

# TACKLING REGIONAL HEALTH INEQUITY VIA U-HEALTHCARE (UBIQUITOUS HEALTHCARE) IN INSULAR AREAS OF THE REPUBLIC OF KOREA

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## **Introduction**

The Republic of Korea is renowned for its splendid ocean scenery, including approximately 3,000 islands across the country. Some are densely populated, while others are sparsely populated or unpopulated. However, the number of residents residing on these islands is not negligible, reaching a total of 260,803 in 2008.<sup>1</sup>

Due to the geographic isolation and ensuing economic, social and cultural disparities, the unmet demands for healthcare on Korean islands have been problematic. Compared to mainland cities, the islands in Korea are especially vulnerable to poor quality medical services because of inadequate accessibility and lack of medical infrastructure. In fact, the current public health law in Korea states that only islands whose population account for 300 residents or more are eligible for a community public health center. Consequently, those who are living in the least densely populated islands are left behind in terms of healthcare services. These people are literally living in a dead zone for medical services. The medical infrastructure and public health workforce on Korean islands are insufficient, resulting in huge medical gaps between mainland Korea and Korean islands.

This paper will demonstrate the health inequity in Korean insular areas compared to mainland Korea and propose the concept of U-healthcare as a viable option to reduce the medical gap. The conceptual definition of Korean insular area refers to a region surrounded by sea on all four sides at high tide, with

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1 Korean Statistical Information Service, "Korean City Statistics," [http://kosis.kr/abroad/abroad\\_02List.jsp?parentId=1211011,#jsClick](http://kosis.kr/abroad/abroad_02List.jsp?parentId=1211011,#jsClick) (accessed October 20, 2012).

**FIGURE 1: THE TOTAL NUMBER OF VILLAGES AND ISLANDS IN KOREA**

City/Province	Villages	Islands
Total	78,575	2,926
Seoul	450	4
Busan	565	79
Daegu	777	0
Incheon	837	179
Gwangju	646	0
Daejeon	777	0
Ulsan	843	9
Gyeonggi	8,031	83
Gangwon	6,815	15
Chungbuk	6,383	4
Chungnam	9,989	239
Jeonbuk	8,469	85
Jeonnam	11,352	1,753
Gyeongbuk	12,823	18
Gyeongnam	9,021	401
Jeju	797	57

Source: Ministry of Land, Transport and Maritime Affairs of the Republic of Korea, "Natural Landscape," <https://stat.mltm.go.kr/portal/cate/engStatListPopup.do> (accessed October 20, 2012).

the exception of Jeju Island.

### Health Inequity in Insular Areas of Korea

The quality of medical services is relatively less favorable for the Korean insular population than mainland residents. This phenomenon of regional health inequity is attributable to a number of factors: geographic isolation, the lack of relevant public health policy, poor local finance, inadequate medical workforce and poor infrastructure. The major obstacle to the improvement of medical services in insular areas is accessibility. In terms of medical supply in Korea's insular areas, the basic health infrastructure such as hospitals, public health centers,

emergency medical services, pharmaceuticals and transportation is inadequate or insufficient.

A case in point is the total number of hospital beds in Korean insular areas compared to mainland cities. The number of hospital beds in Wando Island of the Jeonnam province was 231 in 2006, which shows a stark contrast to the number of hospital beds in Damyang (mainland city in Jeonnam province),

**FIGURE 2: MAJOR PUBLIC HEALTH INDEX OF KOREAN INSULAR AREAS IN COMPARISON TO THE WHOLE COUNTRY**

	People per hospital bed	People per physician	People per dentist	People per nurse	People per ambulance	People per paramedic
<b>Whole country</b>	136.4	761.6	2821.1	263.9	39699.9	16028.9
<b>Insular areas</b>	852.3	2384.2	3843.9	1046.4	26907.4	62784.0
<b>Insular areas adjacent to the mainland</b>	453.8	4114.6	8817.0	2205.3	61719.0	N/A
<b>Densely populated islands</b>	2855.6	2498.7	3123.3	839.9	24986.5	49973.0
<b>Sparsely populated islands</b>	533.7	1111.9	2668.7	606.5	13343.5	26687.0

Source: Jung-soo Im et al., "Overview of Emergency Medical Service in Insular and Mountainous Areas and Possible Support for it," *Gachon University College of Medicine and National Emergency Medical Center (2007)*: 77.

which was 1,031 in the same year.<sup>2</sup> This figure vividly illustrates regional health inequity between insular and mainland areas, since the population of Wando Island is larger than that of Damyang. According to the 2010 national census, Wando Island has a population of 46,476 while the total population of Damyang is 40,726. The short medical supply in Korean insular areas eventually leads to long-term regional health inequity in regard to the quality and quantity of medical services. Figure 2 presents the status of medical care on Korean islands compared to the rest of the country.

A public health infrastructure that functions appropriately requires equilibrium between medical supply and demand. In the case of Korean insular areas, however, this equilibrium does not exist. Aside from geographic distress, the demand for medical resources has not been met in Korea's insular areas. The deepening health inequity has resulted in unnecessary deaths through traffic accidents. There is a greater need for emergency medical service in insular areas since the death rates by traffic accidents tend to be higher along the coastline

2 Korean Statistical Information Service, "Korea National Public Health Survey," [http://kosis.kr/abroad/abroad\\_01List.jsp?parentId=D](http://kosis.kr/abroad/abroad_01List.jsp?parentId=D) (accessed October 20, 2012).

and in insular areas. The correlation between mortality by traffic accidents and the demand for emergency medical services is inevitable because the most effective way to increase the chances for emergency patients' survival is to provide prompt medical treatment.

Korean insular areas are burdened by the enduring medical shortage and health inequity, indicating an urgent need for measures to reduce the medical gap. Thus, realistic solutions will require government support through appropriate public health policy, public and private partnerships and a commitment of medical resources. The most important objective is to achieve health equity in the most effective manner.

### U-healthcare as a Solution to Health Inequity

One innovative solution to the regional health inequity in Korea's insular areas is U-healthcare. U-healthcare, an abbreviation for "ubiquitous healthcare," is the application of IT (information technology), biotechnology and nanotechnology to provide healthcare service in terms of prevention, diagnosis, treatment and post-treatment with no time or space limitations. This new paradigm of healthcare service enables ubiquitous management of health, which can transform the conventional concept of medical service. Service models for U-healthcare can be divided into three categories: mobile healthcare, U-hospital and a wellness program. Figure 3 explains the model in more detail.

The actual effect of U-healthcare has been recognized as a success. Dr. Ahn Chul-woo's research team at Yonsei University's College of Medicine demonstrated the effectiveness of the home healthcare system for diabetes patients. 35 diabetes patients who participated in the research used the home healthcare system for blood glucose management for 12 weeks; their average fasting glucose level dropped from 159 mg/dl to 132 mg/dl, indicating a 17 percent decrease. In contrast, the control group did not show any signs of significant changes.<sup>3</sup> This research sheds light on the development of U-healthcare, which will offer myriad possibilities in managing chronic diseases such as diabetes.

U-healthcare is an effective tool to close the medical gap between mainland and insular areas of Korea. The reasoning behind the U-healthcare as a feasible solution to the regional health inequity is straightforward: U-healthcare has the potential to significantly enhance the accessibility to better quality medical services and thus resolve the inaccessibility problem, which is a root cause of health inequity in Korea's insular areas.

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3 Chul-joong Kim, "Medical treatment anywhere, anytime: U-healthcare in Korea bound by regulation" *Chosun Ilbo*, February 21, 2012.

**FIGURE 3: U-HEALTHCARE SERVICE MODEL**

Category	Project Title	Contents
Mobile Healthcare	U-glucose management (KT-Incheon Choongang General Hospital)	Mobile glucometer
	U-healthcare service(Catholic University of Korea)	Online diabetes management program
U-hospital	U-health consulting (KT-GC healthcare*)	KT health consulting service to provide health related information, health consultation, medical checkup appointment, illness management, visiting nurse service
Wellness	U-health service project (Songdo International Business District)	Collaboration of preventive medicine and residential environment
	U-health behavior management (Asan city)	Physical activity and nutrition management service tailored for individual citizen's health status Electronic record system and management for physical exercise via RFID system** Joint remote medical consultation appointment for Asan city public health center and Soonchunhyang University

KT-GC healthcare\*: Korea Telecom and Green Cross Healthcare joint project

RFID system\*\*: Radio-frequency identification system is a system that uses wireless non-contact system to transfer data from a tag attached to an object

**FIGURE 4: EXAMPLES OF U-HEALTHCARE DEVICES**

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Life vest that analyzes the blood pressure, body temperature, heart rate, breathing, movement of the legs and other functions.



Remote control device for medical treatment that enables telemedicine via a built-in camera and transmits the medical records to the hospital.



Wrist device for healthcare that monitors blood pressure, body temperature, heart rate.



Heart rate tracker for the elderly.



Mobile ultrasound diagnoser.



Mobile electrocardiographer that transmits the information to the hospital.



Wireless exercise measuring device.



Artificial intelligence toilet that monitors weight, body temperature, blood pressure and transmits the information to the computer.

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Source: Chul-joong Kim, "Medical treatment anywhere, anytime: U-healthcare in Korea bound by regulation" *Chosun Ilbo*, February 2, 2012.

## Overview of U-healthcare in Korea

Over the past five years, U-healthcare services in Korea have been at a deadlock due to strict regulations and controversy among different interest groups. The current medical law in Korea prohibits the practice of remote medical treatment by physicians. In other words, a patient should visit a doctor in person to get a prescription. Although there have been several pilot projects for U-healthcare in insular areas and prisons in Korea, the medical treatment via U-healthcare is allowed only if a doctor or nurse is present.<sup>4</sup> Korea's National Assembly continues to debate measures to promote U-healthcare legislation, but it has not made significant gains because of strong opposition from the Korean Medical Association. The members of the Korean Medical Association argue that U-healthcare will bring about huge confusion because it has yet to be fully developed. The main reasons cited by those opposed to U-healthcare include: legal complexities in the case of medical malpractice, complexities in medical insurance fees, indiscreet disclosure of personal medical records and a lack of training programs for U-healthcare experts.<sup>5</sup>

However, the benefits from U-healthcare override those legal concerns, which will be resolved in due time. First of all, the U-healthcare market will boost the economy along with the development of medical technology. As Korea is recognized as one of the world's IT leaders, technological development for the U-healthcare market is also growing at a rapid pace. Investments in U-healthcare businesses are continuing to increase.

Secondly, despite the obstacles and challenges to U-healthcare in Korea, it is expected to bring a promising future to the medical services for the underprivileged population. Since U-healthcare is based on the remote interaction between healthcare providers and patients, the geographic coverage of the service area will be greatly increased. Therefore, U-healthcare will contribute to reducing regional health inequity in insular areas to a large extent. Recently, a number of U-healthcare mobile devices have been introduced by domestic medical technology companies, which have proven to be the driving force for the development of the U-healthcare market in Korea. Figure 4 provides examples of U-healthcare devices used for the management and regular checkup for the health-related index and health risk factors. Some are in the process of development and others are currently in use.

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4 Ibid.

5 Seong-woo Kim et al, "Overview of Recent Trend of U-healthcare Market," *DigiEco Focus* (KT Economics & Management Research Institute, 2009): 9.

## Conclusion

In this essay, the regional health inequity of Korea's insular areas has been discussed and the concept of U-healthcare proposed as a key to reducing health disparities. As discussed, Korea's insular areas are vulnerable to a chronic shortage of medical supplies due to complicated economic, social and political reasons, resulting in extensive inaccessibility to medical services. It seems evident that the geographic isolation of the insular areas is unavoidable. Despite the "tyranny of distance," technology and human effort can make a difference in bridging the healthcare divide between insular and non-insular areas. In this regard, U-healthcare is the way towards health equity, eliminating physical barriers to improve the public health situation of insular regions. If utilized, U-healthcare will enable the mobilization of medical resources so that they can be delivered to anyone, anywhere and at any time. **YJIS**