



# Sustainable Healthcare Systems through Digital Technology

November 2018





## Knowledge Series No. 8

Joint Workshop on Sustainable Healthcare  
Systems through Digital Technology  
Seoul, Korea, 6-8 November 2018

Co-Organized by the

Digital Technology for Development Unit  
Sustainable Development and Climate Change Department  
Asian Development Bank

Korea Health Industry Development Institute (KHIDI)

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Improving health is one of the top priorities in most countries' development agenda and is also included in the United Nations' Sustainable Development Goals (SDGs).

However, the poor, particularly those in developing countries, often forego necessary health services. Thus they usually find themselves trapped in severe financial consequences resulting from ill health. Elderly people who do not have adequate pension or health insurance suffer more. The rapid aging population worsens the situation due to increasing health care spending.

Health sector development is one of the key operational priorities under **Strategy 2030**, which aims to enable the Asian Development Bank (ADB) to respond effectively to the region's changing needs. ADB will support its developing member countries to achieve better health for all, as well as other service delivery in social sectors for those in need.

South Korea, which ranks first for healthcare access among OECD countries, first in the world for healthcare quality, and fourth for having an efficient healthcare system, offers a good showcase for ADB's developing member-countries (DMCs).

As early as 1989, South Korea has already achieved Universal Health Coverage (UHC) within a short period of time after the National Health Insurance (NHI) scheme officially started in 1977. Its use of digital technologies has greatly contributed to making South Korea a role model in health sector development.

It is for this reason that the ADB partnered with the Korea Health Industry Development Institute (KHIDI) to co-organize a Joint Workshop on Sustainable Healthcare Systems through Digital Technology on 6-7 November 2018 in Seoul, South Korea. KHIDI is a government-affiliated institution under the Ministry of Health and Welfare, which performs professional and systematic support to develop domestic health industry and enhance health services.

Participants from the private and public health sector learned from Korean experiences on public health service, health professions education, and national health information system from the perspective of digital technologies.

## Highlights



### Participants

31 participants from governments, health sector organizations from developing countries in Asia, as well as ADB staff directly related to ADB's operations in the health sector



### Speakers

International speakers from the public and private sector on health sector development focusing on digital technologies



### Objectives

- Learn from South Korea's experiences and best practices on health sector development with focus on ICT;
- Discuss ways to tackle the challenges of health sector ICT development; and
- Identify the required public investment in health ICT infrastructure, enabling environment, coordination among stakeholders, and innovative financing mechanisms such as PPP

# Programme



Workshop participants with ADB and KHIDI staff (Photo credit: GDC Consulting)

DAY 1: PUBLIC HEALTH		
Date: 6 November 2018 • Venue: Grand Hyatt Seoul, South Korea		
Time		Speaker/Organisation
08:30 - 09:00 a.m.	Registration and arrival tea and coffee	
09:00 - 09:20 a.m.	Opening and Welcome Remarks <ul style="list-style-type: none"> <li>• Welcome Remarks</li> <li>• Congratulatory Remarks</li> </ul>	Yong-Kwon Yeom, KHIDI Patrick L. Osewe, Chief, Health Sector, ADB
09:20 - 09:30 a.m.	Group Photo & Coffee Break	
09:30 - 09:40 a.m.	Brief Workshop Overview & Introduction of Speakers	Hae-won Chung Team Leader, KHIDI
<b>Session 1: Setting the Context</b>		
09:40 - 10:00 a.m.	Key Challenges and Opportunities for Health Sector Development	Professor Wonseok "Joshua" Sir Graduate School of Public Health Yonsei University
10:00 - 10:20 a.m.	Emerging Strategies to Address Health Care Challenges in Asia and Pacific	Patrick L. Osewe Chief, Health Sector, ADB
<b>Session 2: Public Health System</b>		
10:40 - 11:00 a.m.	Health Financing for Universal Healthcare	Soonman Kwon Professor, School of Public Health Seoul National University
11:00 - 11:20 a.m.	Introduction of ADB Pipeline Projects: Sri Lanka	Manoj Dissanayake Medical Officer, Ministry of Health Nutrition & Indigenous Medicine, Sri Lanka

Time		Speaker/Organisation
11:20 - 12:00 noon	Questions and Open Discussion	
12:00 - 13:00 p.m.	Lunch	
<b>Session 3: Innovations for Public Health</b>		
13:00-13:20 p.m.	Different Technologies for Public Health: Focusing on Maternal and Child Health	Jungwon Rhu CEO, Healcerion Co. Ltd.
13:20-13:40 p.m.	E-Health and Telemedicine for Remote Areas: Challenges and Opportunities for the Developing World	Dr. Sang Chul Yoon Director, National Medical Center
13:40 - 14:00 p.m.	Cases in E-Health and Telemedicine for Remote Areas	Jong Tae Rhee Advisory Committee Medical Artificial Intelligence, ACK
14:00 - 14:20 p.m.	Mobile Hospital	Mingyu Lee Senior Manager, Construction Steel, POSCO Daewoo Corporation
14:20 - 14:40 p.m.	Introduction of ADB Pipeline Projects: Mongolia	Altantuya Jigjidsuren Senior Social Sector Officer ADB Mongolia Resident Mission
14:40 - 15:00 p.m.	Questions and Open Discussion	
15:00 - 18:00 p.m.	Site Visit: Songpa-gu Public Health Center	
18:00 p.m.	Dinner hosted by KHIDI Business Meetings: Enlarging networks between companies and participants	
<b>DAY 2: HEALTH PROFESSIONS EDUCATION</b> Date: 7 November 2018 • Venue: Grand Hyatt Seoul, South Korea		
<b>Session 4: Hospital Building and Management</b>		
09:00 - 09:20 a.m.	Hospital Design and Building	Wonseok Lee Managing Director, Aum&Lee Architects
09:20 - 09:40 a.m.	Smart Technology-Based Hospital Management and Operations	Sae Ho Jun Manager, Medical Business Team/U-Health Division, Hyundai Information & Technology
09:40 - 10:00 a.m.	Introduction of ADB Pipeline Projects in Bhutan	Garab Dorji ICT Chief, EPIS project, Ministry of Health, Bhutan
	Introduction of ADB Pipeline Projects in Armenia	Hayk Sayadyan Director of Health Project Implementation Unit, Ministry of Health, Armenia
10:00 - 10:20 a.m.	Questions and Open Discussion	
10:20 - 10:40 a.m.	Coffee break	
<b>Session 5: Health Professions Education</b>		
10:40 - 11:00 a.m.	Education in Medical Colleges (Curriculums, Laboratories, ICT in Education)	Shin Ki Ahn Professor, Yonsei University Health System
11:00 - 11:20 a.m.	Medical License and Certificate System for Health Professions (ICT-Based Examination)	Seungyong Shin Chairman of Technical & Business Advisory Board, NSDevil Co., Ltd.

# Programme

Time		Speaker/Organisation
11:20 - 11:40 a.m.	Fellowship in Korea: Optimization	Dr. Jongmin Lee Professor, Kyungpook National University Hospital
11:40 - 12:00 noon	Case presentation: Medical Equipment Maintenance Consulting in Viet Nam	Hyeonseon Park Professor, Department of Neurosurgery Inha University Hospital
12:00 - 12:30 p.m.	Introduction of ADB Pipeline Projects in Viet Nam	Ngo Q. Vinh Associate Social Sector Officer ADB Viet Nam Resident Mission
	Introduction of ADB Pipeline Projects in Uzbekistan	Farida Alijonovna Djumabaeva Associate Project Analyst ADB Uzbekistan Resident Mission
12:30 - 13:00 p.m.	Questions and Discussion	
13:00 - 13:00 p.m.	Lunch	
14:00 - 18:00 p.m.	Site Visit 2: Yonsei Severance Hospital and Medical College	
<b>DAY 3: NATIONAL HEALTH INFORMATION SYSTEM</b> Date: 8 November 2018 • Venue: Grand Hyatt Seoul, South Korea		
<b>Session 6: National Health Databases</b>		
10:00 - 10:10 a.m.	Welcome Remarks	Jae Sung Lee Senior Vice President, Finance/Public Business Division, LG CNS Jung Woon-yeol, Director, LG CNS
10:10 - 10:30 a.m.	National Health Insurance System	Kyong Youl Gong Director, Department of International Relations & Cooperation, National Health Insurance Service
10:40 - 11:00 a.m.	Health Insurance Review & Assessment	Keun Ho Bang Full-time Reviewing Committee, Healthcare Review & Assessment Committee, Health Insurance Review & Assessment Service
11:00 - 11:30 a.m.	Case Study: NHIS & HIRA ICT System	Hong Rok Moon Sales Professional, Public Business Team, Public Business, LG CNS
11:30 - 12:00 noon	Questions and Discussion	
12:00 - 12:30 p.m.	Lunch	
12:30 - 13:30 p.m.	Travel to Hotel	
<b>Session 7: Group Project Proposal and Presentation</b>		
13:30 - 14:00 p.m.	Standards and Interoperability: Laying the Foundations for Digital Health Systems	Kirthi Ramesh Social Development Specialist, Sustainable Development and Climate Change, ADB
14:00 - 16:00 p.m.	Group Discussion and Presentation	
16:00 - 16:30 p.m.	Wrap Up and Closing	

# Snapshots



*(Clockwise from top left) Yong-kwon Yeom, Director of Communications of KHIDI, welcomes participants. Patrick L. Osewe, Chief of Health Sector at ADB. Hayk Sayadyan, director of Health Project Implementation Unit, of the Ministry of Health of Armenia. Garab Dorji, ICT Chief, EPIS project, Ministry of Health of Bhutan. Participants at the Songpa-Gu Private Health Center. Seok Yong Yoon of ADB's Sustainable Development and Climate Change Department. (Photo credit: GDC Consulting)*

# Session 1: Setting the Context

## Achieving Universal Health Care Coverage

The world spent US\$ 7.5 trillion on health in 2016, equivalent to nearly 10% of global GDP. While the average per capita health expenditure was US\$1,000, half of the world's countries spent less than US\$350 per person, according to the World Health Organization.

While 5% of their national budgets must be spent on health care, a lot of countries only allocated 2-2.6%, said Patrick L. Osewe, Chief, Health Sector at Asian Development Bank (ADB). "Asian countries tend to spend less than expected," he added.

As countries grow and develop, they also tend to spend more on health, Mr. Osewe said. This is accompanied by changes in the composition of sources of health financing. However, he said there has been a marked decline in external sources in recent years as development partners reduce their support when countries become richer.

"This creates a nexus or a gap," he pointed out. Health sector budgets are never large enough to meet the needs of growing and aging populations, national commitments to universal health coverage (UHC), rising non-communicable diseases, and the escalating cost of health care. To help fill the gap, ADB is in talks with partners to establish a \$150-million regional health fund that will enable and increase long-term integrated financing for health.

Mr. Osewe said health coverage also requires ensuring

that resources and people are available at the right time. "This is usually a major challenge at the lowest level like primary health care facility. When people are not confident of the quality of care they will receive, they will skip the primary health care facility and will go directly to the hospital, rendering the services at the primary health care facility wasted," he explained.

This is why addressing the issues on health care involves collaborating with other sectors such as education. Current WHO predictions show there could be a deficit of up to 18 million health workers by 2030, which could have detrimental effects on targets set in the 2030 Agenda for Sustainable Development.<sup>x</sup>

Mr. Osewe said the education sector should produce workers that meet the demand of the health sector through technical-vocational education and training (TVET) and tertiary education. "The ADB gets a lot of requests to support health information systems to track patients. However, we must face the challenge: many people understand health, but not IT."

He said Mongolia serves as an example for developing countries on how digital technologies could play an important role in the health sector. Before the ADB implemented health sector projects that connect health centers through ICT in Mongolia, patients had to travel to the provincial capital to seek medical treatment and all patient records were typed by health workers. Now, the Mongolian people no longer face these expensive trips and health workers just send patients' medical histories to the province's central database via the internet.

*"The ADB gets a lot of requests to support health information systems to track patients. However, we must face the challenge: many people understand health, but not IT."*

*Patrick L. Osewe (left), Chief of Health Sector at ADB*

*(Photo credit: GDC Consulting)*





## South Korea's Health Care System

The development of the health care system in the Republic of Korea holds vital lessons for developing countries. It is a story that took decades to make, just like its transformation from being an aid recipient in 1949 to gaining aid donor status in 1999, said Professor Wonseok Sir of the Graduate School of Public Health at Yonsei University. As a "stepping stone to development," the country reinvested the foreign aid it received to build infrastructure and strengthen its knowledge base. This model is also evident in Korea's globally admired health care system.

Before South Korea achieved universal health coverage of its population in 1989, it has already undergone four episodes of reforms.

In the 1960s, South Korea was one of the few developing countries to have initiated a policy to lower the birth rate, which subsequently fell to world record-low levels. It also passed legislation permitting establishments with more than 300 employees to offer health insurance to their employees, giving birth to "medical insurance societies."

The 1970s ushered in the "New Village Movement," largely credited with pulling South Korea out of poverty through mobilizing communities. It also initiated a program to assure universal health insurance coverage for all of its citizens by 1989. At that time, less than 10% of the population had any health insurance. By the 1990s, 90% of the population had private health insurance. The Korean government provides health insurance to the remaining 10% of the population that is unable to purchase private health insurance and subsidizes the cost of private health insurance for certain other individuals. During this period, Korea experienced the most rapid growth in per capita income of any country in the world. It then embarked on health care sector training, continuous improvement in health facilities, computerization of health records, and a top-down and bottom-up approach in establishing its medical system, said Prof. Sir.

Despite having a rapidly growing aging population that will account for an increasing share of the country's demographics and a heavily urbanized population, South Korea is now being held as a model of world-class health care system because of its extensive ICT infrastructure and emphasis on supporting innovation in next-generation technology. It has a sizable health IT market that amounted to \$1.8 billion in 2014.



*"With digital technologies, we can bring up the accessibility level of health care."*

*Prof. Wonseok Sir of Yonsei University (Photo credit: GDC Consulting)*

Korean hospitals now implement electronic systems, such as electronic medical records, and making full use of mobile phone applications for urine and blood tests, among others. Since 2014, Korea has been using telehealth technology so doctors can diagnose and treat patients remotely.

Now one of the world's most rapidly industrializing countries, South Korea has been exporting its health ICT system to help provide the capacity to improve health system efficiencies in poor countries. One of its beneficiaries is Moheshkhal, a remote island in Bangladesh's Cox's Bazaar region, one of the poorest areas in the country. A pioneering initiative between Korean private sector and the Government of Bangladesh aims to improve access to health care services using ICT tools such as a cloud-based health information exchanger and mobile applications for urinalysis, handheld sonography, and blood analyzer.

To safeguard the health and well-being of Rohingya women refugees who have fled Myanmar and sought refuge in the Cox's Bazaar District, of whom more than 30,000 are pregnant women, South Korea also launched a Mobile Ante Natal Care using ICT tools.

## Session 2: Public Health System

Achieving Universal Health Coverage (UHC) has become a key health policy goal for many countries. It is also one of the targets under the United Nations Sustainable Development Goals (SDGs).

Moving towards UHC will require strong health systems that are well governed and sustainably financed. While countries in Asia are making headways towards ensuring access to health care with minimal financial hardship, various challenges remain, said Dr. Soonman Kwon, professor at the School of Public Health of Seoul National University.

"The goal is to minimize out-of-pocket (OOP) payment at the point of service and maximize the role of public prepaid financing such as tax and social/mandatory health insurance," he said.

As a share of current health expenditures, OOP payments among low-to-middle-income countries (LMICs) have been rising from 2000 to 2015 compared with the other country income groups, Dr. Kwon said, citing World Health Organisation (WHO) figures. LMICs are defined as low-income economies with \$1,005 or less per capita gross net income.

In addition to huge OOP payments, LMICs also face a large informal sector that poses a major challenge when extending health care coverage. In many LMICs, he said the role of public prepaid schemes such as tax and social health insurance is minimal, and OOP payment is a major source of financing.

"There are evidence that huge OOP results in catastrophic payment for health care, impoverishment due to illness, and unmet needs," he said.

"Catastrophic payment" is defined as annual OOP health payments exceeding 10% of the annual income. An estimated 808 million people, comprising 11.7% of the global population, suffered from financial catastrophe in 2010 because of direct payments for health services, according to WHO and World Bank reports. Of the total, more than half (531 million people) were from Asia, which indicates a widespread lack of financial risk protection.

Dr. Kwon added that countries should measure their progress on providing UHC, not just by looking at the size of the population receiving coverage, but also the two other dimensions: benefits and financial risk protection.

He said there has been a "paradigm change" in health care financing, among which includes: pooling payment contributions from employees and the self-employed (Japan, South Korea, and Taiwan), earmarking revenues from consumption tax (Ghana and the Philippines), and relying on non-wage income tax (France and Taiwan).

Whatever the source, financing for UHC must be designed to provide all people with access to needed health services (including prevention, promotion, treatment and rehabilitation) of sufficient quality to be effective; and ensure that the use of these services does not expose the user to financial hardship.

For countries to achieve a more sustainable health financing of its health system, he said they must expand health financing mechanisms equitably and efficiently, improve stewardship and accountability, strengthen the transition to domestic financing, and enable evidence-informed priority setting and benefits design processes.



**"Health financing is a means, not the end itself."**

*Professor Soonman Kwon, School of Public Health  
Seoul National University (Photo credit: GDC Consulting)*

## Health Sector Update: Sri Lanka

While Sri Lanka spends less on healthcare, estimated by the World Health Organisation at 3.2% of GDP in 2012, its health indicators are comparable with the more developed countries in the region. Life expectancy has been rising while maternal and infant mortality have fallen. Most diseases preventable by vaccines are at near elimination stage, with immunization coverage at more than 99%. Sri Lanka has also been free from polio since 1994 and malaria and filariasis since 2016.

This has been attributed to effective public delivery system, which provides both preventive and curative care at low cost. The Sri Lankan government provides universal healthcare to all its citizens, and this accounts for almost all preventive care and most in-patient treatment. There is also a countrywide comprehensive network of health centers, hospitals, and other medical institutions.

However, changing health challenges and population aging since the 1990s have led to investments being shifted to secondary and tertiary health care services at the expense of primary curative and preventive care services.

Dr. Manoj Dissanayake, Medical Officer of the Ministry of Health of Sri Lanka, said this poses challenges to Sri Lanka's primary health care system. Health resources are not equally distributed, with the peripheral health network suffering from limited development of human resource, health equipment, and inadequate funding. Furthermore, health education concentrates on the production of medical doctors who are concentrated in large urban centers and unwilling to work in the peripheral areas.

Another challenge is the lack of timely and accurate health information which hampers the monitoring of communicable diseases.

Further, access to health, life expectancy, and risk of disease vary according to location, with certain rural populations and those on the plantation estates (for example, growing tea, rubber, and coconuts) especially at risk. Malnutrition in mothers and children is a particular issue in these geographic areas.



*Photo credit: ADB (<https://www.adb.org/news/adb-provides-50-million-enhance-sri-lankas-health-system>)*

To help Sri Lanka meet these challenges, the ADB has extended a grant and loan package totaling \$60 million to support the development of a more responsive and efficient primary health care system in four underserved Sri Lankan provinces: Central, North Central, Sabaragamuwa, and Uva.

The project supports policy and strategy development and implementation for comprehensive primary health care, including capacity development in the line ministry and at provincial level.

It will also strengthen Sri Lanka's health information system to provide real-time sharing of information across health facilities and across different stages of patient care. At ports of entry, the project will boost health surveillance and quarantine capacity, including a web-based surveillance system and training for health personnel.

By its target completion in November 2023, Dr. Dissanayake said the project is expected to contribute to the Government of Sri Lanka's goal of ensuring a healthier nation with a more comprehensive public health care system.

## Session 3: Innovations for Public Health

The health sector has been facing considerable challenges in recent years. Demand for care is growing as populations age, communicable and lifestyle diseases increase, medical costs rise, disasters and other climate change-related events occur, while the number of care practitioners is hard pressed to keep pace.

On the other hand, health care providers are discovering new medical ICT solutions and harnessing digital technologies such as telemedicine. By using ICT, the quality of health care can be increased, or standards can be maintained with fewer people and at lower cost.

This session featured recent health ICT innovations and approaches by renowned speakers from the academe and the private sector.

**Healcerion** is a Korean incubator that offers a mobile-based healthcare system for providing physicians and patients with ultra-portability. Its vision is to bring affordable, high-quality medical care to clinical and remote locations around the world.

Healcerion Co., Ltd. CEO and founder Benjamin Jeongwon Ryu, who has been a lifelong technology entrepreneur involved in dozens of projects, said the Asia-Pacific region accounts for more than 41% of global deaths under five years old and for more than 44% of maternal deaths. This is due to the inadequate number of medical doctors and health care professionals, hospitals, and medical facilities.

He founded Healcerion in 2012 to provide affordable care and make the smallest sonogram device possible that can be synced with tablets or smartphones and instantly display results on the screen. The company developed Sonon 300C, a 360-gram handheld sonogram device with a chargeable battery, Wi-Fi, and 3G/LTE connection, along with an accompanying app that supports iOS and Android. The handheld device goes for only \$6,000 compared with general ultrasound devices that cost around \$140,000 per model unit. In addition, the general ultrasound devices weigh over a hundred kilograms and thus are rarely placed in emergency rooms due to lack of storage or infrequent usage. For Dr. Ryu, this did not make sense, particularly in the age of smartphones, big data, and ubiquitous web.

Healcerion has been donating most of the Sonon devices for public projects in South Korea and emerging markets where affordable healthcare is always needed. It also donated 30 units for public healthcare centers in Viet Nam, as well as educated staff on the proper operation of the Sonon device. Healcerion has so far shipped 300 units all across the world and is also involved in multiple creative share value (CSV) projects with global firms from developed countries aimed at Southeast Asia and Africa.

**Posco Daewoo** is the trading and investment arm of South Korean steel giant Posco with over 100 global networks around the world. Among its various overseas corporate social responsibility initiatives as a global corporation is the design and manufacture of "Korean-type" of mobile hospital for the Korea



*(L-R) Dr. Manoj Dissanayake of Sri Lanka Ministry of Health, Altantuya Jigjidsuren of ADB, Dr. Jong Tae Rhee of ACK, Dr. Sang Chul Yoon of National Medical Center, Benjamin Ryu of Healcerion Co., Ltd (Photo credit: GDC Consulting)*

National Medical Center in 2016. Mingyu Lee, senior manager, Construction Steel, of Posco Daewoo Corporation, also presented the Mobile Healthcare Shelter (MHS) that can provide online and offline services. The MHS truck is equipped with maternity, children's, cardiovascular health, pharmacy, laboratory, disaster response, and general practitioner units. Using a telemedicine system, the MHS can also be used for patients with uncontrolled chronic disease, diagnosis, and other types of care. Posco Daewoo has deployed MHS trucks in several district health centers in Viet Nam for screening of patients with diseases in difficult-to-reach areas. It is also using a Mobile Telehealth Clinic to connect patients who need treatment in community health centers.



**Dongguk University Professor Jong Tae Rhee**, a medical artificial intelligence (AI) consultant in ACK, presented the latest technology on the use of a cloud service platform based on the Internet of Things (IoT) for the management of chronic disease. He said he plans to penetrate the European market with the combination of medical AI and cloud, which is expected to contribute significantly to the Southeast Asian market where interest in diagnosing and managing chronic diseases is increasing.



He said the e-health solution is a model for developing countries that can be built at a low cost. "We have developed smartphone and cloud-based solutions to reduce medical costs," he stressed. As there are still restrictions on telemedicine in Korea, he said ACK is localizing its remote care solution in the Czech Republic and Slovakia where a smartphone app has been proven effective in remote medicine to treat patients even in far-flung areas.



Dr. Sang Chul Yoon of the Center for Global Health & Innovation of the National Medical Center, presented **Project BOM** (Project Blindness Zero Movement). Launched in 2011, the research team affiliated with the Yonsei University College of Medicine aims to provide comprehensive eye care for the visually impaired and marginalized people in developing countries. Project BOM started offering eye health services to the people of Malawi, one of the most impoverished countries in the world. It promotes the use of mHealth (mobile health) or the use of mobile phones and other wireless technology in medical care and trains local eye health professionals.

*(From top) Healcerion makes health care affordable and portable with the Sonon 300L wireless handheld ultrasound device (Photo credit: Healcerion website); Posco Daewoo designed this Mobile Healthcare Shelter to make health care within reach. (Photo credit: Posco Daewoo); Through the Yonsei University's Project BOM, visually impaired people living in resource limited conditions now has access to preventive care and treatment of cataract, trachoma, and refractive errors. (Photo credit: Project BOM website, <http://projectbom.org>)*

# Health Sector Update: Mongolia



Photo credit: ADB Mongolia Health Sector Fact Sheet (<https://www.adb.org/publications/mongolia-health-fact-sheet>)

Since 1993, the Asian Development Bank (ADB) has been one of the largest multilateral development partners of Mongolia in reforming its health care system, which was based on an outdated Soviet model dominated by an extensive network of hospitals that emphasized facility-based curative care. As part of the transition from a centrally planned to a market economy, Mongolia began building a sustainable and efficient health care system focusing on client needs and high-quality services.

In 1994, Mongolia implemented a compulsory national health insurance scheme that aimed at rationalizing healthcare services, increasing non-tax financing, and increasing financial protection of people. In 1995, ADB's first health technical assistance (TA) helped the government improve the policy framework and implementation of the health insurance scheme.

Subsequent TA projects helped refine important aspects of the health insurance system, including its governance, provider payment mechanisms, purchasing and contracting capacity, and management and organizational development.

To date, ADB assistance to Mongolia's health sector amounts to \$134 million. ADB's health assistance aimed at developing primary health care (PHC) and an effective referral system, rationalizing hospital services, and improving sector governance.

Altantuya Jigjidsuren, Senior Social Sector Officer of the ADB Resident Mission in Mongolia, cited the following project milestones:

- Developing family group practice (FGP) as

a means of cultivating a PHC-based health system;

- Helped the government to restructure soum hospitals into soum health centers (SHCs) in rural areas and develop family health centers (FHCs) in urban areas to ensure access of all citizens to an essential package of health services at the PHC level;
- Supported institutional and financial reforms, including referral systems and gatekeeping, service packages, operational standards and incentive packages for staff; and
- Provided financial and technical support to Mongolia to develop and upgrade clinical guidelines and pathways, advocacy and public information, and post-graduate and in-service training—extensive training that involved 89% of PHC-level professionals.

ADB also supported the government to develop and continuously improve the legal and regulatory frameworks of private-public partnerships (PPP), and pilot and expand the PHC system's PPP modality. These arrangements enabled FGPs to provide services in private FHCs and be paid from the national budget using performance-based contracts.

It also helped the government in establishing the hospital licensing and accreditation system, rationalizing hospital services, and improving hospital management and governance. Mongolia also introduced public hospital autonomy, improved regulation of private hospitals, and developed and implemented a hospital development policy and strategic plan with ADB assistance.

## Site Visit: Songpa-gu Public Health Center

Songpa-Gu Public Health Center is a public health medical center located in Songpa-Gu District, the largest among the districts of Seoul with a population of nearly 670,000. In this site visit, participants learned how the hospital manages the health of Songpa-Gu residents through its world-class service and state-of-the-art facility. As a public health center, Songpa-Gu Public Health Center provides care for the management of diseases and the improvement of elderly, maternal and child health. Due to the declining birth rate in Seoul, the center extends a wide range of services for pregnant mothers and their babies — from pre-pregnancy preparations to childbirth to infant care. It also promotes smoking cessation through education and drug therapy, as well as provides personalized visiting health services to the elderly.



(Clockwise from top) The Songpa-gu Office which houses the Songpa-gu Public Health Center. Kim In-Kook, General Superintendent of Songpa-Gu Public Health Center. Workshop participants try out the state-of-the-art facilities of Songpa-Gu Public Health Center. Sung-Soo Park, Head of Songpa-Gu Office, welcomes participants. (Photo credit: GDC Consulting)

## Session 4: Hospital Building and Management

The rapid growth of ICT and internet connectivity has strongly altered the landscape of health service delivery models. Today, e-hospital management systems provide the benefits of streamlined operations, enhanced administration and control, superior patient care, strict cost control and improved profitability.

This session featured the latest trends and approaches to hospital building and management, presented by speakers from the private sector.

**Hyundai Information Technology Co. Ltd.** specializes in the development of medical IT solutions and services. The hospital information system it developed is used in about 40 secondary and tertiary hospitals in Korea.

In the area of public health services, such as the Center for Disease Control (CDC), Central Emergency Centers, it has built IT services for critical healthcare organizations. Some examples of services that have been developed include the National Immunization Management System and early warning systems for communicable diseases. It was also responsible for the construction of the national emergency information service operated by the Central Emergency Center.

The company has also developed various solutions in clinical research. Among these is a web-based clinical trial management system being used at Asan Hospital, one of the largest hospitals in Korea. It designed an epidemic early warning system for the CDC that connects national hospitals and public health centers.

Vast information on infectious disease outbreaks and transmission factors are stored in centrally managed databases, enabling institutions to quickly respond to epidemics at the national level and effectively direct and utilize centralized resources for isolation and treatment.

In the late 2000, the company built an EMR system that computerized patient medical records. "Today, many hospitals are building the next-generation hospital information system that focuses on analyzing patient records and preventing illness while covering all these systems at once," said Sae Ho Jun, manager, Medical Business Team/U-Health Division, of Hyundai Information and Technology.

The company has been implementing various medical IT-related projects overseas since early 2010. These include the national e-Health for the Ministry of Health and Welfare of Armenia, Vietnam, and Mongolia. This contributed to the establishment and realization of e-health models in these countries.

**AUM&Lee Architects Associates** is a 70-year-old Korean company with more than 200 engineers and experts in building design, planning, and supervision.

Wonseok Lee, Managing Director of its Overseas Department, shared the company's experience in building the 500-bed Thua Thien-Hue General Hospital in the central province of Thua Thien-Hue in Viet Nam.

He said the hospital started in November 2009 at a cost of over US\$38.6 million, most of which funded



*(L-R) Seungyong Shin of NSDevil; Ngo Q. Vinh of ADB; Sae Ho Jun of Hyundai Information and Technology; Dr. Jongmin Lee of Kyungpook National University Hospital; Dr. Hyeon Seon Park of Inha University Hospital; and Farida Alijonovna Djumabaeva of ADB (Photo credit: GDC Consulting)*



## Health Sector Update: Armenia



*The Thua Thien Hue General Hospital in Viet Nam (Photo credit: Aum&Lee Architects & Associates)*

by an official development aid from the Republic of Korea and the rest was sourced from the Government of Viet Nam.

The facility, with the capacity to serve 750 patients per day, has been piloted since January 2013. The hospital aims to provide residents in the province and neighboring localities with better access to treatment and ease the overload at central level hospitals.

However, Mr. Lee said management is faced with challenges in sustaining its operations because of the 20-kilometer distance of the hospital to the center of Hue, the low number of patients in the area, and their low income.

"There was no medical planning, no development plan, and no action plan for operation" prior to construction, Mr. Lee said. "The feasibility plan was designed by the government so the consultant has no control. Now they realized the importance of medical planning at the first stage."

To contribute to the sustainable operation of Hue Hospital, AUM&Lee also helps the Korea International Cooperation Agency (KOICA) in implementing Q-Health projects that support previously completed health sector projects in Thua Thien Hue province, including the training of medical personnel in central Viet Nam.



*Enforcement of a tobacco control strategy and promotion of a healthy life style in Armenia (Photo credit: Ministry of Health of Armenia)*

As of 2016, the Republic of Armenia has a population of 2.9 million, with an average life expectancy at 75 years old, considerably higher than the average for countries of the Commonwealth of Independent States (CIS). However, while Armenians are living longer, they do so in poor health.

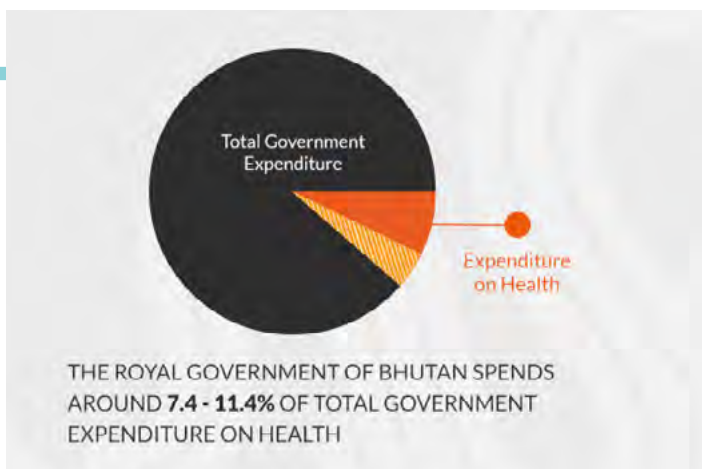
Hayk Sayadyan, director of the Health Project Implementation Unit of the Ministry of Health of Armenia, said Armenia's health care system is still struggling to effectively respond to the changes in morbidity and mortality patterns in recent years with growing cases of noncommunicable diseases (NCDs), which comprise 80% of the mortality burden. The three top NCDs are hypertension, diabetes, and cervical cancer. The Ministry of Health enforced a tobacco control policy due to the high prevalence of smokers, which is estimated to account for 22% of all deaths among Armenian men in Armenia.

Armenia inherited the highly centralized Soviet health care system which guaranteed free medical treatment with a comprehensive range of secondary and tertiary care to all citizens.

To promote the health and well-being of its citizens, the government embarked on programs to decentralize health services, and improve primary health care, health system financing, among others.

In 2017, Armenia launched an e-health system. A unified health information management system is used to collect and store the health information of citizens. The country is also on its way to developing human resource, laboratory-diagnostic examination, and cancer registers, as well as electronic portals for training of specialists and health care goods pricing.

# Health Sector Update: Bhutan



The Royal Government of Bhutan ranked 121<sup>st</sup> in the ICT Development Index Country Rankings in 2017.

Garab Dorji, Chief ICT Officer at the Ministry of Health, said the country in South Asia is "not really lucky" because the internet came to Bhutan only in the late 1980s. "We had a tough time connecting the districts because we are a landlocked country so bringing internet is a great difficulty. We also have a small population so we had to deal with manpower constraint, user resistance due to late tech adoption, and a complex setup," he explained.

Without harnessing technology, the mountainous nation has resorted to using quadcopters to deliver medicine to hard-to-reach patients. Healthcare in the country is free, but there are only three national hospitals out of 855 medical facilities, and only 300 doctors out of 3,000 health workers, Mr. Dorji said.

To solve the shortage of doctors and infrastructure, Bhutan partnered with the ADB and the World Health Organization so new technologies could enable telemedicine at a relatively low cost.

In addition to telemedicine, programs to enhance the quality standards of health data, a centralized medical record repository, and increased connectivity of health centers, among others, are being planned, Mr. Dorji said.

The country's vision is for its health system to be ICT-enabled by 2023 so the Bhutanese people can enjoy better health and care outcomes, thereby contributing to Gross National Happiness.

On the second day of the workshop, participants had a site visit to the Yonsei University which has a rich history that started in 1885 — the oldest private university in Korea.

The private, coeducational university is located in Seoul, South Korea, and is reputed as one of the leading universities in Korea. Korean people consider Yonsei as one of the "SKY" (equivalent of Ivy League) universities, along with Seoul National University and Korea University in South Korea.

Participants were shown how Yonsei University fulfills its educational goals using non-traditional educational methods to cultivate creativity, promote "learning by doing" through experience-based education, and implement digital learning by building a Smart Campus (S-Campus). In December 2018, Yonsei University launched the world's first commercial 5G network platform, which featured utilizing 5G, and a holographic lens user-experience theme park for students and faculty.



*(Top) Participants were given a tour of the state-of-the-art facilities of Yonsei University.*

*(Right) Top officials of Yonsei University brief the participants and responded to questions.*

*Photo credit: Sheila Samonte-Pesayco*

# Site Visit: Yonsei Severance Hospital and Medical College



## Session 5: Health Professions Education

A country's success in the delivery of health care services hinges heavily on the presence of health care professionals. Globally, the shortage of health workers is expected to grow to 12.9 million by 2035 from more than 7.2 million. According to the 2006 World Health Report, 83 countries (44.6%) currently do not meet the threshold of 22.8 skilled health professionals per 10,000 population.<sup>1</sup>

In this session, speakers from the academe and the private sector discussed the global shortage of health care providers, which disproportionately affects low- and middle-income countries that have limited resources, and face a significant burden of disease. The speakers also presented opportunities offered by new ICT tools to contribute towards the scaling up of health professionals' continuing education and training.

**Yonsei University** has undergone a long period of medical education transformation throughout its 127-year-old academic history. Yonsei houses the first and oldest medical college in South Korea established in 1885.

Dr. Shinki An, director of Ban Ki-moon Center for Sustainable Development of the Institute of Global Engagement & Empowerment at Yonsei University, said the university has undergone "three foundings" in 1970, 2004, and 2014 to continuously reform its medical education curriculum. It changed its medical education from teacher-centered to student-centered in 2004, embedding social awareness among students.

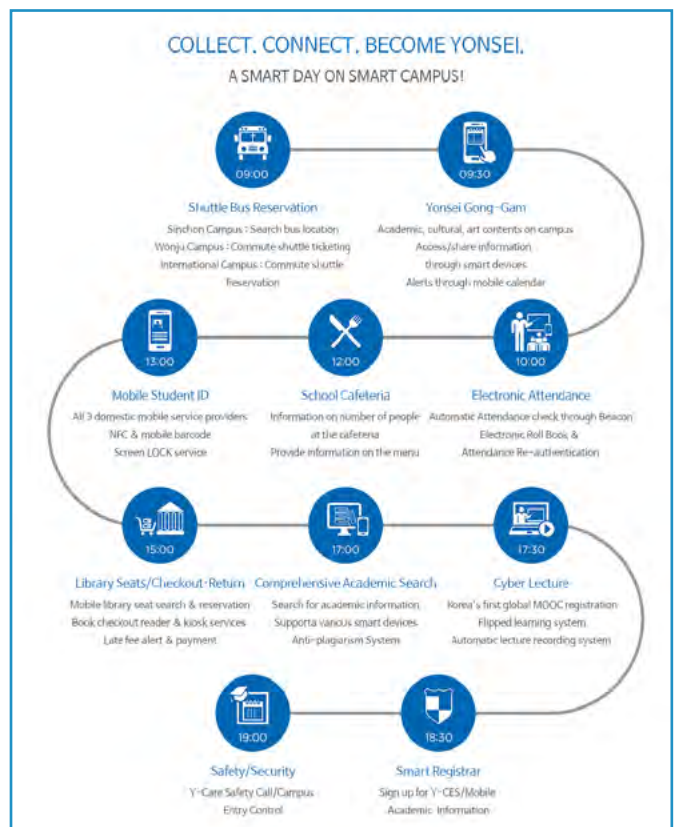
Ten years later, in 2014, Yonsei became the first and only university to adopt a "criterion-based pass/non-pass assessment system" to provide outcome-based education. This "curriculum reformation," said Dr. An, demanded a culture change.

Currently, students at the university use collaborative learning processes using ICT tools. To address the shortage of teaching faculty, which Dr. An said remains a critical problem, Yonsei set up the OCX (Open Campus Experience) to manage and provide all the information that are created within the campus. Professors can easily make videos of their lectures which students can access online, any time, anywhere. Outside lecturers can also participate through online invitation.

"In 73 days, we were able to double the amount of medical knowledge; no need to go to Harvard; they can just use the ICT platform," Dr. An said.

"Say goodbye to lectures in medical schools. ICT can bring us expansion of time and space."

Using the multimedia platform, Yonsei is also able to share and collaborate with other countries and modify the knowledge based on the local context. "Incorporating ICT in education is not a matter of technology but (a matter of) mindset," Dr. An said.



*How Yonsei University uses ICT tools to improve students' learning and campus experience (Graphic from Yonsei University website)*

**NSDevil Co., Ltd.** is a private sector organization based in South Korea with the mission to realize "equal educational opportunity by U-Learning technology" around the world by spreading the UBT (ubiquitous-based test) and the U-Learning platform that can provide energy-efficient programs with less carbon emission.

Seungyong Shin, chairman of the Technical & Business Advisory Board of NSDevil, presented how countries can grant medical licenses to doctors and medical professionals using the UBT method. A computerized test method, UBT is capable of setting multi-dimensional and future-oriented questions and



*Students use smart devices for computerized tests (Photo taken from NSDevil's Facebook page)*

uses images, videos, and other multimedia sources to measure actual problem-solving abilities. It is optimized for tests conducted on various iOS and/or Android-based smart devices and provides immediate test results. This means tests or examinations can be conducted anywhere, without the need for chairs, papers, stationeries, and dedicated rooms which add to the cost of managing tests, especially in examining answer sheets.

Mr. Shin presented the experience of South Korea in using the UBT method in administering tests to medical university students. Since implementing computerized tests using SBT, the Korea Health Personnel Licensing Examination Institute (KHPLI) was able to strengthen clinical performance based on assessments, contributing to the enhancement of training of health and medical personnel. KHPLI also achieved cost efficiency by reducing the cost of exam administration. "The passing rate of medical students also improved when multimedia is involved," Mr. Shin said.

Since 2011, the technology has already reached South Africa, Russia, Japan, and the Philippines but only expanded to medical education starting in 2016. Currently, Mr. Shin said NSDevil is in ongoing discussions with countries, including Mongolia, to modify 23 types of national medical license exams to shift to the UBT method.

**Medical tourism** in Korea was unheard of in the past, but with the country's emergence as a leader in the global healthcare market, there has been an explosion of medical fellows, said Dr. Jongmin Lee, professor

at Kyungpook National University Hospital. Dr. Lee said through Korea is able to share its knowledge, experience and expertise in the field with its neighbors in the Asia-Pacific region by training medical care providers. This started in the 1970s when a government-sponsored program sent Koreans abroad with the goal of getting the best medical education and bringing the expertise back to the country and help restore the system in Korea.

With the vast improvement and modernization of Korea's health sector and medical profession over the years, many doctors and medical professionals from overseas are flocking to Korea as medical fellows, lured to learn from the country's best practices in providing quality services, advanced medical technologies, relatively affordable medical costs, fast and efficient diagnostics and therapeutic services, and cutting-edge hardware and IT-based infrastructure.

Dr. Lee said this has spawned a phenomena called "K-Medical" — the medical profession's version of the global popularity of K-pop drama, K-beauty, and K-fashion as hot trends in many countries worldwide today. "The fellowship in Korea is essential for promoting Korean medical care," he said. Among the benefits of medical fellowship to Korea are: expansion of Korean tutors' international exposure and knowledge, global promotion of tutors and institutes, inter-institute collaboration, and increase in patients from abroad, among others.

**Knowledge and skills for the operation and maintenance (O&M) of medical equipment** remain a challenge for many countries. Professor Hyeonseon Park of the Department of Neurosurgery at Korea's Inha University Hospital, presented the "Inha System" that the university developed to address this problem.

The Inha system has been proven effective in the case of Viet Nam's Lai Chau Provincial General Hospital which was saddled with the problem of lack of skills and knowledge on medical equipment O&M, lack of budget, difficulty in understanding the equipment user manual in English, and constant exposure of the equipment to high humidity.

Inha's r system requires connecting with the Hospital Information System and using statistical data to monitor the performance of medical equipment. Inha also transfers knowledge on preventive checkup, as well as offer a back-up/on-call system of engineers who can conduct O&M, safety supervision, equipment servicing, and training for end-users.

# Health Sector Update: Viet Nam and Uzbekistan

The Asian Development Bank (ADB) has been helping the Government of Viet Nam enhance the country's health care system. Spearheading the implementation of the government's Master Plan for Strengthening the Local Health Care Program (SLHCP) is the Ministry of Health.

SLHCP will consolidate and build on efforts to improve the quality of and access to primary health care services, especially for the poor and ethnic minorities in remote, border, and disadvantaged areas. The ADB loan, amounting to US\$100.6 million, seeks to improve the network of local health facilities (consisting of commune health stations, district health centers, and district hospitals) to meet the changing health requirements of Viet Nam's growing population.

SLHCP comes in three phases: 1) public investment management for local health care; 2) service delivery models for local health care network; and 3) local health care workforce development and management.



*ADB-supported interventions in Viet Nam's Central Highlands have significantly improved people's well-being and access to medical help, reduced infant mortality, and inspired the government in its quest for universal health care coverage. (Photo credit: ADB)*

Another project, the Second Health Human Resource Development Project (SHHRDP), will assist the Government of Viet Nam achieve universal health coverage, including access to essential health care services, by increasing the supply of a skilled health workforce. ADB, the Japan Fund for Poverty Reduction, and the Government of Viet Nam are funding the project with US\$100.2 million.

The health indicators of Uzbekistan have been improving since the country's independence in 1991. However, the country still faces the challenge of reducing premature death and disability from noncommunicable diseases, which are the leading cause of adult death.

The Asian Development Bank (ADB) is helping improve the quality of rural primary healthcare services in Uzbekistan through a US\$45-million loan. This was extended to finance a project that will help expand the scope of service delivery and bring new services closer to the people.

Called the Primary Health Care Improvement Project, the first ADB health project in Uzbekistan since 2004 will strengthen primary health care services in rural areas by providing modern equipment to each of the 793 newly established family polyclinics.

The project also seeks to further enhance the skills of the health staff in these clinics by training almost



*ADB helps improve the quality of rural primary healthcare services in Uzbekistan. (Photo credit: ADB)*

3,000 health technology operators, doctors, and nurses.

It will also institutionalize key monitoring tools including pilot testing a digital health management information system, starting with the rural region of Sirdarya, and lead the way for the Ministry of Health to use those results to improve access, coverage, health, and well-being across the country.

## Session 6: National Health Databases

The session, held at the headquarters of LG CNS, afforded participants a better appreciation of the Korean model in providing low-cost access to quality health care for citizens and its health insurance system that has also gained recognition as one of the most efficient in the world. They also gained basic understanding of the country's Health Insurance Review & Assessment (HIRA) Information System that LG CNS helped to establish. LG CNS is a subsidiary of LG Corporation founded in 1987 that provides information technology services including consulting, System Integration, Network Integration, Business Process Outsourcing, and Information Technology Outsourcing.

Kyong Youl Gong, director of the Department of International Relations & Cooperation at the National Health Insurance Service (NHIS), presented the evolution of NHIS as a public corporation that manages Korea's health care and how it has been reaching out abroad to share the success of South Korea's health insurance models.

Keun Ho Bang, member of the HIRA Committee, said the system allows millions of South Koreans to monitor in real time their medical costs, prescriptions, and appropriate medical treatment. Other features presented by Hong Rok Moon, sales professional, Public Business Team of LG CNS, was the application of ICT in building a National Health Insurance Information System (NHIS), a drug utilization review (DUR) system, and a system for smart utilization of national electronic medical records.

By using an ICT-enabled monitoring of drug inventory, HIRA was able to improve medical service through quality assessment and promote drug use safety. For instance, antibiotic prescription rate for upper respiratory infection has been reduced to 44.5% in 2013 from 73.3% in 2002.

LG CNS officers also presented the use of cloud services for remote system development, repair and maintenance along with model-driven development for software development that requires no coding. These were developed after the company studied the top 10 causes of ICT project failures and found out that human errors accounted for most of the failures.



*Participants listen to presentations from LG CNS officers Jae Sung Lee, Senior Vice President for Finance/Public Business Division; Jung Woon-yeol, director; Hong Rok Moon, Sales Professional, Public Business Team, Public Business; and to Kyong Youl Gong, director at the Department of International Relations & Cooperation, National Health Insurance Service. (Photo credit: GDC Consulting)*

## Session 7: Group Presentations & Project Proposals

Participants were grouped and were asked to present the current situation on digital health in their country, come up with proposed strategies using what they have learned from the three-day seminar, and identify needs and gaps that would need the assistance of the Asian Development Bank.

### Bhutan

- **Overview:** Bhutan is in the early stages in digital health due to its late adoption to ICT. Currently, however, mobile penetration is at 98% for 4G and 3G connectivity. A total of 20 districts and 180 sub-districts have fiber intranet backbone.
- **Strategy and Implementation:** While legislation and policy on data storage and transmission are already in place, laws on data privacy are still being proposed for enactment. An eHealth Strategy as an action plan was put in place last August 2018. Policy implementation is done by an Electronic Governance Interoperability Framework (eGIF) at the broad level and a National Electronic Health Steering Committee has been formed for the health sector.
- **Challenges to Sustainability:** Bhutan has to build its legal framework and build human capacity for digital health adoption. Other issues involve the reliability of current ICT infrastructure.
- **ADB support needed:** Financial support and technical assistance for an eHealth Data Hub, telemedicine, and capacity building of health workers in ICT.

### Mongolia

- **Overview:** Mongolia has put in place policies on digital health such as a software for Hospital Information and Management System (E-health) for tier1 and secondary hospitals in 2015, a State policy that promotes digital health in 2016, e-health for primary health, a strategy for strengthening the health insurance system, and integration of data from the national registry, social security system, social welfare system and immigration (i.e., one ID can be given to newborn infants at hospitals).







- **Strategy and Implementation:** An E-Policy Commission under the State Parliament acts as the main policy maker for development and implementation of digital strategies.
- **Challenges to Sustainability:** Mongolia has to build digital health expertise among its workforce and must focus its attention to end users or patients (emphasis on supply side and top-down approach).
- **ADB support needed:** Technical assistance on use of Big Data for policy making in the health sector, improving electronic licensing in the medical profession, and capacity building of health sector workers.



### Sri Lanka

- **Overview of Digital Health Status:** Sri Lanka has an e-governance policy in place but not comprehensive. Proposals are in the pipeline to have a digital health project. There are available doctors who have taken up post-graduate courses in bioinformatics and have been appointed to hospitals and RDHS.
- **Financing:** Being discussed with ADB and the World Bank
- **Strategy and Implementation:** There are existing health management information systems to store medical health records, a health registry for noncommunicable diseases such as cancer, and a monitoring system for mental illness and diabetes. Sri Lanka also has a web-based supply chain management system.
- **Challenges to Sustainability:** Sri Lanka has to explore ICT to reach the grassroots. To build knowledge on digital health, it sees the need to revise the current curriculum to accommodate digital health. It also needs to integrate mobile health systems design with telehealth and involve digital health professionals in planning medical infrastructure.



*Continue next page*

## Session 7: Group Presentations & Project Proposals

- **ADB support needed:** Financing for ICT infrastructure, technical assistance in digital health solutions, and training on advanced digital health.

### Uzbekistan

- **Overview:** Uzbekistan has adopted a law on Electronic Government which mandates the use of centralized databases of individuals and legal entities and data transmission. The Government of Uzbekistan is also enacting a law that protects data privacy.
- **Strategy and Implementation:** While the concept of having a healthcare system has been developed, it still has to be updated. Leadership and governance of its e-health strategy is jointly implemented by the Ministry of Health and the Ministry of ICT.
- **Challenges to Sustainability:** The country has to cope with the lack of infrastructure in terms of broadband connectivity and networks, and the interoperability of existing information systems in the health sector. In addition, it also lacks medical staff equipped with ICT skills.
- **ADB support needed:** Financing for ICT infrastructure and technical assistance in strategy development and capacity building for building an electronic medical record system, e-health strategy, and teaching health sector workers.



### Viet Nam

- **Overview:** Viet Nam has policies on data privacy protection, electronic data storage and transmission. It has also adopted a Digital Health Strategy implemented by an eHealth committee set up in 2009 and chaired by the Ministry of Health Minister. Starting in 2014, the country has laid down policies on online health services and telemedicine. Existing ICT-based systems include software applications, DHIS2, Health Information System, and these run on a robust ICT infrastructure such as broadband connectivity and networks.
- **Strategy and Implementation:** There are currently three e-health programs in Viet Nam: a national health database, a national e-health record system, and an e-government for health public services.
- **Financing:** Annual budget from the Government of Viet Nam and ADB funding for 12 provinces (2019-2023)
- **Challenges to Sustainability:** Weak and insufficient digital health expertise among Viet Nam's workforce, lack of e-health enterprise architecture, ineffective stakeholder collaboration, and the need for a long-term strategy on e-health.
- **ADB support needed:** Technical assistance for human resource development in e-health



## Knowledge Series No. 8

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