conclusion

Health technology developers must consider local institutional voids, including addressing workforce hurdles such as training shortfalls and providing appropriate patient care. Technology has the potential to engage patients in greater active participation in their care while also assisting new vulnerable patients in gaining access to health care. Public-private partnerships that promote creativity while ensuring the highest possible quality and safety present a significant potential to maximize resources across emerging markets. Aside from the potential to ensure positive health outcomes and guarantee that a more substantial number of individuals in emerging economies have access to high-quality care, there is significant potential for technology to help cut healthcare costs through increased health-system efficiencies.
9.0 Opportunities and Recommendation

As the government uses technology to allocate critical medical resources better, China's healthcare industry is drawing international telemedicine investors and service providers. Nearly all of China's 1.4 billion people have access to primary healthcare, and the country has spent almost a decade improving services. However, many Chinese people continue to have a deep mistrust of a healthcare system that is overburdened and underfunded (Meyers, 2018). According to experts, Chinese doctors see up to four times as many patients per day as their American counterparts. According to Beijing consulting firm iResearch, the majority earn less than $15,000 per year (Meyers, 2018). As a result, there are incentives to encourage additional testing or push specific treatments instead of delivering value-based care,

Leaders responded to mounting public criticism by overhauling the healthcare system in 2009 and investing $900 billion in its improvement. China increased basic insurance coverage to about 95% of the population but has failed to improve primary care and secure improved funding for public hospitals (Meng et al., 2019). This, however, does not address the underlying issue of availability and affordability. While Telemedicine offers a chance for healthcare to flourish, recent events have demonstrated that healthcare is a complex global issue. For global health improvement, advanced and emerging markets must collaborate. Telemedicine isn't enough; at the end of the day, having access to the proper treatment, diagnosis, hospital, and doctor are all essential parts of healthcare. It's not only about the app's accessibility; it's also about its quality.
After a new service was added to an online medical platform in China, embracing innovative technology and digital-first entrepreneurialism, Chinese patients will be able to seek a second opinion from U.S. medical organizations later this year. The project, which will be the first of its sort in mainland China, will be included on Shenzhen's Citizen Health Platform, an app run by the city government of this former boomtown in southern Guangdong province, noted for its early adoption of economic reforms many decades ago (Huifeng, 2015). Companies like Medix Global, which provides second views, necessary testing, and recovery monitoring for individual consumers, are capitalizing on a gap created by AliHealth, WeDoctor, and other Chinese health tech startups (Huifeng, 2015).
Appendix A Emerging Markets Sector Breakdown

Appendix Figure 1 (MSCI Emerging Markets)
Appendix B China Telemedicine Market Use Segmentation

Appendix Figure 2
Appendix C Telemedicine Competitive Landscape in China

<table>
<thead>
<tr>
<th></th>
<th>AllHealth 阿里健康</th>
<th>JDHealth 京东健康</th>
<th>微医微大夫</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ticker</strong></td>
<td>0241.HK</td>
<td>6618.HK</td>
<td>1833.HK</td>
</tr>
<tr>
<td><strong>Market Cap (USD)</strong></td>
<td>$31 Bn</td>
<td>$47 Bn</td>
<td>$14 Bn</td>
</tr>
<tr>
<td><strong>Founded</strong></td>
<td>2014</td>
<td>2013</td>
<td>2014</td>
</tr>
<tr>
<td><strong>2020 Revenue</strong></td>
<td>$2.4 Bn (+61.7% YoY)</td>
<td>$3.04 Bn (+79% YoY)</td>
<td>$1.07 Bn (+35.5% YoY)</td>
</tr>
<tr>
<td><strong>2020 Profit</strong></td>
<td>$55 Mn</td>
<td>($2.7 Bn)</td>
<td>($149 Mn)</td>
</tr>
<tr>
<td><strong>Users</strong></td>
<td>AAU: 65 Mn (+35% YoY)</td>
<td>AAU: 89.8 Mn (+60% YoY)</td>
<td>MAU: 72.6 Mn (+8.5% YoY)</td>
</tr>
<tr>
<td><strong>Strength</strong></td>
<td>E-commerce</td>
<td>E-commerce</td>
<td>Telemedicine</td>
</tr>
<tr>
<td><strong>Affiliation</strong></td>
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<td>JD.com</td>
<td>Ping An Insurance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tencent</td>
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</table>

Table is based on the disclosed numbers. AAU = annual active users, MAU = monthly active users, MPU = monthly paying users.

Sources: Health Advances analysis, company financial reports, HKEX

Appendix Figure 3
The APAC telemedicine market was valued at US$ 11,302.6 million in 2020 and is anticipated to grow at a CAGR of 19.1% to reach US$ 45,710 Mn by 2028. China makes up 27.1% of the APAC telemedicine market with a revenue of $3059 Mn in 2020 and is expected to obtain 28% of it by 2028 with a comparatively higher CAGR of 19.6%.
Appendix E Opinion on the Usage of Telemedicine in China in 2018

This statistic displays the Chinese survey results on global views on healthcare in 2018. According to data provided by Ipsos, about 59 percent of respondents from China reported that they hadn’t used Telemedicine, but we were willing to try. Number of respondents: 1,000. Age group: 16-64. The original question was phrased by the source as follows: "Telemedicine allows patients to consult doctors or specialists without having to visit them in person, using video, audio, and/or messaging applications on a computer, a tablet, or a smartphone. Which of the following best describes your thoughts on using Telemedicine?"
Appendix F Competitor Profile

5.B  JD Health

5.B.i.  Key Facts

<table>
<thead>
<tr>
<th>JD Health</th>
<th>Industry</th>
<th>Sub-industry</th>
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<tbody>
<tr>
<td>Sector</td>
<td>Healthcare Services</td>
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<tr>
<td>Founded</td>
<td>HQ location</td>
<td>Legal name</td>
</tr>
<tr>
<td>2013</td>
<td>Beijing, China</td>
<td>JD Health International Inc.</td>
</tr>
<tr>
<td>Website</td>
<td>Email</td>
<td>Employees</td>
</tr>
<tr>
<td><a href="https://ir.jdhealth.com">https://ir.jdhealth.com</a></td>
<td><a href="mailto:ir-jdhealth@jd.com">ir-jdhealth@jd.com</a></td>
<td>2500+</td>
</tr>
</tbody>
</table>

5.B.ii.  Business Description

As a subsidiary of JD Group, JD Health started to lay out strategies for the medical field as early as 2013 and came into the public’s perspective in 2019. The development direction and business philosophy of JD Health are different from that with traditional internet “platform model” in nature. Its current business scope covers medical and health e-commerce, internet-based medical service, intelligent hospital solutions, and consumer healthcare services. It has established various online and offline integrated businesses, including JD Pharmacy, JD Health Internet Hospital and Pharmacy Alliance, and through their connected supply chain, they connect with various industrial enterprises, healthcare institutions, offline pharmacies, medical aesthetic service providers, dental clinics and other upstream, midstream and downstream enterprises.

Leveraging JD.com’s core strength of supply chain, JD Health has become a leading pharmaceutical retailer in China, with extensive presence in B2C (Business-to-Consumer), B2B (Business-to-Business) and O2O (Online-to-Offline) services.

JD Health’s products and services cover the entire pharmaceutical industry chain, and the complete medical process, health management scenarios, and life cycle of users, aiming to build the most comprehensive “Internet + Healthcare” ecosystem in the industry.

- Retail pharmacy
  - Direct sales
  - Online marketplace and omnichannel initiative
- Online healthcare services
  - Online hospital services
  - Family doctor
  - Consumer healthcare service
  - Smart healthcare solutions

Appendix Figure 6
5.8.iii. Financial Overview

- Revenue Breakup, 2020
  - Service revenue from online marketplace, digital marketing and other services increased by $1.72 million in 2020.
  - The increase was due to an increase in digital marketing service fees, commission fees and platform usage fees.

- Revenue Growth (USD Mn)
  - Revenue increased by 77.8% from $17.2 million in 2019 to $30.4 million in 2020.
  - The increase in total revenue was primarily due to the increase in revenue from sales of pharmaceutical and healthcare products.

- Gross Profit and Net Profit/Loss (USD Mn)
  - Loss widened by 1673% in 2020 primarily due to a loss of $2.75 billion on the fair value change of convertible preferred shares in 2020.
  - General and administrative expenses increased by 322% in 2020, primarily attributable to an increase of employee benefits expenses primarily due to the increased expenses of share-based payment, and (ii) an increase of expenses conducted for the listing.

5.8.iv. Key Developments

- JD Health and Wuxi Mental Health Center of Jiangsu province jointly announced the launch of online psychiatric treatment service on JD Health's App.
  - The collaboration aims to improve the diagnosis and treatment of psychiatric diseases through online follow-up consultations, remote consultations, online training, online expert team consultations, and more, by combining JD Health's telemedicine and the Center's professional expertise.
- JD Health and Sanofi China will expand their existing collaboration to building general and digitalized health management solutions for patients with chronic diseases in China — Jun 2021.
- JD Health, the health-care unit of Chinese e-commerce giant JD.com, has raised $3.5 billion in a Hong Kong initial public offering.
- JD Health launched a "family doctor" service based on an "internet + healthcare" model.
  - The company has recruited about 300 full-time doctors working as the core team for the "family doctor" services.
- JD.com's 1-year-old health unicorn, JD Health, to get $830M from Hillhouse in its Series B financing.
- JD Health has raised US$1bn Series A funding to further expand its core business. It has sold a 14.5% stake to investors including CPEChina Fund, CICC Capital, and Baring Private Equity Asia, among others.

Appendix Figure 7
Appendix G Country Classification

Appendix Table 1

<table>
<thead>
<tr>
<th>Developed Markets</th>
<th>Emerging Markets</th>
<th>Frontier Markets</th>
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</thead>
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<td><strong>MSCI World Index</strong></td>
<td><strong>MSCI Emerging Markets Index</strong></td>
<td><strong>MSCI Frontier Markets Index</strong></td>
</tr>
<tr>
<td><strong>Americas</strong></td>
<td><strong>Europe, Middle East &amp; Africa</strong></td>
<td><strong>Asia</strong></td>
</tr>
<tr>
<td>Canada, United States</td>
<td>Australia, Hong Kong, Japan, New Zealand, Singapore</td>
<td>Brazil, Chile, Colombia, Mexico, Peru, Czech Republic, Egypt, Greece, Hungary, Poland, Qatar, Russia, South Africa, Turkey, United Arab Emirates, China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand</td>
</tr>
<tr>
<td><strong>Pacific</strong></td>
<td><strong>Europe, Middle East &amp; Africa</strong></td>
<td><strong>Africa</strong></td>
</tr>
<tr>
<td>Australia, Hong Kong, Japan, New Zealand, Singapore</td>
<td>Brazil, Chile, Colombia, Mexico, Peru, Czech Republic, Egypt, Greece, Hungary, Poland, Qatar, Russia, South Africa, Turkey, United Arab Emirates, China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand</td>
<td>Argentina, Croatia, Estonia, Lithuania, Kazakhstan, Romania, Serbia, Slovenia, Kenya, Mauritius, Morocco, Nigeria, Tunisia, WAEMU³</td>
</tr>
<tr>
<td><strong>Europe &amp; Middle East</strong></td>
<td><strong>Middle East &amp; Asia</strong></td>
<td><strong>Europe &amp; CIS</strong></td>
</tr>
<tr>
<td>Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom</td>
<td>Bahrain, Jordan, Kuwait, Lebanon, Oman, Bangladesh, Pakistan³, Sri Lanka, Vietnam</td>
<td>Egypt, Greece, Hungary, Poland, Qatar, Russia, South Africa, Turkey, United Arab Emirates, China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand</td>
</tr>
</tbody>
</table>

**MSCI Standalone Market Indexes**

- Saudi Arabia
- Jamaica Trinidad & Tobago
- Bosnia Herzegovina, Bulgaria, Ukraine
- Botswana, Ghana, Zimbabwe, Palestine

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1. The MSCI Standalone Market Indexes are not included in the MSCI Emerging Markets Index or MSCI Frontier Markets Index. However, these indexes use either the Emerging Markets or the Frontier Markets methodological criteria concerning size and liquidity.

2. The West African Economic and Monetary Union (WAEMU) consists of the following countries: Benin, Burkina Faso, Ivory Coast, Guinea-Bissau, Mali, Niger, Senegal and Togo. Currently the MSCI WAEMU Indexes include securities classified in Senegal, Ivory Coast and Burkina Faso.

3. Pakistan will be reclassified from Frontier Markets to Emerging Markets effective May, 2017.
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