



Hochschule für Angewandte
Wissenschaften Hamburg
Hamburg University of Applied Sciences

Hamburg University of Applied Sciences
Faculty Life Sciences

**Public Health Framework and Population Health in Two
Converging Koreas: a Critical Literature Review**

Master thesis
Master in Public Health

Submitted by
Soo Jung Kim
Matriculation Number: XXXXXXXXXX

Hamburg
5th of May 2020

1. Advisor: Prof. Dr. York Zöllner (HAW Hamburg)
2. Advisor: Wiebke Bendt, MSc (HAW Hamburg)

Acknowledgments

Writing this thesis was a dream come true as my passion for population healths for two Koreas in times of closer convergence inspired me to pursue further studies in Public Health. Once a passing thought, I now find myself finishing up and getting ready to submit the thesis. Among many blessings, complete support from my husband and the endearing love from my daughter sustained my pursue to complete the writing. Without them, I would not have found enough time and energy.

I also would like to take this opportunity to express my sincere appreciation and respect for my supervisor, Prof. Dr. York Zöllner. A great professor in MPH academic modules, he was also an excellent supervisor for the thesis writing. His honest feedback along with encouragement guided me to read my thesis with a different perspective. Even with his very busy schedule, he maintained regular correspondences, answering my numerous questions. Moreover, I would like to thank Wiebke Bendt, MSc, for readily agreeing as a second supervisor. Pressured with various other tasks and the COVID-19 incidence, she always responded to my inquiries with warm words and encouragement.

Besides, I should not forget to express my gratitude to several professors at HAW MPH. I used several materials from MPH courses. Professor Ahmed's introduction to the Global Burden of Diseases (GDB) published by the Institute for Health Metrics and Evaluation (IHME) was essential as it eventually took up a substantial part of the thesis. Theories learned in Health Economics and Epidemiology were also mentioned and applied.

While I do not know the very next step after the submission of this thesis, I give my thanks to God who made all this possible. Once just a thought became experience and knowledge. This thesis is a final product of the MPH studies at HAW. Yet, I believe and hope this will be the beginning of another dream coming true.

Table of Contents

Acknowledgments.....	II
Table of Contents.....	III
List of Figures.....	V
List of Tables.....	VI
Abbreviations.....	VII
Abstract.....	IX
1. Introduction.....	1
1.1 Problem Definition.....	1
1.2 Research aim and objectives.....	4
2. Methods.....	5
2.1 Overview.....	5
2.2 Literature sources and searches.....	5
2.3 Inclusion & exclusion criteria.....	9
2.4 Data extraction.....	9
2.5 Literature review on German unification.....	9
3. Background & Current Affairs.....	11
3.1 Ideological foundation of public health framework in DPRK: Juche & Military-First.....	11
3.2. Current Ideology under Kim Jong-un: Party First and private markets.....	11
3.3 The legal frames of DPRK and ROK public health.....	12
3.4 Economics sanctions and foreign relations of the DPRK.....	14
4. Results.....	16
4.1 Basic healthcare provision of two Koreas: insufficient essential healthcare resources for DPRK vs. widening and deepening UHC for ROK.....	16
4.1.1 The reliable public health system in the 1980s and following changes due to the economic crisis in 1990s: DPRK.....	16
4.1.2 Shortage of essential medicines, medical equipment, and professionals in DPRK.....	17
4.1.3 Involuntary & partial marketization of the healthcare system.....	20
4.1.4 UHC coverage gap and further deepening & widening.....	22
4.1.5 A rapidly aging population in two Koreas and UHC.....	24
4.2 The burden of disease in DPRK and common risks for the population in two Koreas.....	27
4.2.1 Disability-adjusted population health of two Koreas.....	27
4.2.2. Infectious disease in DPRK & mutual concerns with ROK.....	31

4.2.3 DPRK’s relatively superior disease management compared to the similar socio-economic level countries	34
4.3 Nutrition, food security, and basic sanitation for children in DPRK	37
4.3.1 Advancements and shortcomings of the of North Korean children's nutritional health	37
4.3.2 Inequity observed for nutritional status of children: regional and age	39
4.3.3 Water, sanitation, and hygiene (WASH) stature in DPRK	43
4.4 Role of the UN agencies & International Non-Governmental Organizations (UN-INGOs) for North Korean population health & cooperation with ROK: humanitarian aids, reliable data collection, and sustainability	45
4.4.1 Providing first aids for population health in DPRK	46
4.4.2 Procuring quantitative and qualitative data on DPRK public health: Livelihood surveys & MICS	48
4.4.3 Monitoring and evaluation efforts of UN-INGOs & limitation	50
4.4.4 ROK’s humanitarian aids provision through UN-INGOs	51
4.5 German Unification as a road already traveled	54
5. Discussion	58
5.1 Summary of findings	58
5.2 Discussion of findings	61
5.2.1 Methodology	61
5.2.2 Discussion of Results	62
5.3 Strengths and limitations	64
6. Conclusion & further research	67
References	i
Statutory declaration	ix
Appendix	x

List of Figures

Figure 1: Evolving Public Health Legislation - DPRK.....	13
Figure 2: Evolving Public Health Legislation – ROK.....	14
Figure 3: HAQ index of DPRK & ROK (1990, 2000, 2016).....	19
Figure 4: Sources of healthcare spending in DPRK & ROK.....	21
Figure 5: Age & sex distribution of DPRK household population in 2017.....	25
Figure 6: DPRK life expectancy (1990-2017).....	26
Figure 7: Causes for the death and disability combined (DPRK & ROK, 2007-2017).....	29
Figure 8: Risk factors for the death and disability combined (DPRK & ROK, 2007-2017).....	30
Figure 9: Causes of premature death in DPRK (1990, 2010).....	35
Figure 10: Infant and child mortality rates in DPRK.....	38
Figure 11: Anthropometric malnutrition indicators in DPRK.....	39
Figure 12: Anthropometric malnutrition indicators by age in DPRK.....	41
Figure 13: Early initiation of breastfeeding and minimum diet diversity in DPRK.....	42
Figure 14: Nutritional status of children in DPRK.....	43
Figure 15: province data on stunting, overweight, and wasting in DPRK.....	43
Figure 16: a household population with safely managed drinking water services.....	44
Figure 17: UN’s targeted beneficiaries by sector.....	47
Figure 18: Composition of aids.....	53

List of Tables

Table 1: Major Research Sources by Type of Organization.....	8
Table 2: Comparative proportion of OOP expenditure in ROK and OECD (2011-2015).....	22
Table 3: Cost structure changes for elderly care home after the ‘Moon Jae-In Care’ (low 25-50% Percentile of NHIS).....	23
Table 4: Notification and TB and RR/MDR-TB cases in DPRK (2012-2017).....	32
Table 5: New TB case notification by type of TB: ROK	33
Table 6: Comparative TB incidence in 2018 (per 100,000).....	33
Table 7: Country benchmarking of the burden of disease.....	36

Abbreviations

CBS	The Central Bureau of Statistics (DPRK)
CMNN	Communicable, maternal, neonatal, and nutritional diseases
DALYs	Disability-adjusted life years
DHS	Demographic & Health Survey
DPRK	Democratic People’s Republic of Korea
FAO	Food and Agriculture Organization
FRG	Federal Republic of Germany
GDR	German Democratic Republic
HAQ	The Healthcare Access and Quality
HBV	Hepatitis B virus
IHME	The Institute for Health Metrics and Evaluation
INGOs	International Non-Governmental Organizations
LSMS	Living Standards Measurement Study
MDR-TB	Multi-Drug Resistant Tuberculosis
MICS	Multiple Indicator Cluster Survey
MOHW	Ministry of Health and Welfare (ROK)
MoPH	Ministry of Public Health (DPRK)

NCD	Non-communicable diseases
2019-nCoV	Novel Coronavirus
NHIS	National Health Insurance Service
OECD	Organisation for Economic Cooperation and Development
OOP	Out of pocket expenditure
ROK	Republic of Korea
SDGs	Sustainable Development Goals
TB	Tuberculosis
UHC	Universal health coverage
UNICEF	The United Nations Children's Fund
UNFPA	The United Nations Population Fund
UNDP	The United Nations Development Programme
UN-INGOs	UN agencies & International Non-Governmental Organizations
UNSAID	The United States Agency for International Development
US	The United States
WASH	Water, sanitation, and hygiene
WHO	World Health Organization
WFP	World Food Programme

Abstract

Objectives: Population healths in the Democratic People's Republic of Korea (DPRK) and the Republic of Korea (ROK) appeared to differ largely. The objective of this thesis was to study the public health framework and population healths of two Koreas, with a particular emphasis on DPRK.

Methods: A literature review on Pubmed produced twenty peer-reviewed publications. Further literature review on the ROK National Knowledge Information System (NKIS) resulted in six findings. Employing document analysis methods, numerous reports and survey findings published by the International Non-Governmental Organizations (INGOs) along with the DPRK government announcements were closely examined. As a reference, a separate literature review was conducted on the German unification and the Eastern German population health.

Background: Since the 1950s, DPRK has been legally committed to providing universal health coverage (UHC), stressing preventive medicine and sector doctor system. However, due to strained foreign relations, economic hardships, and natural disasters, the state has mostly failed to provide UHC. While the current leader, Kim Jong-un, has urged for improvements in public health, the population health relies heavily on medical resources from the private market.

Results: In contrast to ROK, striding to advance UHC, DPRK has encountered a shortage of essential medicine, equipment, and medical personal. Yet, existing and remaining infrastructure in DPRK such as hospitals can speed up the potential recovering efforts in the future. Despite appearing differences, two Koreas share similar risks and causes for premature deaths. The overall mortality rate of the DPRK children has improved but many still suffer from an inadequate level of nutrition and sanitation. DPRK is encouraged to further cooperate with INGOs and ROK. The German experience can offer specifics to avoid or learn for two Koreas.

Conclusion: With a potential increase in contacts, two Koreas are at an opportune moment to partner over the peninsula's population health. INGOs' continued participation in the trusted and committed relationship of two Koreas is highly encouraged as well.

Keywords: North Korea, South Korea, DPRK, ROK, Unified Korea, and Population health

1. Introduction

1.1 Problem Definition

The economic and social conditions of the DPRK fared comparably with ROK up until the 1970s. DPRK with more abundant natural resources maintained a stable trading partnership with the Communist bloc. However, with domestic and international challenges such as the fall of the Soviet Union, the DPRK economy started to experience a significant decline in the 1990s especially compared to its counterpart, ROK. (Mckibbin et al., 2017) Along with the economic deterioration, public health structure has been crumbling as the country struggled with food shortage and resource depletion. Widespread malnutrition, lack of sanitation installations, and very few functioning healthcare facilities would accelerate the spread of infectious transmission and premature death rates especially among vulnerable groups of children under five and pregnant women.

Humanitarian aids for DPRK which aim to assist in basic healthcare have struggled mainly due to sanctions from the international community. The United Nations Security Council and the United States (US) prohibit all exports to North Korea that are directly and indirectly related to the arms proliferation in DPRK. (Park, K.B. et al., 2018) As the protocol includes ‘indirect’ effects, subjective interpretation can include even humanitarian relief goods in the category. The secondary boycott imposed by the US since September 2017 threatens a boycott for any individuals or entities who engage in designated dealings with DPRK. (USDT, 2019) Although humanitarian aids are officially exempted from the sanction list, the embargo has resulted in reduced funds from international donors. Even reliefs already collected by charities and international organizations have encountered barriers in financial transactions and shipments. Donor organizations need basic infrastructures such as bank transactions and shipments. However, few private companies and individuals would risk potential sanctions from

the US. Prices for the transportations have also increased as few are willing to engage in business affairs related to the DPRK. (UNDPK, 2019a) Although many argue that the humanitarian causes should be separated from politics, in reality, it goes hand in hand.

As shown in dealings with ROK and with the international community including the US, foreign affairs continue to change and their impacts on humanitarian aid efforts are significant.

Meanwhile, DPRK's doctrine has not changed. *Juche*, self-reliance, has served as a foundation for politics, society, and economics since the 1950s. (MOR, 2018a) DPRK's adherence to *Juche* has remained strong until today although the regime has much idolized the Kim dynasty as a principle. Following the failed talk at the Vietnam Summit 2019, Kim has reiterated the importance of *Juche* in economic developments, independent of the exterior aids. In his policy speech at the First Session of the 14th Supreme People's Assembly on 12 April 2019, Kim emphasized 'Juche-oriented stand,' 'self-development,' and 'self-reliance,' several times. (RS, 2019a) DPRK's mouthpiece, Nodong Sinmun has written several editorials and also highlighted the logic and purpose of a nation reinforced through independent efforts. (RS, 2019b)

Recognition as a legitimate state is imperative for DPRK as well. The US and Japan do not maintain diplomatic relations with DPRK. (USDS, 2018) ROK, for historical and political reasons, does not recognize DPRK as a legitimate state. Following a recent summit of Russian President Vladimir Putin and Kim, speaking on behalf of Kim, Putin mentioned that the international security guarantee was pivotal for DPRK. (FR and Denyer, 2019) DPRK often argues that its nuclear weapon capability serves as a defensive measure for exterior aggression.

Achieving an effective healthcare system armed with operational sanitary practices and adequate nutritional levels is part of DPRK's fundamental value, *Juche*. Self-reliance effectively applied for public health policy would mean a state with sustainable and functioning healthcare practices. Showing its commitment to achieving a better future for all, the DPRK government has also endorsed the Sustainable Development Goals (SDGs). The 17 SDGs are adopted by all United Nations member states in 2015, agreement on ending poverty, reducing inequality, and

improving health and education for all. (SDG, 2015) The healthy population makes a strong country. Moreover, a state who cannot provide basic sanitation facilities, healthcare services, and sufficient nutrition would not easily convince other states to recognize her as a legitimate state. Thus, attaining an internationally acceptable level of the population health is on the way toward achieving self-reliant state and it would facilitate the international community to respect DPRK as a lawful state.

1.2 Research aim and objectives

As a reclusive state, DPRK draws much attention from the international community and many academic publications have examined humanitarian concerns in DPRK. Researches based on defectors' testimonies particularly have shed some light on nutritional and healthcare provision shortcomings for a large part of the population. (United Nations Human Rights, 1996) On the other hand, scholarly works have largely neglected the implications for relevant population health status in the event of converging Korea. Up to which extent the current population health status of two Korea disparate or compare with each other?

The following thesis attempts to fill in the gap with an **overall research aim** of

: critically reviewing the literature to analyze the public health framework and population healths of two Korea, particularly focusing on DPRK.

In order to fulfill the aim, the author studies the practice of healthcare and population health status of two Korea as well as humanitarian aids for DPRK. Additionally, lessons learned from the German unification are briefly examined for applicability for the road ahead for converging Korea.

Supportive of the overall research aim, the following specific **objectives** are identified.

1. To assess comparatively basic healthcare provisions in the DPRK & ROK (SDG 3)¹
2. To evaluate population health of the DPRK in comparison with ROK, particularly focusing on food security, nutrition, and basic healthcare services for infants and children as indicators for future population health in DPRK ((SDG 2,3,6,10)¹
3. To identify the role of INGOs over the population health of DPRK
4. To explore the case of German reunification and its relevance for converging Korea

¹ Refer to Sustainable Development Goals Number 2,3,6,10 (United Nations Sustainable Development Goals, 2015)

2. Methods

2.1 Overview

As the main methods, this paper relies on literature review and document analysis. The structure of the literature review follows the design of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines from PRISMA. Searched works of literature are selected and analyzed according to the STROBE checklist for combined observational study design. Besides, upon consultation with an expert, it is decided that official documents, grey sources, as well as published works would be researched, reviewed, and qualitatively analyzed. Initial research reveals the importance of setting the research criteria. Sources should be relevant and reliable.

Critical analysis of official documents and secondary sources from ROK government agencies, non-academic journals, and the international organizations would constitute the backbone of the research as they provide solid background information as well as up-to-date quantitative and qualitative data available from DPRK. Data collected by international organizations residing in DPRK and by refugees defected from the regime would be used for different purposes. However, each source alone has limitations which would be further discussed below and the sources would rather complement and verify with each other. A search on *PubMed* resulted in a collection of peer-reviewed findings and its limitation is discussed below as well.

2.2 Literature sources and searches

A literature review is conducted on NKIS, a comprehensive forum of all policy-related findings from government-affiliated organizations in ROK. The flow chart illustrates the process. Most findings are secondary sources published both in paper and online and they used government-affiliated organizations as platforms. Chosen secondary sources on NKIS supplied extensive and

in-depth knowledge for population health status in DPRK. Sources specifically addressing various aspects of population health in DPRK published 2017-2019 are chosen. The Moon administration in ROK is inaugurated in 2017 and significant diplomatic activities have been initiated and progressed since 2017. A few sources on NKIS are published in late 2018 and early 2019 and they contain up-to-date figures on DPRK's population health. Despite the lack of peer-reviewed materials, several experts often have co-authored the literature and published on a government branch platform. Findings would be also compared to those of official documents from international organizations and peer-reviewed academic papers, which partially fulfill the criteria of authenticity and reliability of the sources.

While many international organizations are searched for relevant information, organizations residing in DPRK are closely explored. These organizations have had relatively constant communication with the DPRK government and they have observed directly and indirectly the practice of healthcare and population health status in DPRK. Official publications, periodic brief, and written pledges from the program directors are studied and analyzed. Such document analysis provides valuable insights into immediate needs in the DPRK population health along with quantitative figures that are often missing from DPRK related publications. The data extraction table² illustrates the major findings that would be further analyzed. As all international organizations residing in DPRK inevitably collaborate with the local government agencies, the data accuracy may have been compromised. However, these agencies continue monitoring their program effectiveness with the reporting responsibility for donors. Although DPRK often boasts its economic and military self-reliant capabilities, the regime has to show vulnerabilities to be qualified for the aids program. For this purpose, the DPRK government occasionally conducts the statistical activities often in cooperation with these international organizations residing in DPRK. Thus, data extracted from these agencies are often the best available and quite reliable references today regarding DPRK.

² Refer to Appendix

Among publications co-produced by international organizations and the DPRK government, the 2017 Multi-Indicator Cluster Survey (MICS) calls for special attention. The Central Bureau of Statistics (CBS) performs the household level survey with technical support from UNICEF. Published in June 2018, the survey vividly portrays the DPRK population health status, particularly of children and women. The survey employs indicators associated with child mortality, maternal health, nutrition, education, safe water and sanitation level, and violence afflicted on vulnerable populations. MICS 2017 report covers all provinces and findings are based on interviews with 8,500 households. (MICS, 2018) This thesis employs specific findings from the survey and adopts the survey's strategic objectives as investigative categories as well.

In addition, in accessing the population health of two Koreas, Global Burden of Diseases (GDB) published by the Institute for Health Metrics and Evaluation (IHME) for the world population and country specifics are carefully studied. IHME reports are evidence-based and incorporate injuries to the death rate in accessing population health status. GDB 2017 particularly studies in detail which provides comparative information for two Koreas regarding mortality, life expectancy, causes of death and years of healthy life lost, years lived with disability, the overall burden of disease, risk factors, and the chances of nations meeting the health-related SDG indicators. (IHME, 2019)

A systematic review of Pubmed produces twenty peer-reviewed publications. The flow chart³ illustrates the process. While providing valuable information with peer-reviewed evidence, few journals are referenced in this paper mainly due to too much discussion focused on refugees from DPRK. Most accounts narrate traumatic experiences in DPRK and throughout the defecting period. Such personal psychological aspects can deviate the purpose of this paper which intends to treat the public health framework and population health in DPRK based on scientific and objective resources.

³ Refer to Appendix

Finally, further document analysis of North Korean newspaper articles reveals current developments in politics and the diplomatic situation concerning DPRK. Rodong Sinmun, a mouthpiece of the DPRK government, is searched and some articles and editorials are quoted to represent the voice of the current DPRK government. Already existing conceptual models may be used to develop arguments. Moreover, German Unification would be briefly discussed to establish similarities and differences to the Korean peninsula division and the approach to improving population health in East Germany before and after the unification.

Table 1: Major Research Sources by Type of Organization

Type of Organization	Name of Organization	Nation / Entity	Types / Methods
Government	Ministry of Unification	ROK, Germany	Document Analysis
	Statistics Korea	ROK	Document Analysis
	Institute for National Unification	ROK	Document Analysis
	National Knowledge Information System	ROK	Secondary Sources
	DRPK MoPH	DPRK	Document Analysis
	Department of Treasury	US	Document Analysis
	Department of State	US	Document Analysis
International Organizations	Security Council	UN	Document Analysis
	UN Human Rights	UN	Document Analysis
	UN-INGOs in DPRK	UN	Document Analysis
	UNICEF	UN	Document Analysis
	FAO	UN	Document Analysis

	WHO	UN	Document Analysis
Peer-Reviewed Search engine	PubMed	PubMed	Literature Review
Journals	Nodong Sinmun	DPRK	Document Analysis

2.3 Inclusion & exclusion criteria

Literature evaluating the association between DPRK’s political ideology and its impacts on the public health policy are included in the review. Publications on current population health of DPRK and ROK, proclamations over national health policy in DPRK, the literature on the experience of German unification, and testimonies of DPRK defectors currently residing in ROK are examined as well. On *PubMed*, the search is limited to 2015-2019. Publications are in English and Korean. Only ‘free full text’ are retrieved. Publications focusing on traumas of DPRK defectors are excluded although their testimonies regarding the current practice of healthcare in DPRK are included.

2.4 Data extraction

Through a three-step strategy, suitable articles are identified. Upon retrieving articles, titles and abstracts are first examined as the first filtering step to remove the irrelevant literature. Among the remaining articles, methodological aspects such as study design and analytical process are examined utilizing the STROBE checklist for combined observational study design. A data extraction table⁴ is created summarizing the findings.

2.5 Literature review on German unification

⁴ Refer to Appendix

A separate literature review is conducted using the PICO Tool and the topic is developed into a research question: after examining health indicator changes following the German unification, relevance to unified Korea would be considered. Through PICO Tool, East Germany is identified as population, public health policy as intervention, west German patients after the unification as a comparison, and health indicators as an outcome. Listed in PICO Tool as keywords, 'East Germany' and 'health indicators' are used to create search syntax which is used on 'PubMed'. Only English, free, and full-text would be included in the search. Only gender and children focused topics are excluded.

The search employs keywords/MesH and results in ten publications. After reading abstracts, four sources are chosen which provide the best evidence for the research question.⁵ Four sources are analyzed critically. Upon examining health indicator changes following the German unification, comparability to unified Korea would be considered.

⁵ Refer to Appendix

3. Background & Current Affairs

3.1 Ideological foundation of public health framework in DPRK: Juche & Military-First

DPRK can be described in three different eras depending on its supreme leader: the initial phase under the ruling of Kim Il-sung, the founding father of DPRK, the second phase under Kim Jong-il, the son and successor of Kim Il-sung, and finally the present ruling of Kim Jong-un. Due to changes in internal and external conditions, population health status in DPRK has continued to fluctuate. Since the Korean War and following the division in 1950, DPRK with its founding father Kim Il-sung has enacted laws based on its upmost important ideology, *Juche*, self-reliance over every aspect of the state ruling including public health. Strengthening internal communist ruling and facing China-USSR conflicts overseas, *Juche* conveniently has served the state's objective. (Ministry of Reunification, 2018a) *Juche* ideology involves cooperative communities and unconditional loyalty to the state and the DPRK legal frames and practices would reflect the ideology.

Facing limitations of *Juche* ideology, especially with the economic crisis in the mid-1990s, DPRK introduces a new ideology called *Military-First* and it would be incorporated with *Juche* thereafter. Policies relying on *Juche* have weakened DPRK politically, economically, and even militarily with the sole purpose of strengthening the one person ruling system. *Military-First* gains support from the military which would guard the existing ruling power and the ideology influences all aspects of the state including healthcare. (Ministry of Reunification, 2018a) For example, the state would campaign for improved healthcare for a strong military. The military may get the ration while the public starves which has been the basis for the criticism from international communities.

3.2. Current Ideology under Kim Jong-un: Party First and private markets

Kim Jong-un succeeds in the supreme leadership position following his father Kim Jong-il's death. Officially recognized by the DPRK Constitution since April 2012, Kim Jong-un has controlled the Party, the military, and the governing branches: legislative, executive, and judicial. Under Kim Jong-un's leadership, the Party particularly is regarded as the center of power. (Ministry of Reunification, 2018b) The young leader often urges socioeconomic developments. Kim Jong-un has even actively employed private markets to boost the DPRK economy. (Ministry of Reunification, 2018a) Systemized private markets have already become an important part of the national economy. The Leader's New Year address in January 2020 also urges improvements over agricultural production level and public health. (Rodong, 2020)

3.3 The legal frames of DPRK and ROK public health

Since the 1950s, DPRK enacts public health legislation providing free healthcare with particular emphasis on preventive medicine thus claiming UHC. DPRK also introduces a unique system designating a doctor in charge of each pre-divided area, a sector doctor system. (Park H, 2018) *DPRK Socialist Constitution* Article 56 clearly states that “the state advances free medical care, strengthens sectorally designated doctor system, protects lives through preventive medicine, and finally improved the health of workers. (Hong, J. and Kim, S. and Jeong, E. 2018) DPRK first formalizes its public health structure in 1946 through *Social Insurance Law*. Free medical care introduced in 1953 covers treatment expenses for veterans from the Korean War. (Hong, J. and Kim, S. and Jeong, E., 2018)

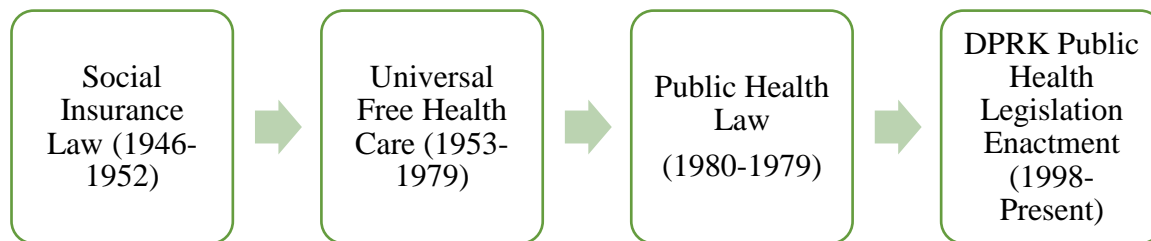


Figure 1: Evolving Public Health Legislation - DPRK

(Source: created using Park, H., 2018)

In April 1980, DPRK passes *Public Health Law* which further strengthens its public health governing principles such as preventive medicine and free medical care. Article 2 of *Public Health Law* proclaims that “the state further advances comprehensive free medical care”. Article 3 states that “the basis of the socialist medicine is preventive medicine”. (Park H, 2018) Furthermore, in January 1998, DPRK declares *Healthcare Legislation*, continuing the value of *Public Health Law*. The new legislation states detailed classifications and instructions over various health-related governing principles. Article 1 states the basis of *Healthcare Legislation*, Article 2 provides instruction for medical diagnosis and screening, Article 3 describes patients' treatments, Article 4 mentions medical evaluation, and Article 5 dictates instructions for medical services. (Park H, 2018) Further utilization of traditional medicine is strongly encouraged as well. *Healthcare Legislation* Article 31 states “medical institutions must accept treatments and medicine from traditional medicine”. (Hong, J. and Kim, S. and Jeong, E., 2018) Traditional medicine not only would fulfill the state's pride as originated on its own but also would source necessary equipment and medicine within the territory. Traditional medicine would fit the *Juche* ideology.

Since the Korean War and following division in the 1950s, DPRK and ROK diverge greatly regarding public health legislation. In contrast to DPRK, initial healthcare in ROK mostly involves private care along with social health insurance schemes. ROK focuses more on treatments rather than prevention. Until 1989, when the National Health Insurance starts to cover basic healthcare, South Koreans pay entire medical bills out of pocket. (Park H, 2018) Except for very few public hospitals financed by the governments, most hospitals and clinics are initially private.

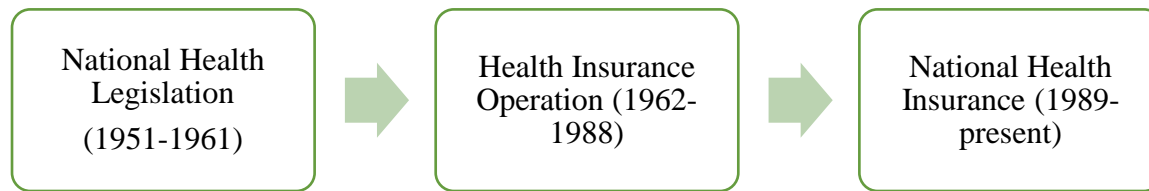


Figure 2: Evolving Public Health Legislation - ROK

(Source: created using Park, H., 2018)

Economic developments enable the initiation and expansion of the National Health Insurance in ROK. As most funds for National Health Insurance are sourced from direct contributions, South Koreans with higher income could afford higher contribution rates and the government allocates part of its budget to the Insurance as well. (Young-Rae Song, 2018) In the 1950s, North Korea has a similar level of GDP per capita to South Korea, but their gap has been remarkably widened over time. The Bank of Korea estimates that North Korea's per capita income, at USD 1,200, is less than 5% of South Korea's in 2015. (McKibbin W.J. et al. 2017) As DPRK healthcare is officially all offered from public funds, the national economy would have to be much improved and stabilized to support the proclaimed universal health coverage.

3.4 Economics sanctions and foreign relations of the DPRK

Considering the impacts of politics and foreign relations on humanitarian aids and population health of DPRK, the current foreign relations of the DPRK remains vital to examine. While the effectiveness of embargo on denuclearization in DRRK remains unclear, it has hurt the regime enough for the supreme leader of DPRK to meet the president of the US to discuss denuclearization in return for the sanction removal. In February 2019, Donald Trump of the US and Kim Jong-un of DPRK meet in Hanoi, Vietnam. A second summit following the previous in Singapore, Trump emphasizes potential economic success for DPRK resulted from the sanction lift and the foreign investments and asks denuclearization in return. Kim asks for an end to the

tough sanction imposed on DPRK. Upsetting rosy outlooks before the summit, two parties party abruptly from Hanoi and the negotiation halts. (FR and Simon, 2019) Since then, the bilateral relationship has not improved although it has not been deteriorated significantly either. It also means that aids for population health in needs have not reached DPRK due to the persisting sanctions measures.

Throughout these summits, President Moon Jae-in of ROK has acted as a moderator for Trump and Kim. Moon must have recognized the importance of the amicable relationship between the US and the DPRK. ROK has maintained a strong military alliance with the US and remains largely under the U.S. influence economically, politically, and militarily. Even if ROK makes a bilateral agreement with DPRK to provide humanitarian aids, efforts are limited as ROK cannot simply ignore the terms set by the U.S. on its allies and the international community. Yet, DPRK may start regarding ROK as a reliable development partner especially in healthcare and basic infrastructure improvements. According to Article 2.4 of the Pyongyang Joint Declaration, September 2018, Moon and Kim agree on cooperation over infectious disease spread and transmission across the border. (Park, 2018) Although deliberations have been delayed mainly due to the resolutions of the United Nations Security Council and the U.S., it is an important step forward for cooperation over public health developments in DPRK. Measures would benefit both ROK and DPRK.

4. Results

4.1 Basic healthcare provision of two Koreas: insufficient essential healthcare resources for DPRK vs. widening and deepening UHC for ROK

4.1.1 The reliable public health system in the 1980s and following changes due to the economic crisis in 1990s: DPRK

People in DPRK belong to organized communities from births to deaths. As shown in the sector doctor system, public health is community-based. Designated doctors and clinics in a sector would be in charge of the residents living there, providing primary care. Throughout obligatory schooling years, pupils register to the designated organizations. Even housewives and elderlies would have their assigned organizations to join. (Ministry of Reunification, 2018b) Public health services would be provided through these organizations as well.

Public Health Law enacted in April 1980 guaranteed free medical care in DPRK and the state could provide basic healthcare coverage until the end of the 1980s. Socialist states tended to emphasize the importance of education and public health and the still surviving Eastern bloc traded with DPRK. Domestically, DPRK also followed the socialist's ideology valuing public health and implemented legislation accordingly. (Hong, J. and Kim, S. and Jeong, E., 2018) Specifically, weighting preventive medicine heavily, DPRK implemented national vaccination programs in the 1960s although the state did not provide a sufficient amount of medicine and equipment. Besides, the government strongly promoted public sanitation and personal hygiene. A sanitation pass was required for traveling domestically. Although sufficient medical training was questionable and limited to traditional treatments such as herbal medicine and acupuncture, DPRK built many hospitals and employed more doctors than South Korea. (Pak, Sunyoung, et al, 2011)

Starting from the 1990s, DPRK struggled to provide basic universal healthcare due to severe recession, natural disasters, and the fall of the Eastern bloc. The decline of the Socialist bloc drastically reduced the trading, series of natural disasters decreased the agricultural outputs, and the death of Kim Il-sung deteriorated the regime stability. (Hong, J. and Kim, S. and Jeong, E. 2018) The average GDP growth rate staggered at -4.6% in 1990-1995. (McKibbin W.J. et la., 2017) The Great Famine between 1996-1999 disabled the state to allocate enough resources in the healthcare sector which relied almost entirely on the public fund. (Ministry of Reunification, 2018a) When the population suffered from such prevalent hunger and public-funded hospitals were deplete of basic medicine and equipment to treat, DPRK's proclaimed universal health coverage and preventive medicine could not have served those in most needs.

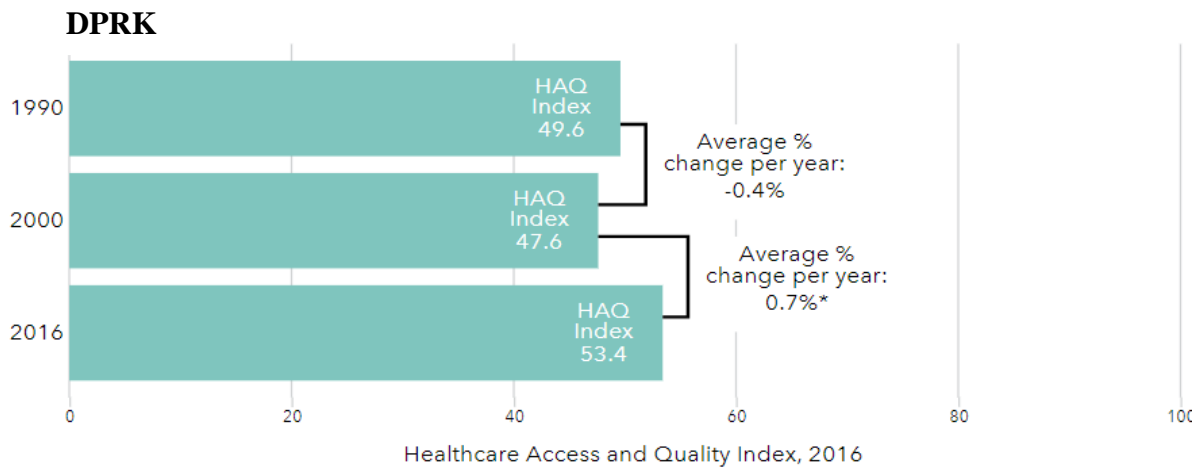
4.1.2 Shortage of essential medicines, medical equipment, and professionals in DPRK

As one of the most isolated states in the world, reliable data regarding essential medicine, medical equipment, and trained professionals have not been readily available. However, experts have made evaluations through sources such as international organizations residing in the regime and defectors' testimonies. The government occasionally publishes statistics as well although many questions the reliability. Such sources are to be further discussed below upon examination of international organizations in the DPRK. The availability of medical equipment is not only too few but also seriously outdated and mismanaged. (WHO, 2018) Published in the *World Bank*, physicians' density scored 3.7 per 1000 population for both 2016 and 2017. (The World Bank) Compared to 2.4 for ROK in 2017 and 2.9 for the Organisation for Economic Cooperation and Development (OECD) average in 2015, DPRK has a noticeably higher number of physicians available for patients. (The World Bank) However, the qualifications and standards of the physicians are questionable. (WHO, 2018) Moreover, defectors' accounts illustrate that even qualified physicians cannot provide medical service for patients when essential medicine and equipment are absent. According to the defectors' testimonies, patients have to procure medicine by themselves in case of operations or admissions. As hospitals are out of fuel, patients either have to pay extra for the heating cost or have to bring their sources of heating for admission. (Lee, K. et la., 2018) Lack of essential medicine, medical equipment, and trained professionals

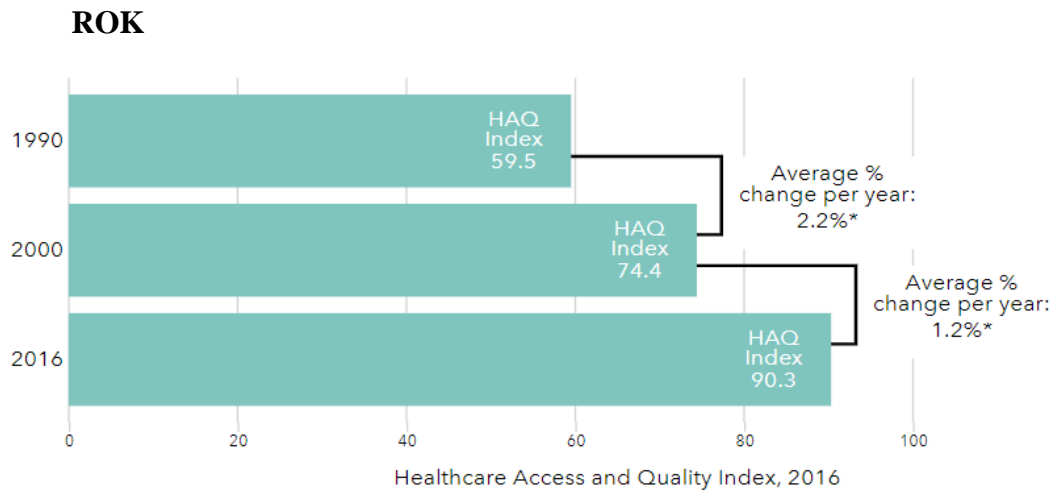
are evident as reports from international organizations and defectors' testimonies correspond to each other.

The Healthcare Access and Quality (HAQ) Index for DPRK and ROK illustrate the contrasting level of healthcare access and quality for two states. The index shows mortality-to-incidence ratios from avoidable deaths in the presence of adequate quality healthcare. (IHME, 2017a) The measurement regressed in DPRK over 1990-2000 and improved slightly over 16 years since 2000. The improvement between 2000-2016 was statistically significant. In contrast, ROK saw a statistically significant rise throughout 1990-2000 and continued to progress. In 2016, the ROK HAQ Index figure 90.3 compared to 53.4 DPRK HAQ.

How do personal healthcare access and quality measure up?



Stars indicate the average rate of change was statistically significant for that time period.



Stars indicate the average rate of change was statistically significant for that time period.

Figure 3: HAQ index of DPRK & ROK (1990, 2000, 2016)

(Source: IHME, 2017a & IHME, 2017b)

Despite such a shortage of essential medical goods and personals, DPRK has the potential to recover the basic healthcare offering for the population. Up to the 1980s, DPRK maintained basic healthcare provision. Although the sudden economic collapse since the 1990s has resulted in a serious shortage of provisions, facilities such as hospitals and clinics still exist. (Hong, J. and Kim, S. and Jeong, E., 2018) If enough medicine and equipment are provided, these medical facilities could again meet the basic needs of the population. Kim Jong-un has frequently urged improvements of the health sector, through New Year Speeches and Party Meetings. (Rodong, 2020) The Medium-Term Strategic Plan for the Health Sector (2016-2020) aimed to increase the proportion of the health sector up to 6.4% of the total expenditure. DPRK also proclaimed a constant increase over the public health expenditure: 113.3 % increase in 2017 and a 106% increase in 2018 compared to the previous year. (Lee, K. et la., 2018) Although such figures could be questionable due to the lack of auditable data, the leader's strong emphasis on the population health alone provides a potential for population health improvements.

4.1.3 Involuntary & partial marketization of the healthcare system

Extreme poverty and the state's distribution failure led to the black market formation in DPRK, also deepening inequity over the healthcare supply. Initially illegal, these private markets rapidly became part of the North Korean daily life. Starting to operate in the mid-1980s due to the sudden economic collapse, marketization started to take roots. The nationwide market networks were established by the end of the 1990s. (Ministry of Reunification, 2018a) The private market since then has compensated the collapsed centrally planned economy. In 2016, the market economy supposedly composed 28.6% of the total economy. (McKibbin W.J., 2017) Kim Jong-il attempted to control the expansion of private marketization through a currency reform. Such effort failed because the economy and daily life of North Koreans were already integrated with the market economy. Even a centrally planned economy and government budget were relying on the private market. (Ministry of Reunification, 2018a)

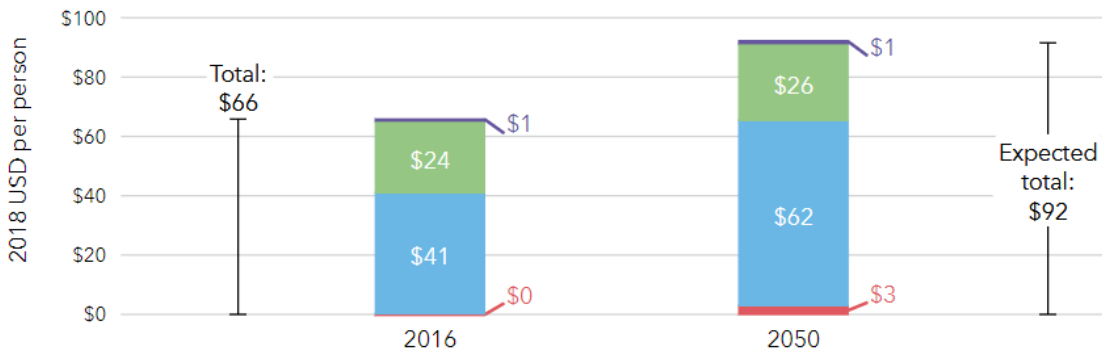
The state's pharmaceutical supply system collapsed in DPRK which led to the marketization of medical services and equipment. People started to rely on their capacities to secure daily basic goods including medical care. (Ministry of Reunification, 2018a) Defectors' testimonies have vividly described private healthcare services and the unofficial medical goods market. When patients are asked to bring their own medicine for admission, they would go buy medical equipment and medicine at the market. Doctors also charged doctor fees which went against the free UHC principle of DPRK. Patients would pay cash directly to the hospital doctors although all hospitals in DPRK were public and supposed to be free of charge. Upon admission, patients had to pay for heatings and meals separately. (Lee, K. et la., 2018) For gynecological treatments such as pregnancy care, abortion, and birth control, private clinics were regarded more highly than public and private clinics also cost more than public hospitals. Public hospitals failed to provide quality healthcare for free as promised and private clinics required even more money which poor often could not afford. As shown in Figure 4, the gap of two Koreas regarding the average total health spending per person is outstanding although the amount is expected to increase for DPRK in the next 30 years. Both Koreas exhibit relatively high relative out of pocket (OOP). In DPRK, average health spending was estimated at 66 USD per person in the

year 2016 and OOP expenditure was estimated at around 36%. It compared to the average health spending of 2,150 USD per person and OOP expenditure around 33% in ROK.

How much is spent on health – now, and in the future – and from which sources?

DPRK

- Prepaid private spending
- Out-of-pocket spending
- Government health spending
- Development assistance for health



ROK

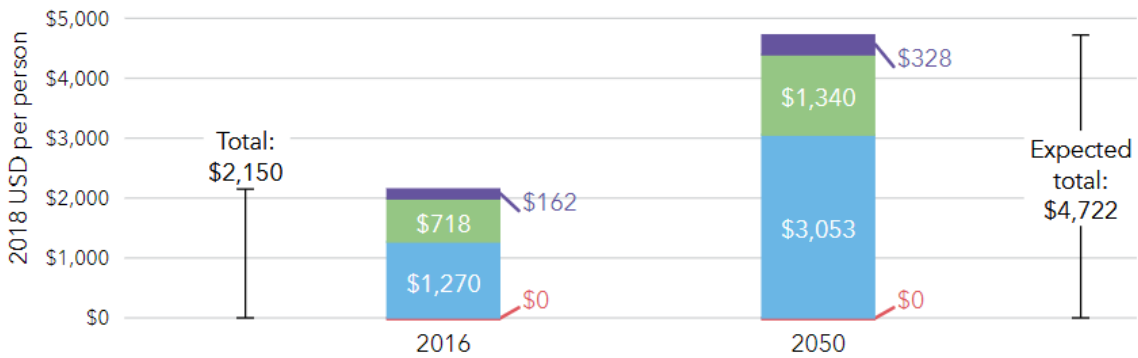


Figure 4: Sources of healthcare spending in DPRK & ROK

(Source: IHME, 2017a & IHME, 2017b)

As patients are asked to buy medicine at an unregulated private market, patients risk serious harm to health. The authenticity of the medicine and proper storage would be all questionable. While the government failed to provide the medicine through official channels, North Koreans have ventured into self-diagnosis. Proper medicine and illegal drugs would be sold at the same vendor in the market. Particularly concerning testimonies regarded use of illegal drugs such as methamphetamine which was often believed to be the cure for all. Some bought these illegal addictive drugs at the market or grew at home and used for treating various illnesses. Most were not aware of the life-threatening addictive properties. (Lee, K. et la., 2018) Either knowing the serious side-effects or not, these drugs became substitutes in easing the pain.

4.1.4 UHC coverage gap and further deepening & widening

Despite UHC attainment in 1989 and the expansion since then, South Korean UHC has not substantially expanded service and financial coverage levels comparable to the OECD average. Relative OOP expenditure in South Korea has remained around 33% while the OECD average has been around 14%. Half of OOP spending is deductibles and another half is non-reimbursable. (Young-Rae Song, 2018) Such a high OOP rate implies inequity and insufficient financial protection in health expenditures that should be guaranteed by UHC. The lower-income bracket would hesitate to seek healthcare services even in needs.

Table 2: Comparative proportion of OOP expenditure in ROK and OECD (2011-2015)

(Source: The World Bank – ROK)

Out-of-pocket expenditure (% of current health expenditure)					
	2011	2012	2013	2014	2015
Korea, Rep.	37.2	37.8	37.7	37.1	36.8
OECD members	14.4	14.3	14.5	14.2	13.8

Source: Health Nutrition and Population Statistics. Click on a metadata icon for original source information to be u

In order to address the high OOP rate, inequity, and financial burden due to healthcare costs, the current Moon Jae-in administration has initiated a bold reform in strengthening UHC in South Korea. ‘Moon Jae-In Care’ aims to eliminate clinically necessary non-reimbursable, reduce the burden from the deductible, and formalize catastrophic fund. Moon Jae-In care is to achieve the goal gradually over 5 years starting from 2017. (Jong-Myung Kim, 2017) The plan has addressed the core shortcomings of the National Health Insurance Service (NHIS) through comprehensive reforms on NHIS policies, social aids, and private health insurance regulations. South Korea is rapidly aging and the nation’s retirement and healthcare expenditure plan could not heavily rely on private insurance, especially for lower-income households. As shown in the example below, the care now provides significant aids for the elderly staying at long-term ‘care home’ and the deductible has reduced total OOP cost significantly.

Table 3: Cost structure changes for elderly care home after the ‘Moon Jae-In Care’ (low 25-50% Percentile of NHIS)

(Source: Hee-Jung Kang, 2018)

	Before the Care	After the Care
Total Cost	USD 2,000	USD 2,000
Reduction Rate	0%	40%
OOP Rate after Reduction	20% (no reduction)	12%
OOP	USD 400	USD 220

Moon Jae-In Care is still in its inception phase and the road ahead is not smooth. Opposition from political parties, medical providers, and insurance companies have been fierce. The public

is in favor of more service coverage through NHIS, yet remain skeptical about NHIS payment increases.

4.1.5 A rapidly aging population in two Koreas and UHC

Often regarded as a problem for developed countries, the DPRK population is rapidly aging. According to the *World Bank*, fertility rate which measures the birth number per woman recorded 1.9 in DPRK and ROK recorded 1.1 in 2017 while the OECD average was 1.7 and the low-income country average was 4.6. Starting in 1969, the fertility rate has gradually fallen in DPRK from 4.35 to 1.9 in 2017. (The World Bank, 2017) Fertility rate 1.7 does not meet the replacement rate which is the balanced level between the births and the deaths and the replacement rate applies 2.1 across the world at present. Meanwhile, life expectancy in DPRK has been steadily increasing. Aware of the declining fertility rate, the state has been campaigning for more births. In the first year of Kim Jong-un's ruling, 2012, the government designated 15th November as a 'Mother's Day' and awarded women with multiple births. Since 2016, households with more than three children receive special monetary aids. (Lee, K. et al., 2018) In a household survey conducted in 2017, population distribution by age and sex illustrated that DPRK would be facing an aging society shortly. (MICS, 2018) The populated middle-age groups would soon become elderlies and a relatively fewer number of the younger generations would need to support them. With the continuously falling fertility rate and improved life expectancy, the trend is likely to accelerate.

Age & sex distribution of household population

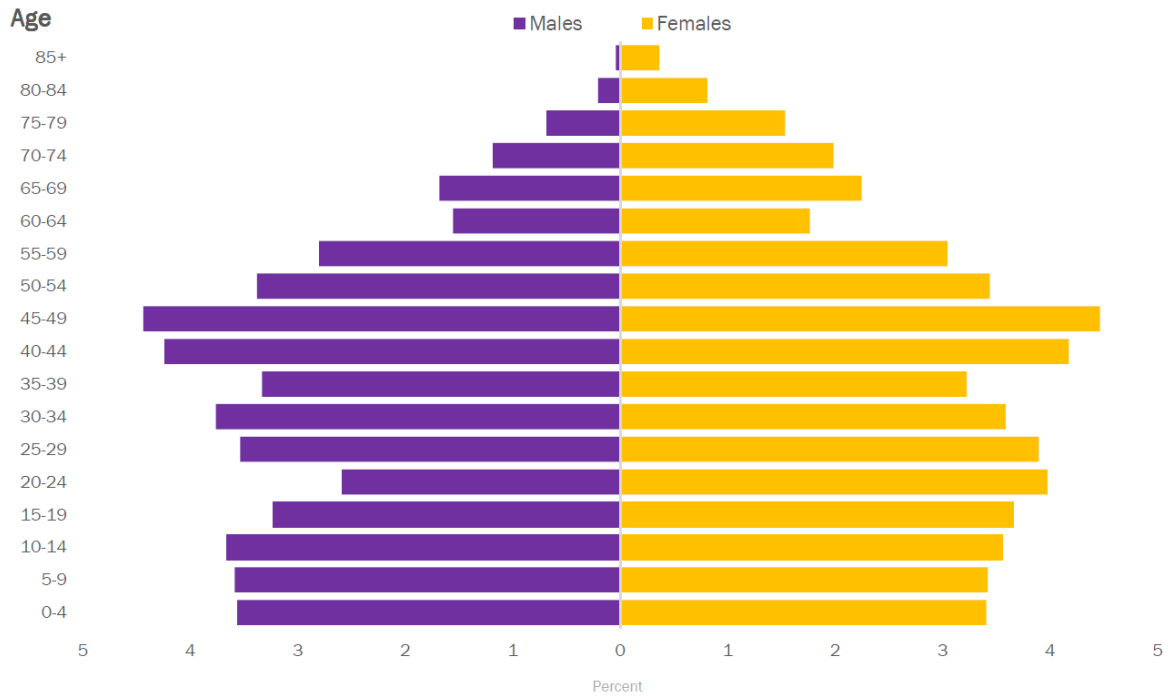
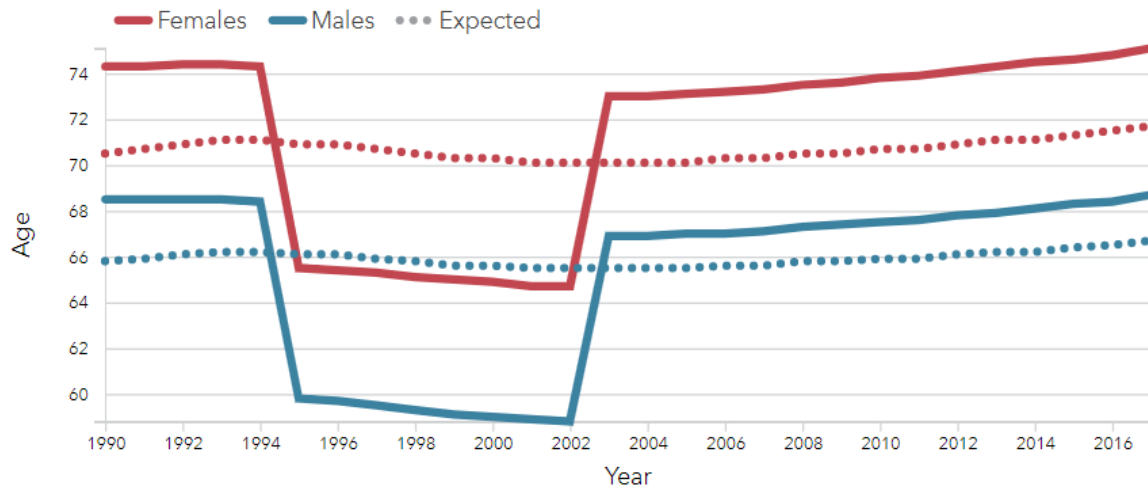


Figure 5: Age & sex distribution of DPRK household population in 2017

(Source: MICS, 2018)

How long do people live?



	Expected		Observed	
	1990	2017	1990	2017
Females	70.5	71.7	74.3	75.1
Males	65.8	66.7	68.5	68.7

Life expectancy, 1990-2017

Figure 6: DPRK life expectancy (1990-2017)

(Source: IHME., 2017a)

Comparable to the DPRK, ROK has seen a sharper decline in the fertility rate and the society has already started aging rapidly. The highest in OECD, ROK recorded 3.6 of the senior-citizen growth rate while the world average was 0.56. Currently, 15.7 %, the proportion of aged-over-65 is forecasted to reach 38 % of the total population by 2050. (KOSIS., 2020 & Britnell M., 2015) ROK's fertility rate fell below one⁶ in 2018 which was well behind the replacement rate 2.1. Such a remarkably low fertility rate shows no sign of reversing. Meanwhile, life expectancy currently at 82.8⁷ is predicted to rise continuously. (KOSIS., 2020)

⁶ Actural rate was 0.977 (KOSIS., 2020)

⁷ Life expectancy measured in 2018 (KOSIS., 2020)

DPRK and ROK both face a potentially serious public health concern, increased healthcare costs, due to the aging society. ROK government has already started addressing the concerns of the rapidly aging population by reforming pension plans and restructuring NHIS as mentioned above. However, even with more rigorous reform efforts, ROK may not be ready by 2050 for providing basic UHC to elderlies who are projected to take up 38% of the population. Despite current efforts, the UHC rate will not reach the OECD average even in 2022. (Jong-Myung Kim, 2017) However, the nation has embarked on the reform and DPRK could study the path and emulate or avoid specifics when the regime is ready to offer basic UHC again with functioning public health facilities.

4.2 The burden of disease in DPRK and common risks for the population in two Koreas

4.2.1 Disability-adjusted population health of two Koreas

Disability-adjusted life years (DALYs) measure both premature mortality (YLLs) and disability (YLDs) within a population; thus, DALYs show the gap between the current health of a population and an ideal scenario where every individual achieves the full life expectancy in full health. (IHME, 2015) Due to the capturing of the morbidity, statistical findings reflecting both death and disability could be argued as a better estimation of population health than mortality or life expectancy alone although they remain as important measurements of population health. Moreover, DALY calculation can lead to identifying causes and risk factors of mortality and morbidity.

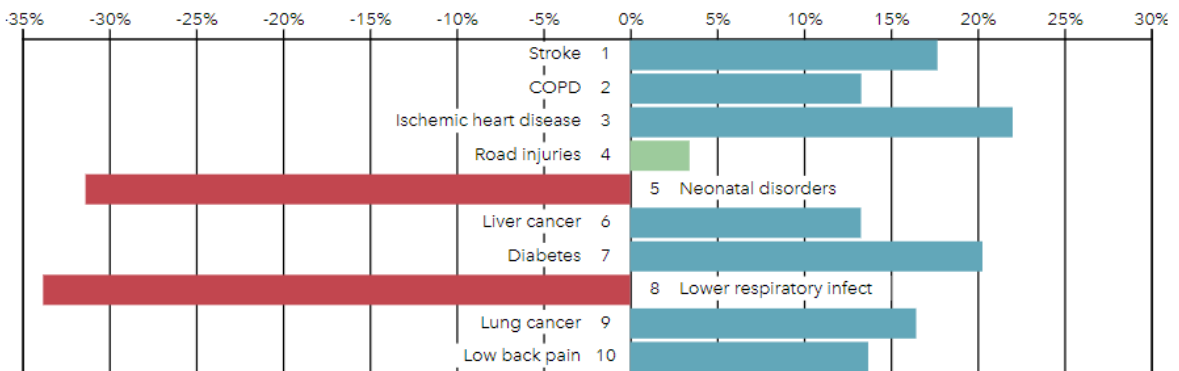
As shown below, although significantly reduced over ten years, both neonatal disorders and lower respiratory infections rank within ten most causes for the death and disability combined for DPRK. Despite different ranks, the top three causes for ROK, low back pain, stroke, and diabetes, are also included in the top ten reasons for DPRK. Two figures show that DPRK struggles against communicable, maternal, neonatal, and nutritional diseases (CMNN) as well as

non-communicable diseases (NCD). However, the significant improvement over the last ten years in CMNN and a steep deterioration in NCD shows the shift in the main causes of death and disability combined. If the trend continues, DPRK and ROK may confront mostly common causes in the top ten lists.

What causes the most death and disability combined?

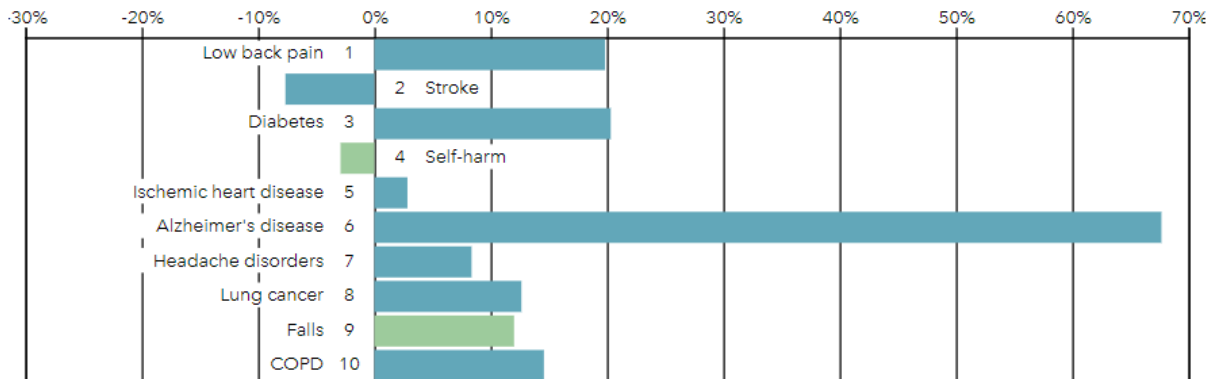
DPRK

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries



Top 10 causes of disability-adjusted life years (DALYs) in 2017 and percent change, 2007-2017, all ages, number

ROK



Top 10 causes of disability-adjusted life years (DALYs) in 2017 and percent change, 2007-2017, all ages, number

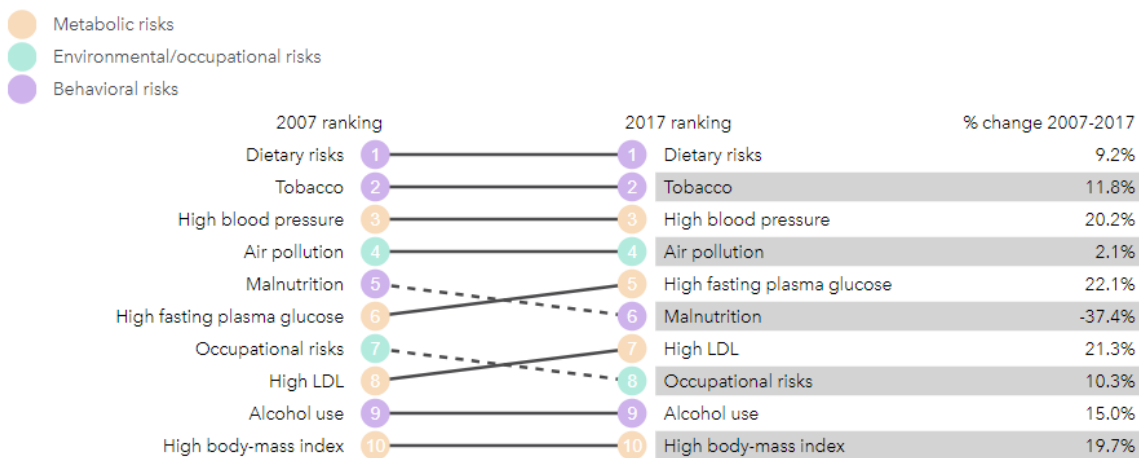
Figure 7: Causes for the death and disability combined (DPRK & ROK, 2007-2017)

(Source: IHME 2017a & IHME 2017b)

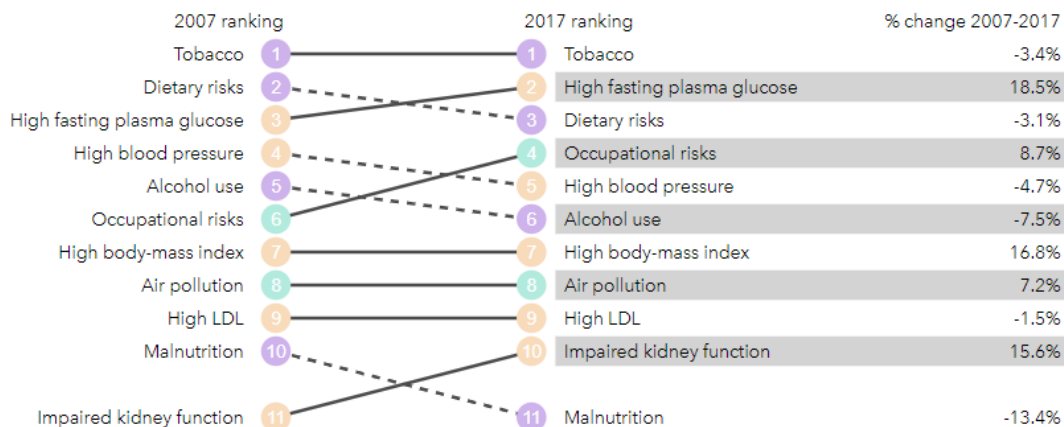
The top four risk factors driving death and disability in DPRK have remained the same ranks from 2007 to 2017. Increased percentage change for all four top factors shows that public health efforts for these risk factors have been absent or ineffective. Furthermore, without immediate intervention, the trend is likely to continue which may also increase the prevalence of related diseases. These four risk factors, dietary risks, tobacco, high blood pressure, and air pollution, also rank within the top ten risk factors for ROK. Qualified as behavioral risks, tobacco and dietary risks rank the top two for DPRK and first and third for ROK. ROK has seen around 3 to 4 % of the reduction in these two risk factors over ten years. Both the ROK government and individuals have been aware of the risk factors. The South Korean Ministry of Health and Welfare (MOHW) has campaigned against smoking for several years as well as providing education and clinical assistance for dietary needs. (MOHW, 2020) Ranked causes for DPRK and ROK may remain similar in the near future. However, if recent trends of risk factors continue in two countries, ROK is likely to see the reduction and DPRK to witness an increase in the current main causes of death and disability.

What risk factors drive the most death and disability combined?

DPRK



ROK



Top 10 risks contributing to DALYs in 2017 and percent change, 2007-2017, all ages, number

Figure 8: Risk factors for the death and disability combined (DPRK & ROK, 2007-2017)

(Source: IHME 2017a & IHME 2017b)

4.2.2. Infectious disease in DPRK & mutual concerns with ROK

While several NCDs have been responsible for many deaths and disabilities in DPRK, infectious diseases remain a real challenge for DPRK. Moreover, academic researches have identified a strong linkage between NCDs and infectious disease, especially in developing or under-developed countries. (Remais, J. et al., 2012) Hepatitis B virus (HBV)⁸, tuberculosis (TB), diarrhoea, and malaria are the most commonly cited as the biggest infectious disease threats in DPRK. (Han, P. et al., 2019) Among them, malaria incidence has been decreasing in recent years, from 0.3 million in 2000 to 4626 cases in 2017. The country aims to eliminate the disease by 2025. (WHO, 2018)

Among infectious diseases, TB has considerably impeded North Korean population health in spite of advancements in recent years. The DPRK government has also acknowledged the serious impacts of persistent TB infections and set up a National TB Control Program and cooperated with international organizations such as WHO. Illustrated in the table below, a cooperated mission of INGO and the government targeting TB control in 2018 finds a reduction in the number of cases notified between 2016 and 2017 contrasting constant increase over previous years. (Bhatia, V., 2018) However, extreme winter in the year has been credited for the reduction, not the systemic public health efforts. The notified Multi-Drug Resistant TB (MDR-TB) cases are reported 1,515 on the table although MDR-TB cases among notified pulmonary TB cases are estimated 4,600. (Bhatia, V., 2018 & WHO, 2018) Among MDR/RR-TB cases, only a small part of the patients are enrolled for treatments and the data does not show completed course of the treatments. Due to the shortage of equipment and trained medical personal, TB cases are likely underdiagnosed as well. (WHO, 2018)

⁸ The only available data on HBV in DPRK is 4.5% prevalence rate in 2003 (DPRK MoPH, 2017)

Table 4: Notification and TB and RR/MDR-TB cases in DPRK (2012-2017)

(Source: Bhatia, V., 2018)

	2012	2013	2014	2015	2016	2017
Notified TB cases	99,399	104,912	110,290	120,722	120,323	107,103
% new TB cases tested for RR		0	0	0	0	-
% previously treated TB cases tested for RR	0	1	2	2	8	14
Notified MDR/RR-TB cases	25	244	197	209	935	1515
Patients started on MDR-TB treatment	50	170	212	125	814	1,732
MDR/RR-TB cases in t/t outcome cohort	50	170	212	325		
Estimated MDR/RR-TB among notified pulmonary TB cases						4100

Although TB incidence has been reportedly decreased in ROK, it remains considerably high compared to the high-income country average. Moreover, ROK has the highest incidence rate and death rate due to TB among OECD countries. According to the South Korean MOHW, elderlies above 65 compose of most new cases, having acquired the disease in 1950-1960 when the Korean population hugely suffered from the Korean War aftermaths. In 2018, 45.5% of new TB cases were elderly above 65. These elderly cases with latent TB infection may have started to develop TB as their immune systems were challenged. (MOHW, 2020) If such numerous South Korean elderlies with readily available healthcare and nutritional provision develop TB in the old age, many North Korean elderlies who experienced the same Korea War and the sufferings afterward may have acquired TB as well and have gone undiagnosed considering the challenged healthcare services in DPRK.

Table 5: New TB case notification by type of TB: ROK

(Source: modified from KOSIS, 2020)

TB type	2016	2017	2018
Total	30,892	28,161	26,433
Pulmonary TB	24,696	22,314	20,883
Extra-Pulmonary TB	6,196	5,847	5,550

Table 6: Comparative TB incidence averages in 2018 (per 100,000)

(Source: created using data from The World Bank, 2018 & WHO, 2019)

World	132
High-income countries	11
Upper middle-income countries	66
Low-income countries	206
DPRK	513
ROK	66

Despite some advancements in infectious disease control, DPRK is not ready for emerging diseases such as SARS, HCV, and legionella or some re-emerging diseases such as cholera, sexually transmitted disease, and plague. Lack of essential medicine, equipment, and trained personal makes it difficult to detect a disease at an early stage. DPRK government maintains silence at the event of possible spread of infectious diseases from neighboring countries such as China. In spite of the separation across the demilitarized zone, prevalent infectious diseases in DPRK spread to ROK. Almost extinct in the early 1980s, malaria has re-emerged in ROK since the 1990s and most new cases are occurring near the demilitarized zone. In 2018, 89% of indigenous cases in ROK happened in provinces close to the demilitarized zone. (KCDC, 2019) Both ROK and DPRK government recognize the need for cooperation over infectious disease

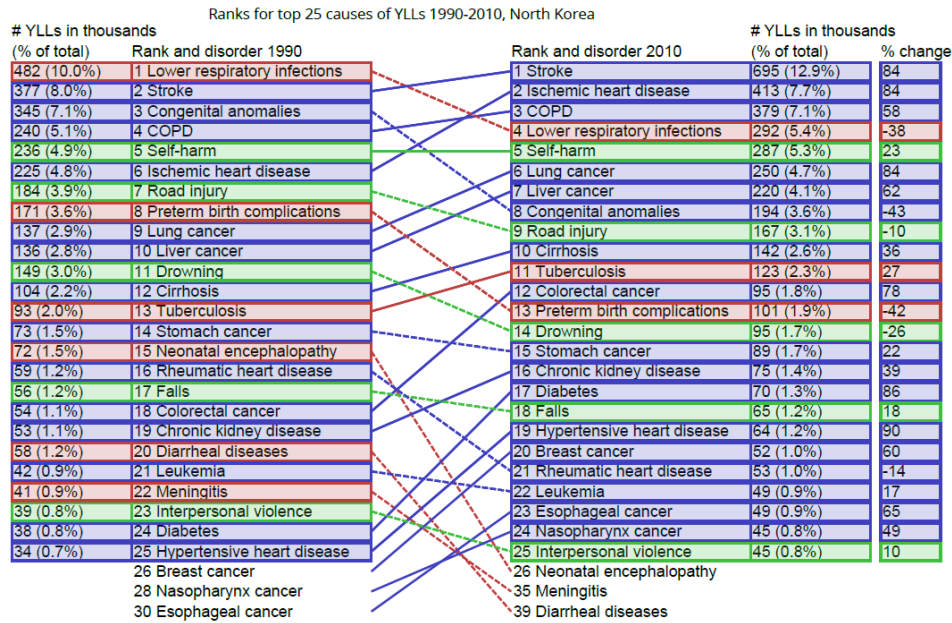
spread. According to Article 2.4 of the Pyongyang Joint Declaration, September 2018, Moon and Kim agreed on cooperation over infectious disease spread and transmission across the border. (Park, 2018) Because of the political deadlock and foreign relations, the agreements have not progressed into practical terms. Since late December in 2019, Novel Coronavirus (2019-nCoV) believed to have originated from Wuhan, China is spreading regionally and globally. (WHO 2020) Such emergencies reawaken the need for cooperation regarding infectious disease spreads for two Koreas.

4.2.3 DPRK's relatively superior disease management compared to the similar socio-economic level countries

In the last few years, infectious and children-related diseases in DPRK have seen many improvements. As shown in the figure below, a lower respiratory infection that was the number one cause for premature death in 1990 has moved down the rank in 2000 along with the percentage reduction. Communicable, maternal, neonatal, and nutritional causes are coded with red-colored lines. Compared to six in 1990, only three red coded causes remained in the top 25. Every red coded cause in 1990 has moved down the rank. In 2000, neonatal encephalopathy, meningitis, and diarrheal diseases were not even included within the top 25 causes for premature death. Diarrheal diseases are known to be largely responsible for the premature deaths of children in the DPRK. (MICS, 2017) Decreased percentage change in neonatal-related disorders and diarrheal diseases signify improvements over the main causes of premature deaths for children.

Causes of premature death

Years of life lost (YLLs) quantify premature mortality by weighting younger deaths more than older deaths.



This chart shows the change in the top 25 causes of YLLs due to premature mortality from 1990 to 2010. Solid lines indicate a cause has moved up in rank or stayed the same. Broken lines indicate a cause has moved down in rank. The causes are color coded by blue for non-communicable diseases, green for injuries, and red for communicable, maternal, neonatal, and nutritional causes of death.

Figure 9: Causes of premature death in DPRK (1990, 2010)

(Source: IHME., 2017a)

The table below illustrates North Korea’s relative position regarding the burden of disease to other countries with similar income per capita. Although the years compared here are not most up-to-date, the table still provides meaningful insights. Age-standardized rate incorporates changes in population size and age structure. Life expectancy adjusts for mortality. Health-adjusted life expectancy incorporates years lived with less than full health. (IHME, 2015) Among countries compared, DPRK ranked either first or second, high ranks referring to lower death rates or longer lives. In 1990, DPRK ranked first for all categories and in 2010 ranked first for all but one category, age-standardized death rate. Thus, compared to the countries with similar income per capita, DPRK fared relatively better for several categories measuring the burden of disease. On the other hand, one may argue that the sudden collapse of the DPRK economy in the 1990s brought down its income per capita and moved DPRK into the lower-income group; thus, such ranks do not illustrate performing population health but rather

consequences from a failed economy. However, as DPRK still suffers economically and remains in the lower-income category at present, the data enables valid observation in accessing public health success in DPRK.

Table 7: Country benchmarking of the burden of disease

(Source: IHME., 2017a)

Age-standardized death rates, YLL rates, YLD rates, and life expectancy at birth and health-adjusted life expectancy at birth for 1990 and 2010, both sexes combined																				
Country	Age-standardized death rate (per 100,000)				Age-standardized YLL rate (per 100,000)				Age-standardized YLD rate (per 100,000)				Life expectancy at birth				Health-adjusted life expectancy at birth			
	1990		2010		1990		2010		1990		2010		1990		2010		1990		2010	
	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	LE	Rank	LE	Rank	HALE	Rank	HALE	Rank
Timor-Leste	1,223	3	872	4	45,244	3	26,770	4	14,698	8	13,715	7	60.5	4	68.7	4	50.7	4	58	4
Chad	1,508	10	1,389	11	67,610	11	58,839	12	15,080	13	14,364	13	52.5	11	55.5	12	43.9	11	46.8	13
Benin	1,312	6	1,080	6	58,713	9	38,726	6	15,237	14	13,830	9	55.9	9	63.4	6	46.6	9	53.7	7
Ghana	1,185	2	1,030	5	45,628	4	35,128	5	14,555	6	13,298	5	60.5	3	64.9	5	50.9	3	55.3	5
Bangladesh	1,295	5	864	3	49,258	5	26,361	3	14,743	9	13,206	4	58.9	5	69	3	49.2	7	58.4	3
Lesotho	1,316	7	2,130	14	43,569	2	85,888	14	13,503	3	15,483	14	60.9	2	47.4	14	52	2	40.2	14
Zambia	1,722	14	1,533	13	73,053	13	57,620	11	15,030	11	13,732	8	50.6	13	55.8	11	42.7	13	47.8	11
North Korea	895	1	832	2	25,915	1	21,755	1	10,569	1	10,347	1	68.9	1	70.8	1	60.7	1	62.4	1
Haiti	1,717	13	3,321	15	61,823	10	137,295	15	15,059	12	16,428	15	54.1	10	37.2	15	45.7	10	31.8	15
Tanzania	1,357	8	1,137	7	55,603	8	43,461	8	14,553	5	14,177	12	56.6	8	61.7	8	47.8	8	52.2	8
Nepal	1,285	4	832	1	49,745	6	26,361	2	13,660	4	12,959	3	58.8	6	69.2	2	49.8	5	58.8	2
Comoros	1,439	9	1,223	8	52,340	7	38,959	7	13,050	2	12,879	2	57.5	7	62.8	7	49.5	6	54	6
Burkina Faso	1,521	11	1,396	12	68,852	12	59,507	13	14,862	10	13,409	6	52.1	12	55.2	13	43.8	12	47.1	12
Uganda	1,658	12	1,290	9	75,253	14	45,587	9	15,596	15	13,882	10	50.4	14	60.3	9	42.2	14	51.5	9
Mali	1,726	15	1,331	10	78,963	15	53,703	10	14,609	7	13,991	11	48.7	15	57.3	10	41.1	15	48.6	10

Another example of relatively well-performing public health practices is the high vaccination rates of North Korean children. DPRK historically has valued preventive medicine importantly and high vaccination rates in children resulted in improvements over children's health. In spite of the shortage of essential medicine, the country has maintained successful completion of vaccination for children. According to a recent survey, the overall vaccination rate by 12-months of age is 95.5% except for the inactivated polio vaccine due to a global shortage. (MICS 2017, WHO 2018) The vaccine completion data available from DPRK MoPH and international organizations also correspond with the defectors' testimonies. (Lee, K. et al., 2018) On the other hand, vaccines are highly dependent on international aids. Such vulnerability may be resolved in the long-term as DPRK eventually may acquire vaccine production abilities. Till then, the nation has no choice but to rely on the aids. Thus, in spite of many challenges regarding the burden of diseases, DPRK has performed relatively well compared to its economically similar conditioned group. Such findings may be partly due to the several factors mentioned in this thesis so far, such as already existing infrastructure and valuing of public health efforts.

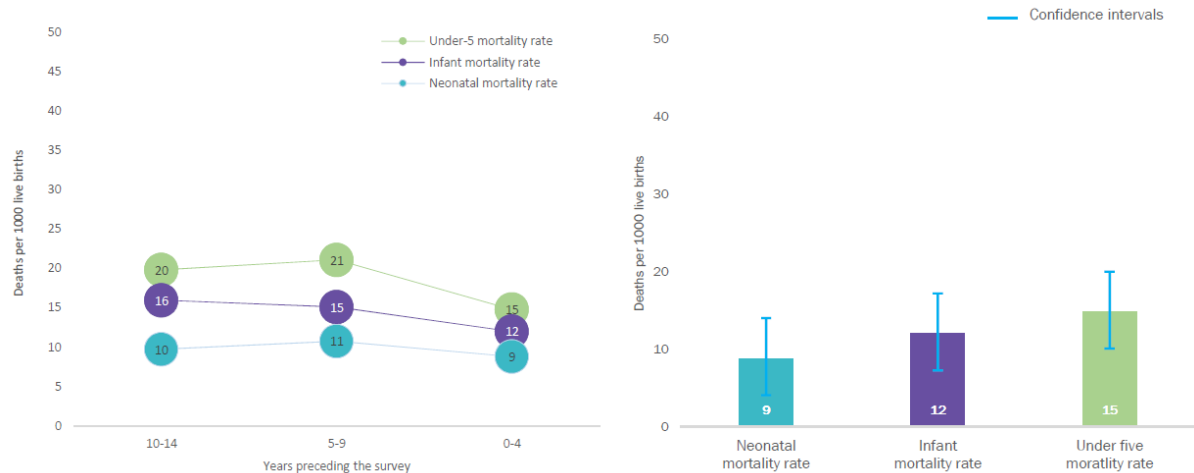
4.3 Nutrition, food security, and basic sanitation for children in DPRK

The physical and mental health of mothers and grandmothers transcend to the offspring. (Kapur, A., 2015) Stable and balanced nutritional provision is essential for intergenerational health. As often emphasized, the well-being and good health of children are imperative for the prospectives of any nation. Women in childbearing age should not lack essential nutrition for their potential future children as well as for their own healths. This chapter particularly focuses on the nutritional status of North Korean children rather than the general population as maternal and children health reflect the population health of the present and the near future. For the nutritional requirement of infants and children, UNICEF and WHO recommend continued breastfeeding, emphasis on initial breastfeeding in the first one hour of birth, appropriate meal frequencies not just dense energy, and diverse and nutritious food sources. (MICS, 2017)

4.3.1 Advancements and shortcomings of the of North Korean children's nutritional health

Corresponding with the improvements observed over population health in recent years in spite of some apparent deficiencies, North Korean maternal and children health have positively progressed. The survey results produced in 2017 illustrate simultaneously decreasing neonatal, infant, and under-5 mortality rates in the last 10 years. Compared to 15 years before, mortality rates have declined in all low-income categories as shown in the table below. The infant mortality rate has decreased continuously in the last 15 years and the under-5 mortality rate has declined noticeably in the recent 5 years preceding the survey. Improvements in neonatal and under-5 mortality rates also indicate a step closer achieving SDG 3.2.2 and SDG 3.2.1.⁹ In 5 years prior to the survey, neonatal mortality was yet responsible for almost 2/3 of under-5 mortality, calling for measures such as increased facility deliveries.

⁹ Refer to SDG 3 (United Nations Sustainable Development Goals, 2015)



Years Prior to the Survey	Neonatal mortality rate: SDG 3.2.2	Post-neonatal mortality rate	Infant mortality rate	Child mortality rate	Under-5 mortality rate: SDG 3.2.1
0-4	9	3	12	3	15
5-9	11	4	15	6	21
10-14	10	6	16	4	20

Neonatal mortality (NN): probability of dying within the first month of life
Post-neonatal mortality: calculated as difference between infant and neonatal mortality rates
Infant mortality (${}_1q_0$): probability of dying between birth and the first birthday
Child mortality (${}_4q_1$): probability of dying between the first and the fifth birthdays
Under-5 mortality (${}_5q_0$): the probability of dying between birth and the fifth birthday

Figure 10: Infant and child mortality rates in DPRK

(Source: MICS, 2017)

Despite overall improvements in infant and child mortality rates, North Korean infants and children still suffer from malnutrition with physical and mental consequences. Quoting an established relationship between insufficient nutrition and increased risks to TB and other diseases, a report emphasizes medical vulnerability in malnourished children. (WFP, 2019) For children aged 6-23 months, one-third lack the required diet needs for both food diversity and minimum feeds frequency. (United Nations in DPR Korea, 2019a) Chronic malnutrition can result in stunting which refers to proportionally too short height to the age. Stunting is especially concerning because of its irreversibility and the condition may result in physical and cognitive development failure. According to the MICS 2017 survey, 19% of North Korean children under 5 are affected by stunting. (MICS, 2017) One out of five children under 5 suffering from stunting is alarming as the affected will suffer from the condition throughout life. Improved mortality rates of North Korean children would not reflect the high stunting rate as the condition may not

directly result in the children's mortality rates. Meanwhile, 3% under 5 are wasted whose condition referring to the proportionally too thin for the height. (MICS, 2017) Severely wasted children are at an increased risk of death but treatment is possible which is more difficult in stunted children. Decreased infant and child mortality in recent years may be due to improved preventions and treatments for children suffering from wasting.

Anthropometric Malnutrition Indicators

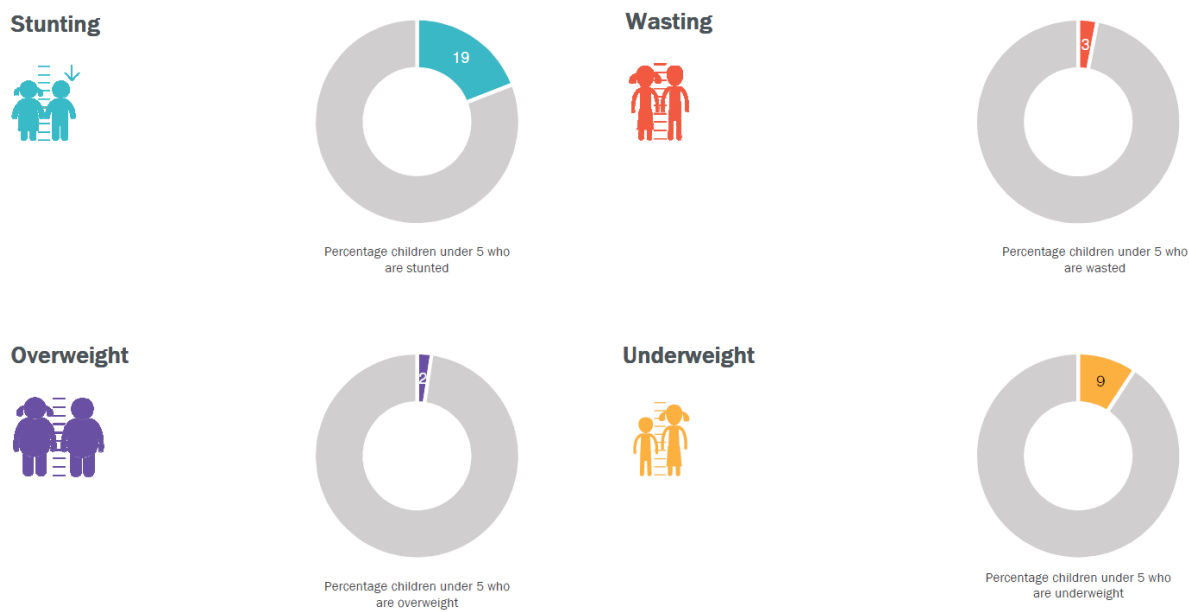


Figure 11: Anthropometric malnutrition indicators in DPRK

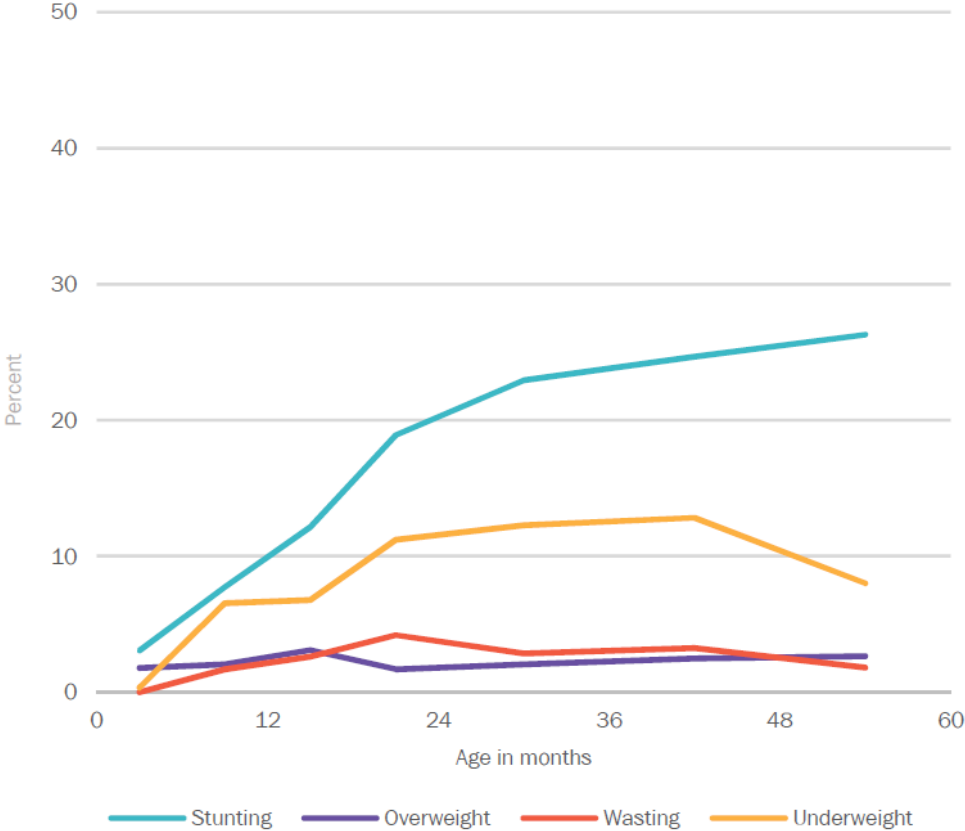
(Source: MICS, 2017)

4.3.2 Inequity observed for nutritional status of children: regional and age

In spite of the overall improved mortality rates in DPRK, nationwide failure of meeting minimum nutritional needs for children under 5 years old calls for further investigation. Upon closer look, noticeable inequities are observed in different ages, wealth, and regional groups of DPRK. Among malnutrition indicators presented by age differences, stunting outstandingly

increases continuously over months up to 5-year old age. Stunting increases sharply in the first 24 months already reaching 20% of the studied population and maintain the rise at a slower pace. Despite an initial rise in the first 20 months or so, both wasting and underweight conditions stay plateau and then start to improve at around 40 months. Children around 40 months especially start gaining weight substantially shown by sharp fall in underweight condition. The proportion of children suffering from wasting seems to stay at a relatively constant rate although it sees improvements around 48 months. The finding shows that the proportion of children who suffer from unmet minimum nourishments in the first 12 months of their life tend to experience continuous undernourishment during 12-48 months after birth. A relatively sharp and continuous rate increase in stunting supports the seriousness of irreversible stunting.

Anthropometric malnutrition indicators by age



Percentage children who are underweight, stunted, wasted and overweight, by age in months

Figure 12: Anthropometric malnutrition indicators by age in DPRK

(Source: MICS, 2017)

Large gaps exist depending on wealth and provinces for feeding conditions and malnutrition indicators. Breastfeeding practice which is essential for optimal infant and young children feeding differs largely depending on wealth and delivery conditions. Wealthier people tend to correctly practice early breastfeeding compared to the poor. Deliveries at institutions such as hospitals tend to facilitate breastfeeding practices earlier than the deliveries at home. Vaginal deliveries than cesarean sections (c-sections) tend to lead to the early initiation of breastfeeding. Such findings are interconnected. For instance, according to the MICS 2017 survey, women living in rural areas tended to have more home-based deliveries, 87.3%, to 95.4% in the urban area. 100% of respondents living in Pyongyang, the affluent capital of DPRK, delivered at public sector health facilities compared to 86.6% in South Hwanghae. Moreover, 97.6% of relatively wealthy respondents¹⁰ delivered at institutions compared to 82.7% of the bottom fifth lowest. (MICS 2017) One may infer that people living in urban areas such as Pyongyang tend to have more wealth and have better access to hospitals and medical information. Thus, women delivering in these areas are likely to have more institutional deliveries and early initiation of breastfeeding. On the other hand, some defectors recounted that wealthier people preferred c-sections and doctors even recommended c-sections for safety reasons. (Lee, K. et al., 2018) As these surveys are qualitative findings, in-depth interviews with defectors may add depths.

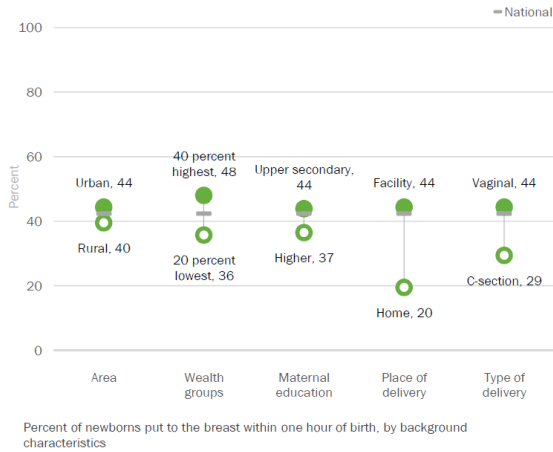
Minimum diet diversity and nutritional status of children also vary largely following living areas and wealth. Children living in the urban area and better-to-do families tend to have more diet diversity as well as lower rates of stunting and wasting. Young children 6-8 months seem to be much more neglected in terms of diet diversity compared to 18-23 months. Meanwhile, the proportion of children suffering from stunting is more than three times higher in Ryanggang compared to Pyongyang and wasting four-time higher in Ryanggang than North Pyongan. While

¹⁰ Highest 40% in wealth index

stunting is a nationwide challenge, regional differences may help the DPRK government and foreign aids to make strategic responses.

IYCF: Equity

Early Initiation of Breastfeeding



Minimum Diet Diversity

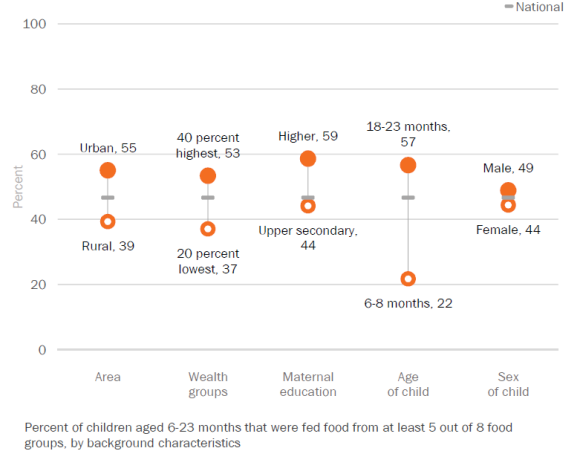
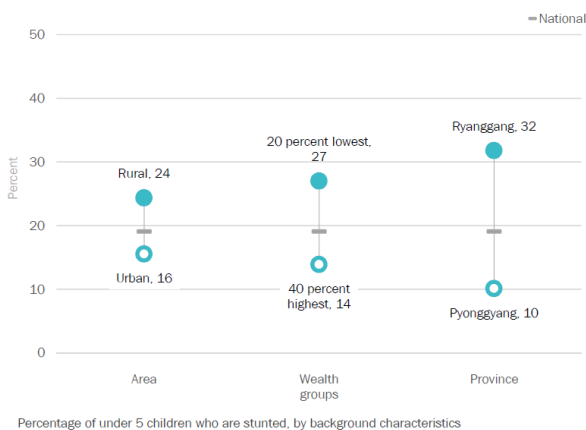


Figure 13: Early initiation of breastfeeding and minimum diet diversity in DPRK

(Source: MICS, 2017)

Nutritional Status of Children: Disaggregates

Stunting



Wasting

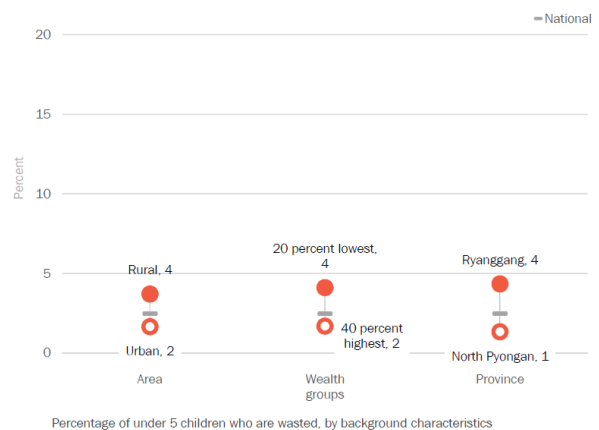


Figure 14: Nutritional status of children in DPRK

(Source: MICS, 2017)

Province data on stunting, overweight & wasting

	Stunting	Overweight	Wasting	
	% stunted (moderate and severe)	% overweight (moderate and severe)	% wasted (moderate and severe)	% wasted (severe)
National	19	2	3	1
Rygang	32	2	4	1
North Hamgyong	22	1	2	1
South Hamgyong	19	1	3	1
Kangwon	21	1	4	0
Jagang	23	3	2	0
North Pyongan	20	3	1	0
South Pyongan	19	4	2	1
North Hwanghae	19	0	3	0
South Hwanghae	19	3	3	0
Pyongyang	10	4	1	0

Figure 15: province data on stunting, overweight, and wasting in DPRK

(Source: MICS, 2017)

4.3.3 Water, sanitation, and hygiene (WASH) stature in DPRK

Even if basic healthcare and nutritional provision may improve children's health, insufficient WASH conditions can compromise the achievements. WASH deficiency especially put the children at risk for waterborne diseases such as diarrhoea. The disease is listed as one of the main causes leading to child mortality and malnutrition. (United Nations in DPR Korea, 2019a) In DPRK, 93% of the household population has access to at least basic water services, referring to the availability of improved drinking water sources such as piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water. While such a relatively high percentage seems to be praiseworthy, the proportion of the household population with safely managed drinking water services remains only 60.9 %. (MICS, 2017) The condition qualifies for not only improved drinking water sources on-premises but also drinking water free of Thermotolerant Coliform (TTC), which measures faecal contamination risks. As observed in nutritional status for children, the gap is stark comparing among areas, regions and wealth

groups. 71% of households living in urban areas have access to safely managed drinking water services in contrast to 44% in rural areas.

Safely managed drinking water

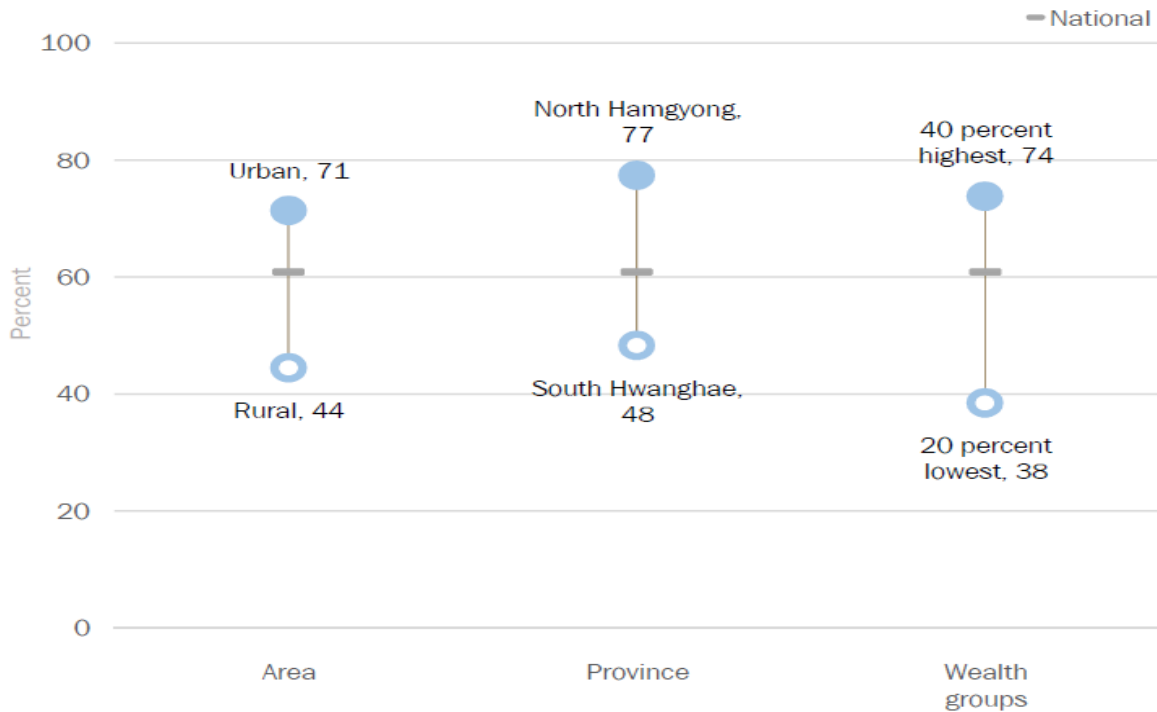


Figure 16: a household population with safely managed drinking water services

(Source: MICS, 2017)

In addition to insufficient water management, unsafe disposal of human wastes serves as a serious health risk and inequity between rural and urban areas is observed. Only 72% of North Korean households living in rural areas live with improved sanitation facilities, referring to flush or pour-flush to piped sewer systems, septic tanks, or pit latrines. The disparity between urban and rural areas is observed here again with 88 % in urban areas with improved sanitation facilities. Along with 97% of unsafe disposal from on-site sanitation services, nine out of ten

household populations in rural areas live with potential health risks resulted from both unsafe disposals of human excreta and the use of unimproved sanitation facilities.

Basic drinking water and sanitation service availability combined, 85 % of urban areas and 65 % of rural areas have access. (MICS, 2017) While the concern is nationwide, the impact on children living in a rural area would be especially considerable. As shown above, due to inequity in nutritional provision across different living areas or wealth groups, a relatively larger number of children living in rural areas and poor households suffer from malnutrition statuses such as stunting and wasting. These children living in rural areas and poor households face a higher chance of insufficient WASH. Nutritional vulnerability combined with the lack of safe drinking water and sanitation access would block the path to the improved well-being of all North Korean children.

4.4 Role of the UN agencies & International Non-Governmental Organizations (UN-INGOs) for North Korean population health & cooperation with ROK: humanitarian aids, reliable data collection, and sustainability

UN-INGOs residing in DPRK not only provide short-term humanitarian aids and long-term development assistance but also pressure the government to cooperate in data collection and assist in population health surveys as well. International donors contribute to the fund collection and UN-INGOs distribute the aids appropriately according to the needs and priorities. (United Nations DPRK, 2019b) The first livelihood surveys were conducted in 1997. (Hong, J. and Kim, S. and Jeong, E., 2018) Reports from UN-INGOs residing in DPRK often provide the most objective and comprehensive information on the population. In spite of some reservations, the continuous presence of UN-INGOs on the DPRK soil largely justifies their role as humanitarian aid providers and essential data collectors, especially if complemented with efforts from the DPRK government. Nutritional and population health gaps between two Koreas would have been much larger without the committed assistance from UN-INGOs as well.

4.4.1 Providing first aids for population health in DPRK

With the current sanctions imposed, UN-INGOs remain as the last channel to provide emergency aids. Partners focusing on population health include UNFPA, UNICEF, WHO, Fida International, and a few European Union project supporters. These agencies have pursued a mutual goal of achieving UHC, targetting women, children, and other vulnerable groups. In line with UHC principles, they value equity in access to basic healthcare services, and their interventions are diverted according to priorities and needs for different areas. (United Nations in DPR Korea, 2019a) North Korean government has also valued the UHC principle in its public health policy. In an official document, DPRK emphasizes equity in basic healthcare provision targetting those in need such as young children and women. (DRPK MoPH, 2017) Vulnerable regions and population groups would need constant care and monitoring. The continuous presence of UN-INGOs can contribute to the efforts by directly providing aids and also assisting the government with short-term goals and long-term plans.

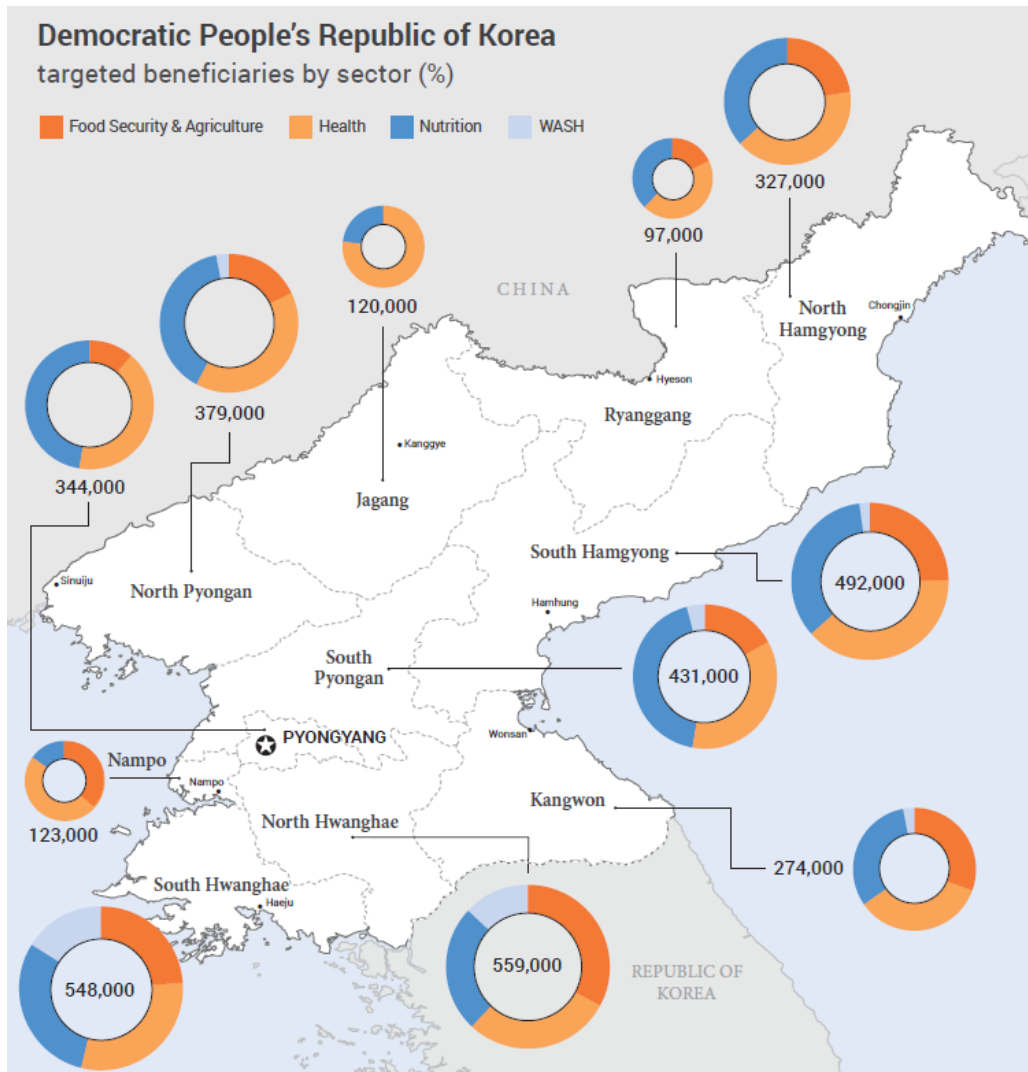


Figure 17: UN's targeted beneficiaries by sector

(Source: United Nations in DPR Korea, 2019a)

Although sanctions imposed by the UN Security Council since 2017 have brought many challenges to the works of UN-INGOs, these agencies have not only adapted to the restrictions successfully but also continued appealing for funding from international donors. Managing the largest humanitarian operation in DPRK, WFP acknowledges restrictions imposed from the resolutions and adapts its activities accordingly. In providing fortified cereals and biscuits, effective nutrition supplements, WFP describes the production process which does not involve cash transfer methods. (WFP, 2019) A report produced by UN agencies in 2019 addressed

several challenges such as inadequate fundings, obstructed banking transfers, and blocked goods deliveries which all related to humanitarian purposes. Overall funding appeal only resulted in a 24 % achieving rate which was one of the lowest funded appeals in the world. For the health sector alone, for 37 million USD required for the mission works, only 15.5% were funded, even relatively less than nutrition and WASH sector funding status. (United Nations in DPR Korea, 2019a) As an international organization, UN-INGOs are sensitive to international politics both in acknowledgments and adaptations. By quickly reflecting restrictions from the resolution, these agencies could continue to operate even with limitations and they continue calling for further funds from the international community. Officially criticizing sanctions resolution from the UN Security Council, the DPRK government could not directly appeal for funds even if they were essential for basic population needs such as vaccination for young children.

4.4.2 Procuring quantitative and qualitative data on DPRK public health: Livelihood surveys & MICS

Known as one of the most reclusive states, procuring reliable and trustworthy data on DPRK is almost impossible or very difficult. Yet, available information today owe to the direct reports from the DPRK government, survey results from international communities residing in DPRK, and finally from defectors' testimonies. (Ministry of Reunification, 2018a) DPRK currently allows international communities residing in DPRK to design and conduct the population surveys in cooperation with the local government agencies. Largely ignored as unnecessary and interfering, DPRK did not conduct population census and did not allow international organizations to conduct the census on its soil until 1997. The great famine may have pressured the regime to reach out to international aids which required census results. Without trustful data on the population health, international communities would be unable to provide aids, especially concerning the donors. (Hong, J. and Kim, S. and Jeong, E., 2018) Surveys designed and conducted by DPRK alone may undermine credibility; however, cooperation from the DPRK regime would be necessary for data collection efforts.

Results from surveys designed and conducted by UN-INGOs residing in DPRK in cooperation with the government would be compared and contrasted with the defectors' testimonies. Testimonies fill in the gap of credibility and provide a vivid illustration of daily North Korean lives if treated with caution. Defectors' testimonies are yet criticized for their compromised reliability as they are personal accounts and defectors are not representative of the North Korean population in terms of gender and the provinces they originate. As of December 2017, defectors from Hamgyong and Ryanggang provinces composed 85% of the total number of defectors. 71% were women and 20-30-year-olds took up more than half. (Ministry of Reunification, 2018c) However, some testimonies have corresponded with long-term findings from surveys conducted by international communities. (Hong, J. and Kim, S. and Jeong, E., 2018) If findings from official reports correspond with the testimonies, it would provide further reliability and if they contrast to each other, it will be a ground for further investigation.

Internationally recognized livelihood surveys provide valuable information on population health and living status. Sharing the identical format, these surveys are comparable among nations in similar socioeconomic status. World Bank created the Living Standards Measurement Study (LSMS), the United Nations Children's Fund (UNICEF) designed the Multiple Indicator Cluster Survey (MICS), and the United States Agency for International Development (USAID) designed the Demographic & Health Survey (DHS). DHS and MICS focus on health status while LSMS investigates economic activities mainly. Surveys on DPRK livelihoods conducted by United Nations-affiliated organizations can be categorized into four. The first is the Population Survey by the United Nations Population Fund (UNFPA). The second is the Nutrition & Health Survey conducted in support of UNICEF, World Food Programme (WFP), Food and Agriculture Organization (FAO). Next is the Food Production Survey by WFP and FAO. Finally, the fourth concerns the Agricultural & Environmental Survey conducted through the United Nations Development Programme (UNDP). (Hong, J. and Kim, S. and Jeong, E. 2018)

First collected in 1997, the most recent DPRK livelihood surveys were conducted in 2017 by the UNICEF in the form of MICS. Among several surveys, MICS is particularly relevant in examining the population health status of DPRK due to several reasons. Many countries

including DPRK have not participated in DHS and the survey is not as routinely conducted. MICS directly studies various population health status especially concerning children and pregnant women. DPRK has already participated in five MICS and the sixth is underway. The Nutrition & Health Survey conducted in support of UNICEF also sheds light on the population health status of North Koreans and the DPRK participated four times. The survey conducted in 1998 which was in the middle of the Great Famine heightened awareness of the international community regarding the serious famine in DPRK. The survey has been routinely conducted and its findings also correspond with the defectors' testimonies. MICS and the Nutrition & Health Survey both incorporate direct responses from the common population. (Hong, J. and Kim, S. and Jeong, E. 2018) As MICS 2017 reports, defectors have narrated receiving a vaccination at schools and local health facilities. (MICS, 2017 & Lee, K. et al., 2018) Such testimonies correspond with the reports from the DPRK government and the UN-INGOs.

4.4.3 Monitoring and evaluation efforts of UN-INGOs & limitation

Appealing for funds from international donors requires trustworthy monitoring, evaluation, and auditing of operations. UN-INGOs jointly with the DPRK government have produced periodic reports from continuous monitoring and evaluation. Monitoring includes technical and observational visits to households and project sites such as health facilities, fortified food production factories, and nurseries. Regular interviews are also conducted. Field officials regularly collect data and compile the findings as reports. Agencies also check the sustainability of improvements and the intended use of goods and equipment provided by the agencies. (United Nations in DPR Korea, 2019a) Such monitoring activities ensure donors of appropriate and effective spending of funds where they are intended. Incomplete or unreliable reports would deter potential donors to contribute. Cooperation from local government is necessary for such thorough monitoring efforts. UN-INGOs also work closely together with local government agencies such as MoPH for monitoring operations in the DPRK. Often encouraged in developmental works, the local government should be able to implement and monitor operations when they can finally acquire resources independently. Active participation in monitoring activities conducted by these international agencies can influence the local government to implement international standards in their eventual own monitoring activities. Thus, the local

government agencies' participation can eventually contribute to the transparent and sustained systematic data collection in DPRK.

On the other hand, the DPRK government's participation in monitoring works of UN-INGOs often brings criticism from the international community due to suspected government's fabrication. UN-INGOs do not have a choice but to cooperate with the DPRK government in its operation and monitoring efforts as their every activity including local trips and site visits all require permission from the government. Aware of such suspicions from the international community, the DPRK government has agreed on open access for UN-INGOs operational sites and UN agencies report that the government so far has not prevented their visits and monitoring activities at the project sites. UN-INGOs further express their concerns that the lack of funds forcing the closure of some operations may eventually forbid access to the site and the area around. (United Nations in DPR Korea, 2019a) Such blockage can further compromise continued information collection of residing INGOs. Meanwhile, agencies such as WFP remains firm with its standards for monitoring and access to data, shown on its "no access, no assistance" principle. (WFP, 2019) So far, UN-INGOs have illustrated efforts to improve transparency and countability regarding operations essential for North Korean population health. As the North Korean government has publicly prioritized socioeconomic developments, continuous cooperation with UN-INGOs is also imperative for DPRK as agencies are committed to the eventual transition from humanitarian to development assistance in the future.

4.4.4 ROK's humanitarian aids provision through UN-INGOs

Learning of suffering North Korean population from scarce food and healthcare resources, ROK started to assist DPRK in 1995 when the North Korean representative in the UN requested emergency aids to United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). Assistance for the healthcare sector started with supplying medicine to DPRK through UNICEF and WHO in 1997. (Park, H., 2018) Even until recently, ROK continued providing humanitarian aids to DPRK through UN-INGOs due to domestic and international

politics. Aid provision through UN-INGOs has remained relatively stable compared to the bilateral delivery.

Strict sanctions imposed since 2017 have limited the ROK government's intention to deliver even purely humanitarian aid such as rice. However, the current administration in ROK has expressed several times its strong commitments to separating politics and humanitarian aids, especially addressing the population health of the most vulnerable in DPRK. The government supports non-governmental organizations assisting infectious disease prevention, medical facilities, and the nutritional healths of children and pregnant women. In an official address at the G20 Hamburg summit in 2017, President Moon reiterated the importance of continued humanitarian aids particularly for malnourished children in the DPRK and how South Korea wished to work together with UN-INGOs for the aids delivery. The President emphasized the room to carry on the aid activities within the sanction limitations along with countable monitoring schemes. (Ministry of Reunification, 2018c) UNICEF and WFP also requested funds from the South Korean government who has agreed to provide funds for several projects including vaccination, nutritional aids, and children's hospital facility improvements. However, the funding date is not yet fixed. (Park, H., 2018) It shows that UN-INGOs have served an essential role in channeling aids from ROK to DPRK. South Korean government may deepen the relationship with the agencies to achieve its promised commitments. Moreover, promised fundings are to be delivered to the agencies as soon as possible to facilitate ongoing projects and trusts between the ROK government and the agencies.

Fluctuating public opinions and political conditions in ROK have affected the timely provision of humanitarian aids to DPRK including relief efforts for population health. Most severe criticism and suspicion over potentially diverted funds and aids for DPRK come from some South Koreans. Along with newly elected President and government officials, policy regarding DPRK may change periodically and radically which may affect the aids program. Politicians often criticize how South Korean taxpayers are funding for the military build-up of DPRK that the goods intended for humanitarian aids are siphoned for either the North Korean military or pocketed in the ruling class of the regime. (Lee, C. et al., 2017) Yet, even under the occasionally

unfavorable domestic political conditions, supports for North Korean population health have remained relatively steady. When the South Korean government stopped bilateral food aids for DPRK in 2008, supports for the North Korean public health sector continued through UN-INGOs. Aids for the sector took up more than 50% of the total aids throughout 2008-2017. (Park, H., 2018) Thus, with more committed and systemized input from two governments, cooperation over the population health improvements in DPRK can continue.

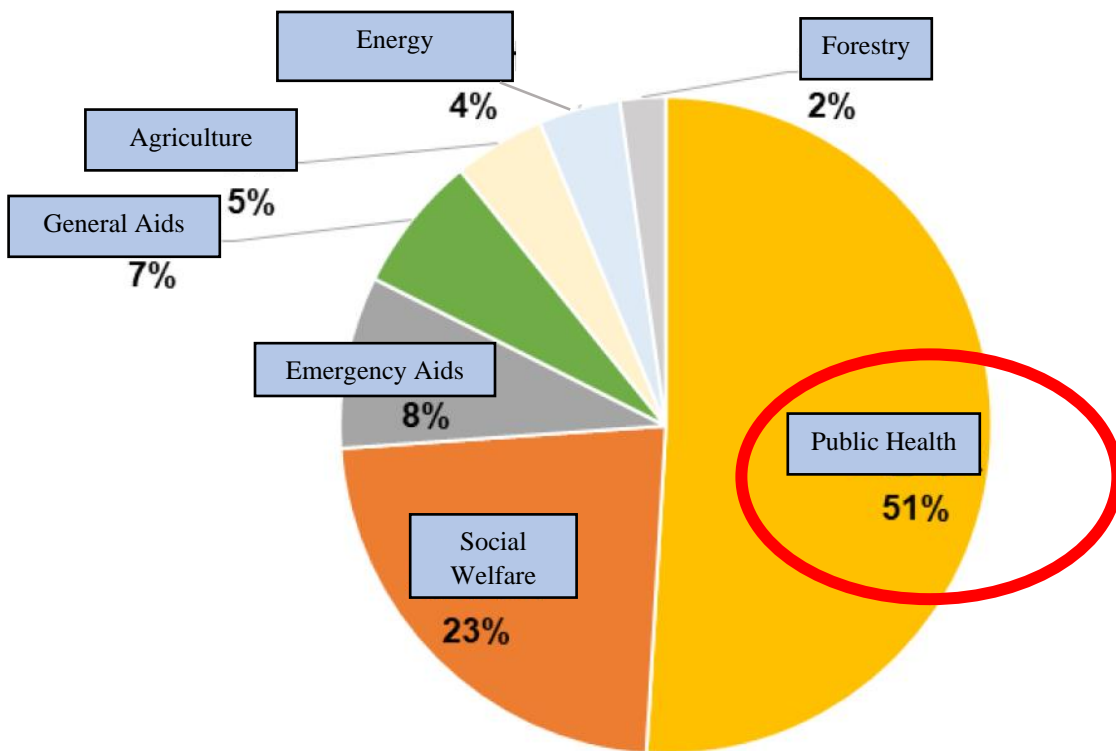


Figure 18: Composition of aids

(Source: Adopted from Park, H., 2018)

Continuing close works with the UN-INGOs, continuous and trusted cooperation of two Koreas would benefit the population health of the peninsula. As shown in the Pyongyang Joint

Declaration 2018, both governments recognize urgent needs for cooperation over health concerns, particularly regarding infectious disease spreads over the border. Initially started as providing essential medicine, ROK has remained committed to assisting the North Korean population health. (Park, H., 2018) A healthy population free of NCD and infectious disease in the DPRK benefits the population health of ROK. Meanwhile, DPRK wishes to shift from a recipient of humanitarian aids to an independent country through social and economic developments. ROK can become a steady partner in healthcare development efforts in DPRK, incorporating efforts from the UN-INGOs. ROK and UN-INGOs have been emphasizing the separation between politics and humanitarian aids that politics should not interfere with continuous development efforts regarding population health of DPRK.

4.5 German Unification as a road already traveled

Many correlate the German unification to the conflict in the Korean peninsula including potential public health challenges and solutions. The unification changed the daily lives of Germany, especially in the East. The German unification was unique starting from the sudden fall of the Berlin Wall followed by the rapid absorption of the east into the west, including the health sector. Many other east European countries previously under the Soviet Union's influences evolved at a slower speed and they did not integrate with an already fully developed system. Formally divided Germany and current Korean peninsular face similar public health challenges despite many differences such as level of separation and economic gap. Sharing similar geopolitical history, German unification may provide useful information in health policy analysis of converging Koreas.

Health is a basis of daily life and the unification had both structural and clinical impacts on East Germany. The widened mortality rate difference between east and west over the separation narrowed. The reduction in mortality rate in East Germany is often credited to the unification. By the end of the 1990s, the life expectancy of East German females measured higher than West German females although that of east men did not improve as fast. (Grigoriev, P., Pechholdová, M., 2017) Upon the unification, the healthcare structure of the socialist German Democratic

Republic (GDR) was intentionally ignored and counterparts of the Federal Republic of Germany (FRG) were considered superior. (Nolte, E., McKee, M., 2000a) Healthcare facilities and practices in the prosperous FRG seemed superior to GDR.

In this thesis, selected literature on German unification and impacts on the east German health population were reviewed. The authors of reviewed literature commonly discussed the positive impacts of the unification on an overall health indication of East Germany as well. Advanced equipment and more medicine were available. Reduction in mortality numbers from cerebrovascular and chronic heart disease may have been related to such upgrades in facilities and medical supplies. Nolte E credited the diet change with more vegetables and fruits for improved cardiovascular health. (Nolte, E. & McKee, M., 2000a). Meanwhile, Grigoriev P & Pechholdová M argued that the reduction in the specific mortality category already started well before the unification that the unification and the improved facility only facilitated the improvement. (Grigoriev, P., 2017).

Further document analysis revealed perhaps regrettable decision makings throughout the consolidation of the GDR and FRG healthcare systems. Prosperous and democratic FRG seemed to be superior to GDR. Health finances and deliveries of the GDR model were easily abandoned. As shown on the Germany Unification Policy White Paper, interviews with the GDR academics revealed they were mostly ignored in seeking opinions. (Ministry of Reunification, 2015) Nevertheless, much discussion over health system reform in Germany today borrows the idea from the GDR model. Some public health policies under the socialist GDR model produced better public health performance than unified Germany. The smoking rate in east women increased significantly, from 20.5% in 1990-1992 to 29.1% in 1998. Moreover, with the disappearance of the public health policies particularly valuing maternal and infant healths, immunization rate in the east fell after the unification which may be responsible for 10-20 times increase in pertussis infection rates in school-aged children. (Nolte, E. & McKee, M., 2000a) Children suffering from chronic allergies multiplied and children with developmental disabilities also increased. (Ministry of Reunification, 2015) Policlinics unique to GDR had enabled

discussion among several departments. Healthcare providers for outpatients and inpatients could discuss together over patients' conditions which resulted in avoiding unnecessary admissions.

In terms of health finances, GDR maintained a universal statutory health insurance system until the unification which was abandoned and merged to FRG statutory health insurance system. (Ministry of Reunification, 2015) Increased income cap of statutory membership and adding new industrial groups to the membership enabled the inclusion of economically disadvantaged Eastern German population to the Republic sick fund. (Busse, R., 2004) Interestingly, due to increasing medical costs and the potential shortage of sick funds, some argue today that Germany should employ universal statutory health insurance. In spite of considerable merits, maintaining two systems simultaneously upon the unification would have been very costly and inefficient. While the possibility of turning the present social health fund to universal statutory sick fund is currently proposed by some politicians and public, the over-night German unification did not provide time to discuss fine details of healthcare financing model redesign. Instead, the East German population was completely absorbed into the FRG sick fund and billions of Euros were invested in the health-related infrastructure of East Germany. Such complete abandoning of GDR healthcare structure and the following absorption into FRG provide valuable lessons to learn and some paths to avoid for two Koreas.

Moreover, unified Korea may bring health hazards to North Korea as the German unification resulted in a short-term mortality spike in Eastern Germany. North Korean youths may encounter obesity issues upon unification. Youths among North Korean defectors who were often born with low birth weight and experienced malnutrition upon birth gained weight quickly with abundant food in South Korea after defection. Such a combination of low birth weight, malnutrition at the toddler stage followed by sudden weight gain can result in hypertension and obesity. (Choi, S.K., Park, S.M., Joung, H., 2010) Overflowingly available fast foods in South Korea would only worsen the situation. Besides, exposed to immense changes in daily life with open competition, many North Korean may develop serious psychological disorders. In 1990 and 2010 surveys in DPRK, self-harm already ranked 5th in causes of premature death. (MICS, 2017)

While such findings may not be as surprising, the mental health of the North Korean population can get worse as two Koreas converge more closely.

Additionally, database and research materials employed in scholarly works on health indicators post-German unification shed light on research efforts for unified Korea. Researchers indicated the unreliability of statistics from the GDR era. For example, cause-specific mortality data were artificially controlled. (Nolte, E., Shkolnikov V. & McKee, M., 2000b) Acknowledging a lack of evidence-based data can better prepare the policymakers for potential unification and health-related policy needs. As shown in the German case, better data would be available eventually regarding North Korean population health but it would take several years after the unification. It took several years to produce meaningful studies regarding the impacts of the unification on the former GDR population. (Nolte, E. & McKee, M., 2000a) In addition, neglecting scholars from the former GDR throughout the consolidation period brought much criticism as these academics and specialists often possessed knowledge on the local population healths. DPRK researchers read written materials published by international or ROK institutions. While two states were in a better relationship, after reading an academic paper produced by ROK researchers, DRPK researchers reached out and two parties co-developed medication for tuberculosis. (Park 2018) Such experience shows the possibility and opportunity to cooperate academically over the population healths of two Koreas at any stage of convergence.

5. Discussion

5.1 Summary of findings

The main research objective of this paper was to examine various literature and analyze public health structure and population healths of two Koreas. In order to support this overall research aim, basic healthcare provisions, population healths, the humanitarian assisting role of the UN-INGOs, and Eastern German population healths before and after the German reunification were critically assessed. The summary of findings meeting these objectives follows below.

Comparing UHC in two Koreas

Although DPRK initially proclaimed free medical care emphasizing the importance of preventive and community-based healthcare, the regime has not fulfilled its commitment since the 1990s. Gradual economic collapse combined with repeating natural disasters has depleted the DPRK government of resources to fund basic healthcare. Lack of essential medicine and equipment at public hospitals has driven patients and their families to the private markets. Although the government boasts the relatively high doctor to patients ratio, the qualifications of these doctors are questionable. Meanwhile, ROK's economy has been steadily growing since the Korean War and healthcare quality has improved alongside abundant medicine and equipment. HAQ index improved from 59.5 in 1990 to 90.3 in 2016. (IHME, 2017b) Moreover, once heavily relying on private healthcare provisions, ROK has been striving to expand public funding for the population health. Moon care, initiated in 2017 by the current Moon administration, aims to reduce OOP expenditure for the South Korean population which has a relatively high OOP rate compared to the OECD average. The ROK government has increased public financial resources along with recognition to expand UHC for the population.

In consideration, two Koreas both value and strive for improving UHC for their populations. Yet, relatively high OOP rates are observed in both Koreas. ROK faces financial and political obstacles in the widening and deepening of its UHC. Despite severe financial constraints, the DPRK government has repeatedly acknowledged the importance of population health and well-being. Moreover, already existing infrastructure such as district hospitals could be upgraded and start providing care once the North Korean government could regularly procure essential medicine and equipment. As another common challenge, two Koreas face aging populations. Different from many developing countries, DPRK has recently recorded low birth rates and decreasing death rates. ROK is facing the most rapidly aging society in the OECD countries. Both countries could cooperate to mitigate challenges arising from high healthcare demands from the aging population.

The burden of Disease in two Koreas

In addition to the life expectancy and death rates, DALYs measuring both mortality and disability are applied for assessing the population health of two Koreas. Compared to countries with similar economic status, DPRK has fared relatively better in terms of death rates and life expectancy. DPRK particularly has seen many improvements in neonatal and maternal healths in recent years. High vaccine rates may have largely contributed to the improvements. In spite of a large socioeconomic gap, two Koreas currently face a few common challenges in causes and risk factors leading to premature death and disability combined. Ranks differ but many items are commonly listed in the top ten causes or factors. If the trend continues, DPRK and ROK may confront mostly common causes of premature death and disability.

Although two Koreas are separated by a border and a DMZ, they deal with similar infectious diseases such as TB. DPRK has seen a decline in infectious disease incidents. Decreased incidences in diarrhoea and malaria have especially improved DALYs for North Korean children. Both ROK and DPRK governments have targeted TB in recent years. Although TB remains a serious concern in ROK, most patients are elderlies who probably acquired the disease after the Korean War and the incident rate has been sharply declining. DPRK deals with more

widespread TB but the incidence is decreasing. Meanwhile, rising threats from global emerging infectious diseases put further pressure on two Koreas to cooperate over health securities.

Nutrition, food security, and basic sanitation for children in DPRK

Studying nutritional and basic sanitation conditions for North Korean children reveals the population health of DPRK at the present and in the near future. Despite improvements over the neonatal, infant, and under-5 mortality rates in the last 10 years, North Korean children still face physical and mental development challenges due to insufficiently nutritious food. Almost one of every five North Korean children suffer from stunting which is irreversible. Wasting, not as high as stunting rates, needs to be reduced to further improve the children's mortality rates.

In addition to the unmet nutritional needs of children under-5 on a national level, disparities over different ages, wealth, and regional groups exist. Stunting already affects 20% of North Korean children under 24 months which slows afterward. Women living in rural areas receive limited prenatal care along with lower institutional delivery rates. More children residing in an urban area meet minimum diet diversity and nutritional status with higher access to acceptable WASH. Affluent Pyongyang has the lowest proportion of children suffering from stunting and wasting yet with the highest percentage of overweight children. The wealthy households unsurprisingly provide better nutritional food along with better WASH to their children.

UN-INGOs and cooperation with ROK

UN-INGOs have aided the North Korean government to improve the population health by providing short-term humanitarian aids, collecting data in cooperation with the government, and assisting the government with development efforts. In spite of serious political challenges, the organizations have adapted to the restrictions and continued their committed works. Residing organizations assist in conducting North Korean population surveys and producing reliable reports. Open access to the aid goods production sites means a chance to meet and affect the North Korean population.

While some critiques question the sustainability and credibility of UN-INGOs' efforts in the DPRK, the gap between the two Koreas would have been much larger without their presence. Meanwhile, ROK has channeled its aids to DPRK through these organizations. Domestic and international politics have often challenged bilateral provisions to DPRK. Among aids, healthcare provisions have often taken up the highest proportion as regarded as purely humanitarian. The Pyongyang Joint Declaration 2018 illustrates the heightened recognition of the necessary cooperation in population healths.

German unification

Often quoted as an example to follow, German unification provides lessons to be learned and to avoid. The literature review suggests that the availability of more medical equipment and medicine upon the unification may have reduced mortality rates due to effects on some chronic diseases in East Germany although the trend already started shortly before the unification. Meanwhile, upon the unification, the GDR healthcare model was discarded and the Eastern German population was absorbed into the FRG system. Some today discuss the benefit of unique GDR features such as the polyclinics that prevented avoidable admissions and provided attentive care for maternal care. FRG scholars who may have argued for the integration rather than the complete absorption were not invited for sharing their opinions. The German unification occurred overnight and both GDR and FRG were not ready. On the other hand, two Koreas now have time and opportunity to discuss.

5.2 Discussion of findings

5.2.1 Methodology

The goal of this thesis is to conduct a literature review and document analysis employing structured scientific methods producing reliable findings, especially considering the obscure data available on the DPRK population health. The collected information from various sources is

cross-checked for validity. The author attempts to represent sources from ROK, DPRK, and the international community. Most primary data are sourced from UN-INGO and the North Korean government reports, such as periodic population surveys. Evidence-based findings from IHME are referenced to compare the burden of disease of two Koreas. Qualitative testimonies of defectors add depth to the research as well. Furthermore, literature reviews conducted on Pubmed and NKIS supplement the findings. In the verification process, the author notes that one publication values the North Korean population health perspectives relatively highly quoting low birth rates in DPRK. The authors of the publication argue that continuously decreasing birth rates in the DPRK are likely to reduce maternal and infant deaths thus improving maternal health. (Hong, J., Kim, S., and Jeong, E, 2018) However, most publications such as reports from UN-INGOs express concerns over unprepared North Korean society for the aging society. The thesis rather discovers the need for cooperation between two Koreas facing this common challenge now and in the coming days.

Many publications searched on Pubmed are based on defectors' accounts. Due to the objective of the thesis, such publications are not discussed in-depth but rather treated as additional information supporting the main findings. Scholars may have conducted studies on defectors' healths as primary sources on DPRK population health is scarce. In attempts to incorporate DPRK perspectives, this thesis mainly assesses the government's involvement with the UN-INGO's survey and humanitarian aid works. Direct voices from Kim Jong-un, DPRK legislation documents, and editorials from Rodong Sinmun are assessed as well. Findings from such document analysis are compared with results from other document analysis and literature reviews mentioned above. A separate literature review on German unification and the population health add further insights into the study as a comparison.

5.2.2 Discussion of Results

Degrees of convergence and the necessary partnership over the population healths

If sociopolitical convergence is by choice and fluctuates, population healths have already started converging between two Koreas. With an increasing number of defectors residing in ROK, population health in the DPRK has direct impacts on the South Korean population. Defectors' successful integration into the South Korean society often first requires physical and emotional recovery from hardships throughout the defecting phase. Not to be used as a means for discrimination, crumbled basic healthcare in DPRK may mean defectors with undiagnosed and untreated diseases such as TB. As most defectors are from poor regions and households, they are more likely to carry such diseases as shown on the survey.

Furthermore, threats from infectious diseases over the border between two Koreas and neighboring third countries such as China further pressure two Koreas to cooperate over the infectious disease control. Through the Pyongyang Joint Declaration in 2018, two leaders of the Korean peninsula agreed on partnership over infectious disease spread and transmission across the border. The recent outbreak of 2019-nCoV has highlighted the need for further cooperation on population healths. Even if the military border remains, population healths of each Korea is affecting another. As more defectors are expected to move to ROK and infectious disease outbreaks are expected to recur, two countries have no choice but to work together.

Beneficial bilateral cooperation for two Koreas

As shown in the biosecurity concerns, cooperation between the two countries is essential and it also benefits population healths of both states. In addition to infectious diseases, the DPRK population has a high prevalence of NCD diseases such as heart disease. Moreover, two Koreas are recently encountering common diseases and risk factors for premature death. Stroke and lung cancer are among the top two causes of the most premature death in two Koreas. They both face an aging society, whereas ROK has already started experiencing its impact on population health and the national health budget.

Decreasing NCD prevalences in DPRK benefits both Koreas. As the convergence accelerates, such as potential restoration of ROK funded production facilities and travel routes in the DPRK, a healthier North Korean population with treated and prevented NCDs will benefit ROK. With humanitarian medical aids from ROK, DPRK can provide appropriate essential medicine and medical supplies treating NCDs in the North Korean population. The DPRK government can reference ROK experiences in preventing and dealing with NCDs such as reducing smoking. If the positive cycle continues, ROK will need to provide fewer humanitarian aids in the long run.

The partnership can reduce stunting in North Korean children. In contrast to the general improvements of children's health in DPRK, stunting remains a serious challenge on the national level. DPRK government should distribute nutritious food to vulnerable children living in rural areas and poor households. As the country now faces continuous sanctions from the international community and recurrent natural disasters, bilateral humanitarian aides from ROK could provide nutritious food to these children steadily and reliably. Children compose a significant portion of the defectors and the irreversible stunting condition affects the successful integration process, thus affecting the South Korean society as well.

German unification and road untravelled for two Koreas

Public health policy for converged Korea should selectively adopt German experience as poor economic conditions and health indicators of North Korea foretell challenges ahead. North Korean population may benefit the most by maintaining some of its healthcare systems while cooperating with ROK regarding facility upgrades such as machines and equipment at hospitals. Some regret today in Germany the exclusion of GDR experts in the integration phase upon the German unification. ROK should recognize existing scholars and specialists in DPRK as they have direct experience with the North Korean population.

5.3 Strengths and limitations

Not many studies have explored the converging population healths of two Koreas which has already progressed. Such scarcity may be due to several obstacles to conducting studies on North Korea. Intentions of the North Korean government are often cryptic at the best and the regime is isolated from the international community. Yet, urgent needs for studies on this field persist as it can affect the population health of the Korean peninsula as well as the neighboring countries. Furthermore, while life expectancies and mortality rates are sought after in accessing population health of DPRK, the burden of disease that addresses quality of life has been missing in studies.

In response to the call, this thesis attempts to research and analyze various scientific documents, qualitative and quantitative data, and official documents in assessing the population health of two Koreas. Gathered facts and perspectives from ROK scholars, international communities, and the DPRK government are examined. Comparing and contrasting such different sources of publications add validity to the research outcome. Utilizing GBD reports adds depth in investigating population healths of two Koreas. Furthermore, the thesis incorporates a separate study on the German experience as a reference.

In spite of the notable strengths, the thesis has encountered a few limitations. Reliable data on the DPRK are hard to obtain and difficult to verify. The regime still relies heavily on the propaganda to direct the domestic public opinion. As the population health is a politically sensitive matter, the government often chooses to hide a serious shortage of essential medical goods. However, in order to acquire aids from international donors, the regime has participated in the population survey and other data collection in cooperation with the INGOs. UN-INGOs residing in the regime do note the restricted access but their production sites funded by the international agencies. None of the surveys are collected or verified by a third-party independently. While the partnership with the North Korean government is imperative and helpful in designing surveys, the government can also distort findings by selectively choose the studied sessions of the population. Yet, the DPRK government needs to reveal at least some of the affected populations suffering from the lack of nutritious foods and basic medical care for the aids. In addition, for the desired official recognition in the international stage, the state needs to produce reliable

statistical data on its population. Thus, this thesis employs such surveys and collected data as part of the analyzed sources.

Another limitation regards the missing voices of DPRK scholars. Experts from ROK and many other countries have conducted studies on the population health of DPRK. While closed communication with the rest of the world may mean limited research efforts for scholars in the DPRK, they have first-hand experience with the North Korean population. Doctors in DPRK would know the level of medical supply shortages in the field. Experts in North Korean public health working for the government agencies would understand the macro-level challenges and opportunities. While the government may quote the experts in its official speech or declaration, it does not necessarily mean direct voices from the experts. Two Koreas promised to cooperate against threats for the population healths and scholars from both Koreas could collaborate. Such an attempt is not inexistent. Remembering the lesson from Germany, South Korean doctors and experts should not disregard the opinions of the DPRK. South Korean counterparts should acknowledge that their North Korean colleagues understand the North Korean population the best.

Finally, possession of German language skills could have nurtured the research efforts in German unification and the Eastern German population health which is studied in this thesis as a reference. Yet, many dependable publications regarding the German unification were available either in English or in Korean. A literature review conducted on Pubmed search resulted in several publications assessing the German unification and the Eastern German population health in English. Furthermore, German and ROK governments signed a treaty in sharing academic knowledge on the German reunification. White papers produced by the German government regarding population health before and upon the unification were shared with the Korean government and further published in Korean. This thesis conducted document analysis on the white paper in the Korean version. Although the German language skills were desired, the knowledge of Korean was rather essential in analyzing both ROK and DPRK sources.

6. Conclusion & further research

The status of North Korean population health concerns not only DPRK but also ROK and the neighboring countries in the region. Sharing the same ethnic roots and culture, DPRK and ROK have been continuously converging with each other ever since the division in 1945. Despite the physical division over the demilitarized zone, DPRK and ROK governments have arranged brief reunions of separated families and South Koreans were once allowed to invest and travel within the restricted areas of DPRK. Despite fluctuations over the degree of such convergence, it continues. The influx of North Korean defectors into ROK is simply another form of immigration.

Along with such population movements, population healths of two Koreas affect each other. Infectious diseases can spread either by human or animal carriers across the border. North Korean defectors or occasional South Korean visitors to DPRK can spread diseases. Moreover, as defectors integrate into the South Korean population, their health issues also become part of the South Korean national health concerns. Despite significantly fewer South Koreans visiting the DPRK, animals could still carry various infectious diseases to DPRK. The geographical proximity and empathetic emotions of two Koreas bind them to find the next step together for maintaining and improving the population health of the Korean peninsula.

Potentially more active exchanges between two Koreas in the near future can increase threats but also opportunities for the population health of the peninsula. German unification happened suddenly and the state did not have time to consolidate opinions. Korea has time for discussions over further convergence and could closely cooperate wisely. Not only the prevention of infectious diseases but also positive impacts on NCD prevalence can result. ROK has experience over the prevention and treatments of several NCDs that the DPRK population now suffers largely. ROK can share both knowledge and medical supplies with the DPRK. On the other hand, they both face a rapidly aging society upon which they can work together to mitigate the burden on population health.

Despite continuing sanctions from the international community, UN-INGOs residing in DPRK should continue their efforts in humanitarian and development aids in cooperation with the government. Continuous population surveys conducted together such as MICS are highly regarded for the data collection purpose as well as improving the population health. As the trusts build up over the years, further research could be carried on currently tabooed subjects in DPRK such as the prevalence of STDs, illegal drug uses, and the preparedness against emerging infectious diseases. If findings are significant, DPRK may be more convinced to pursue the developments in healthcare regardless of short-term political obstacles. ROK and the international community would also benefit if DPRK is committed to the long-term development efforts in the population health.

Finally, research activities incorporating the DPRK scholars would enhance the research efforts and benefit two Koreas. DPRK scholars are already reading publications from ROK and international sources. Although halted abruptly, experts of two Koreas did work together once over producing herbal medicine. As both states recognize the critical matters and timing on hand, they could act on promises from the Joint Declaration. DPRK may not permit as much freedom and autonomy to its scholars and specialists at first. However, one step would lead to the next. ROK and committed INGOs should patiently wait and meanwhile make preparations for further cooperation with DPRK over improving the population of the peninsula.

References

Bhatia, V. (2018). rGLS country support mission report. WHO/SEARO. [online] Available at: https://www.who.int/docs/default-source/searo/tuberculosis/pmdt-report-dprk-2018.pdf?sfvrsn=40806ddf_2 [Accessed: 20 Jan 2020]

Britnell M. (2015). In search of the perfect health system. 1. published. Basingstoke, Hampshire: Palgrave Macmillan.

Busse R, Riesberg A. (2004). Health care systems in transition: Germany. Copenhagen, WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies.

Centers for Disease Control and Prevention (CDC), 1997. Status of public health--Democratic People's Republic of Korea, April 1997. MMWR Morb. Mortal. Wkly. Rep. 46, 561–565. [online] Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/00048030.htm> [Accessed: 28 May 2019]

Central Bureau of Statistics of the DPR Korea and UNICEF, 2017. (MICS 2017) DPR Korea Multiple Indicator Cluster Survey 2017, Survey Findings Report. Pyongyang, DPR Korea: Central Bureau of Statistics and UNICEF. [online] Available at: <http://mics.unicef.org/surveys> [Accessed: 10 Jan 2020]

Choi, S.K., Park, S.M., Joung, H. (2010). Still life with less: North Korean young adult defectors in South Korea show continued poor nutrition and physique. Nutrition Research and Practice 4, 136. [online] Available at: <https://doi.org/10.4162/nrp.2010.4.2.136> [Accessed: 18 May 2019]

DPRK Ministry of Public Health. (DRPK MoPH) (2017). Medium Term Strategic Plan for the Development of the Health Sector DPRK, 2016-2020. WHO. [online] Available at: http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/democratic_peoples_republic_of_korea/dpr_korea_medium_term_strategic_plan_2016-20.pdf [Accessed: 21 Jan 2020]

Ferris-Rotman, A and Denyer, Simon. (2019). Putin: Kim Jong Un needs international security guarantees to give up nuclear arsenal. *Washington Post*. [online] Available at: <https://www.washingtonpost.com/graphics/2019/world/amp-stories/trump-kim-vietnam-summit/?noredirect=on> [Accessed: 18 May 2019]

Food and Agriculture Organization of the United Nations. (2019). Global Information and Early Warning System: DPRK. [online] Available at: <http://www.fao.org/gIEWS/countrybrief/country.jsp?code=PRK> [Accessed: 17 May 2019]

Grigoriev, P., Pechholdová, M. (2017). Health Convergence Between East and West Germany Reflected in Long-Term Cause-Specific Mortality Trends: To What Extent was it Due to Reunification? *European Journal of Population* 33, 701–731. [online] Available at: <https://doi.org/10.1007/s10680-017-9455-z> [Accessed: 18 May 2019]

Grundy, J., Biggs, B.-A., Hipgrave, D.B. (2015). Public Health and International Partnerships in the Democratic People’s Republic of Korea. *PLoS Med.* 12, [online] e1001929. Available at: <https://doi.org/10.1371/journal.pmed.1001929> [Accessed: 28 May 2019]

Han, P., Teng, Y., Bi, X., Li, J., and Sun, D. (2019). Epidemiology survey of infectious diseases in North Korean travelers, 2015-2017. *BMC Infectious Diseases*. 19, [online] 13. Available at: <https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-018-3664-x> [Accessed: 20 Jan 2020]

Hee-Jung Kang. (2018). Issues and Policy Options for Moon Jae-in Care. *Health and Social Welfare Forum*, [online] 255:23-37. Available at: <http://kiss.kstudy.com/thesis/thesis-view.asp?key=3572052> [Accessed: 17 Jan 2020]

Hong, J. and Kim, S. and Jeong, E. (2018). Livelihoods in North Korea and Cooperation Plan. KINU, [online] Volume 18-12. Available at: <https://www.nkis.re.kr:4445/main.do> [Accessed: 18 May 2019]

IHME. (2015). How causes contributed to change in life expectancy. Seattle, WA: IHME, University of Washington [online]. Available at: <https://vizhub.healthdata.org/le/> [Accessed: 22 May 2019]

IHME. (2017a). North Korea. Seattle, WA: IHME, University of Washington [online]. Available at: <http://www.healthdata.org/north-korea> [Accessed: 18 Jan 2020]

IHME. (2017b). South Korea. Seattle, WA: IHME, University of Washington [online]. Available at: <http://www.healthdata.org/south-korea> [Accessed: 18 Jan 2020]

IHME. (2019). History. Seattle, WA: IHME, University of Washington [online]. Available at: <http://www.healthdata.org/about/history> [Accessed: 28 Mar 2020]

Jong-Myung Kim. (2017). Future of private insurance post Moon Jae-In care. Korean Preventive Health Forum, [online]. Available at: <http://www.prevmmed.or.kr/bbs/download.php?bbsMode=fileDown&code=freeData&id=298> [Accessed: 19 Jan 2019]

Kapur, A. (2015). Links between maternal health and NCDs. Best Practice & Research Clinical Obstetrics & Gynaecology, [online] Volume 29, Issue 1. Available at: <https://www.sciencedirect.com/science/article/pii/S1521693414001576?via%3Dihub> [Accessed: 23 Jan 2020]

Korean Centers for Disease Control and Prevention (KCDC). (2019). Guideline for Malaria[online]. Available at: http://www.ksid.or.kr/file/2019_190503.pdf [Accessed: 21 Jan 2020]

Korean Statistical Informationa Service (KOSIS). (2020) Statistical Database: TB [online]. Available at: https://kosis.kr/eng/statisticsList/statisticsListIndex.do?menuId=M_01_01&vwcd=MT_ETITLE&parmTabId=M_01_01&statId=1973001&themaId=#D1_3_1_1.5 [Accessed: 20 Jan 2020]

Lee, C. et la. (2017). Issues and Tasks of Unification with regard to Population, Health, Welfare Integration. National Research Council for Economics, Humanities and Social Sciences, [online] Volume 17-17-01. Available at: <https://www.nkis.re.kr:4445/main.do> [Accessed: 18 May 2019]

Lee, K. et la. (2018). Health Rights in North Korea. KINU, [online] Special Edition. <https://www.nkis.re.kr:4445/main.do> [Accessed: 18 May 2019]

Lee, Y.H., Yoon, S.-J., Kim, S.H., Shin, H.-W., Lee, J.Y., Kim, B., Kim, Y.A., Yoon, J., Y.S. (2013a). A Strategy Toward Reconstructing the Healthcare System of a Unified Korea. *Journal of Preventive Medicine & Public Health* 46, 134–138. Available at: <https://doi.org/10.3961/jpmph.2013.46.3.134> [Accessed: 18 May 2019]

Lee, Y.H., Yoon, S.-J., Kim, Y.A., Yeom, J.W., Oh, I.-H. (2013b). Overview of the burden of diseases in North Korea. *J Prev Med Public Health* 46, 111–117. Available at: <https://doi.org/10.3961/jpmph.2013.46.3.111> [Accessed: 28 May 2019]

McKibbin W.J., Lee, J.W., Liu, W., Song, C.J. (2017). Modeling the Economic Impacts of Korean Unification. [online] The Brookings Institution, 6. Available at: https://www.brookings.edu/wp-content/uploads/2017/04/es_20170420_koreaunification.pdf [Accessed: 18 May 2019]

Ministry of Health and Welfare (MOHW). (2020). Policies. [online] Available at: <http://www.mohw.go.kr/react/index.jsp> [Accessed: 20 Jan 2020]

Ministry of Reunification. (2015). Germany Unification Policy White Paper: Health. [online] Available at: <https://www.unikorea.go.kr/books/> [Accessed: 17 May 2019]

Ministry of Reunification. (2018a). Understanding DPRK, 27. [online] Available at: <https://www.unikorea.go.kr/books/> [Accessed: 17 May 2019]

Ministry of Reunification. (2018b). Understanding Unification. [online] Available at: <https://www.unikorea.go.kr/books/> [Accessed: 17 May 2019]

Ministry of Reunification. (2018c). Unification White Paper. [online] Available at: <https://www.unikorea.go.kr/books/> [Accessed: 17 May 2019]

Nolte, E., McKee, M. (2000a). Ten years of German unification. *BMJ* 321, 1094–1095. [online] Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1118886/> [Accessed: 17 May 2019]

Nolte, E., Shkolnikov, V., McKee, M. (2000b). Changing mortality patterns in East and West Germany and Poland. I: long term trends (1960-1997). *J Epidemiol Community Health* 54, 890–898. Available at: <https://jech.bmj.com/content/54/12/890> [Accessed:28 May 2019]

Pak, Sunyoung, et al. “Height and Living Standards in North Korea, 1930s–1980s.” *The Economic History Review*, vol. 64, no. S1, 2011, pp. 142–158. JSTOR, www.jstor.org/stable/27919537.

Park, H. (2018). A study on Legislation of Inter-Korea Health and Medical Cooperation. Korea Legislation Research Institute, [online] Volum 18-19-2-05. <https://www.nkis.re.kr:4445/main.do> [Accessed: 18 May 2019]

Park, J.J., Lim, A.-Y., Ahn, H.-S., Kim, A.I., Choi, S., Oh, D.H., Lee-Park, O., Kim, S.Y., Jung, S.J., Bump, J.B., Atun, R., Shin, H.Y., Park, K.B. (2019). Systematic review of evidence on public health in the Democratic People’s Republic of Korea. *BMJ Glob Health* 4, e001133. [online] Available at: <https://doi.org/10.1136/bmjgh-2018-001133> [Accessed: 28 May 2019]

Park, K.B. and Khan, U., and Seung, K.J. (2018). Open Letter to The Global Fund about its decision to end DPRK grants. *The Lancet*. [online] Available at: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)30672-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)30672-X/fulltext) [Accessed: 18 May 2019]

Remais, J., Zeng, G., Li, G., Tian, L., and Engelgau, M. (2012). Convergence of non-communicable and infectious diseases in low- and middle-income countries. *Int J Epidemiol.* 42(1): 221-227. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3600620/> [Accessed: 20 Jan 2020]

Rodong Sinmun. (17 Apr 2019 a). Supreme Leader Kim Jong Un's Policy Speech. [online] Available at: http://www.rodong.rep.kp/en/index.php?strPageID=SF01_02_01&newsID=2019-04-17-0001 [Accessed: 17 May 2019]

Rodong Sinmun. (25 Apr 2019 b). Let Us Go All-out for Grand Advance of Self-Reliance. [online] Available at:

http://www.rodong.rep.kp/en/index.php?strPageID=SF01_02_01&newsID=2019-04-25-0001
[Accessed: 17 May 2019]

Rodong Sinmun. (1 Jan 2020). Report on 5th Plenary Meeting of 7th C.C., WPK. [online]
Available at: http://www.rodong.rep.kp/en/index.php?strPageID=SF01_02_01&newsID=2020-01-01-0012 [Accessed: 13 Jan 2020]

Ryu, G.-C. (2013). Lessons From Unified Germany and Their Implications for Healthcare in the Unification of the Korean Peninsula. *Journal of Preventive Medicine & Public Health* 46, 127–133. Available at: <https://doi.org/10.3961/jpmph.2013.46.3.127> [Accessed: 17 May 2019]

The World Bank. DPRK: Physicians. [online] Available at:
<https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=KP> [Accessed: 16 Jan 2020]

The World Bank. ROK: Health population and nutrition indicator. [online]. Available at:
<https://databank.worldbank.org/data/source/health-nutrition-and-population-statistics> [Accessed: 20 Jan 2020]

The World Bank. (2018) DPRK: Incidence of tuberculosis (per 100,000 people). [online]
Available at: <https://data.worldbank.org/indicator/SH.TBS.INCD> [Accessed: 20 Jan 2020]

The World Bank. (2017) DPRK: Fertility rate. [online] Available at:
<https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=KP> [Accessed: 20 Jan 2020]

United Nations Human Rights. (1996). International Covenant on Economic, Social and Cultural Rights [online] Available at: <https://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx>
[Accessed: 17 May 2019]

United Nations DPRK. (2016). DPRK United Nations Strategic Framework 2017-2021. [online]
Available at:
<https://www.undp.org/content/dam/unct/dprk/docs/DPRK%20UN%20Strategic%20Framework%202017-2021%20-%20FINAL.pdf> [Accessed: 17 May 2019]

United Nations in DPR Korea. (2018). DPRK Korea Needs and Priorities. [online] Available at: https://www.undp.org/content/dam/unct/dprk/docs/unct_kp_NP2018.pdf [Accessed: 17 May 2019]

United Nations in DPR Korea. (2019a). DPRK Korea Needs and Priorities. [online] Available at: https://www.undp.org/content/dam/unct/dprk/docs/DPRK_NP_2019_Final.pdf [Accessed: 17 May 2019]

United Nations DPRK. (2019b). Statement by Mr. Tapan Mishra, UN Resident Coordinator in DPRK, on the release of the 2019 Needs and Priorities Plan. [online] Available at: https://www.undp.org/content/dam/unct/dprk/docs/UNCT_%20KP_Statement_UN%20Resident%20Coordinator_2019.pdf [Accessed: 17 May 2019]

United Nations Security Council. (2019). 1718 Sanctions Committee (DPRK). [online] Available at: <https://www.un.org/securitycouncil/sanctions/1718/resolutions> [Accessed: 17 May 2019]

United Nations Sustainable Development Goals (SDG). (2015). Knowledge Platform. [online] Available at: <https://sustainabledevelopment.un.org/?menu=1300> [Accessed: 4 Feb 2020]

U.S. Department of State, (2018). U.S. Relations with North Korea. [online] Available at: <https://www.state.gov/u-s-relations-with-north-korea/> [Accessed: 18 May 2019]

U.S. Department of the Treasury. (2019). North Korea Sanctions. [online] Available at: <https://www.treasury.gov/resource-center/sanctions/programs/pages/nkorea.aspx> [Accessed: 17 May 2019]

Winston, F.K., Rineer, C., Menon, R., Baker, S.P. (1999). The carnage wrought by major economic change: ecological study of traffic related mortality and the reunification of Germany. *BMJ* 318, 1647–1650. Available at: <https://www.bmj.com/content/318/7199/1647/related> [Accessed: 28 May 2019]

World Food Programme (WFP). (2019). DPRK Interim Country Strategic Plan (2019-2021). [online] Available at:

https://one.wfp.org/operations/current_operations/ResUpdates/KP02.pdf?_ga=2.78788626.787599200.1558277411-2046263451.1555507463 [Accessed: 17 May 2019]

World Health Organization. (2018). Country Cooperation Strategy: DPRK. Available at: <https://www.who.int/countries/prk/en/> [Accessed: 15 Jan 2020]

WHO. (2019). Global Tuberculosis Report. Available at: <https://apps.who.int/iris/bitstream/handle/10665/329368/9789241565714-eng.pdf?ua=1> [Accessed: 21 Jan 2020]

WHO. (2020). Novel Coronavirus – Japan (ex China). Available at: <https://www.who.int/csr/don/16-january-2020-novel-coronavirus-japan-ex-china/en/> [Accessed: 21 Jan 2020]

Young-Rae Song. (2018). Strengthening of NHIS Coverage. HIRA Policy Issues [online]. 12(1):7-18. Available at: http://www.hira.or.kr/download.do?src=%2Fshare%2Finternet%2Fpt%2Fbbs%2F479%2F2018%2F07%2FBZ201807233961775.pdf&fnm=2018+HIRA_12%EA%B6%8C+1%ED%98%B8_%EC%A0%95%EC%B1%85%ED%98%84%EC%95%8802.pdf [Accessed: 2019 Jan 2019]

Statutory declaration

I hereby confirm that I am the author of the thesis presented. I have written the thesis as applied for previously unassisted by others; using only the sources and references stated in the text.

Date:

Appendix

Appendix 1: Prisma flow charts

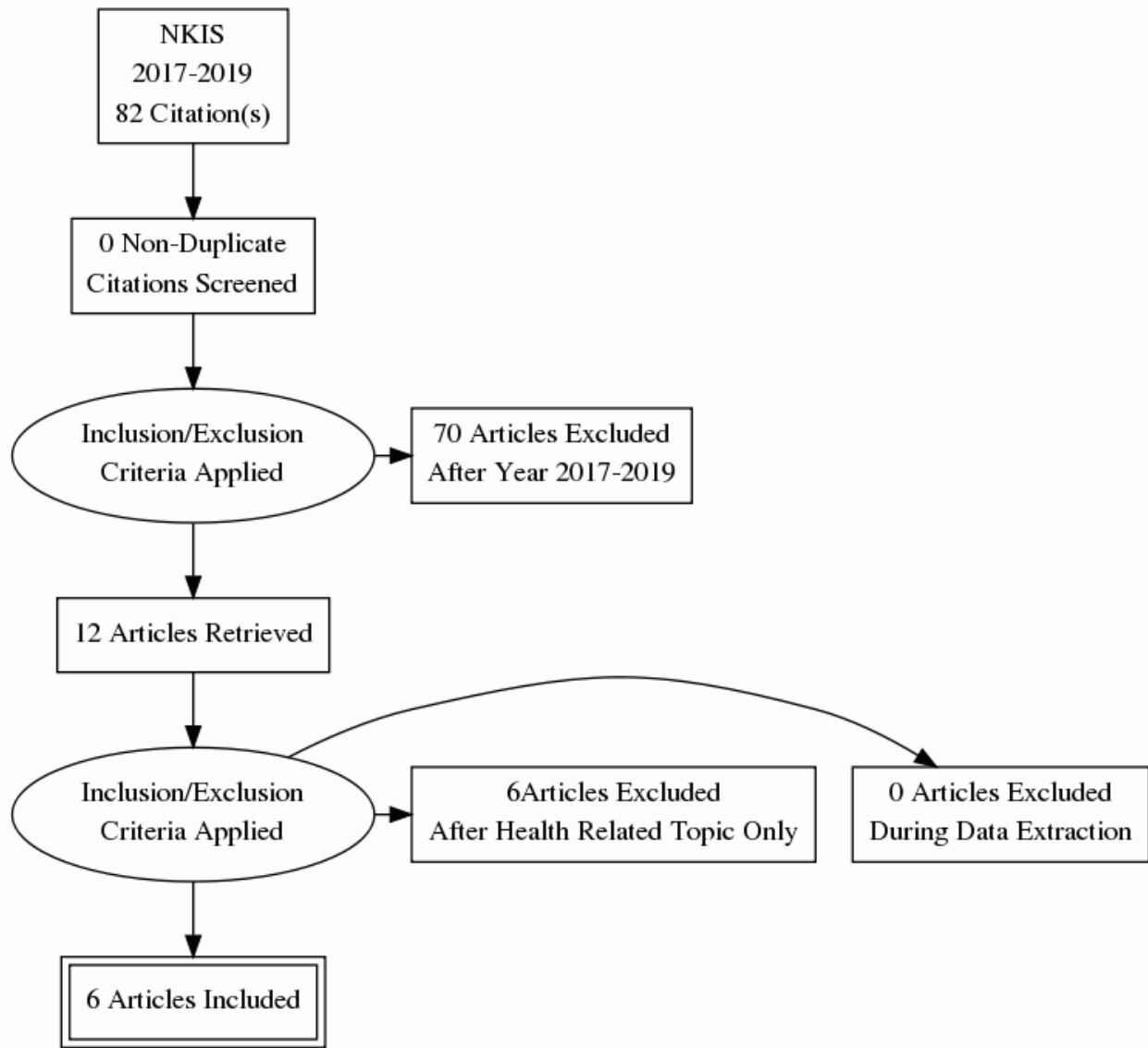


Figure 1: Prisma Flow Chart (NKIS) (Source: created)

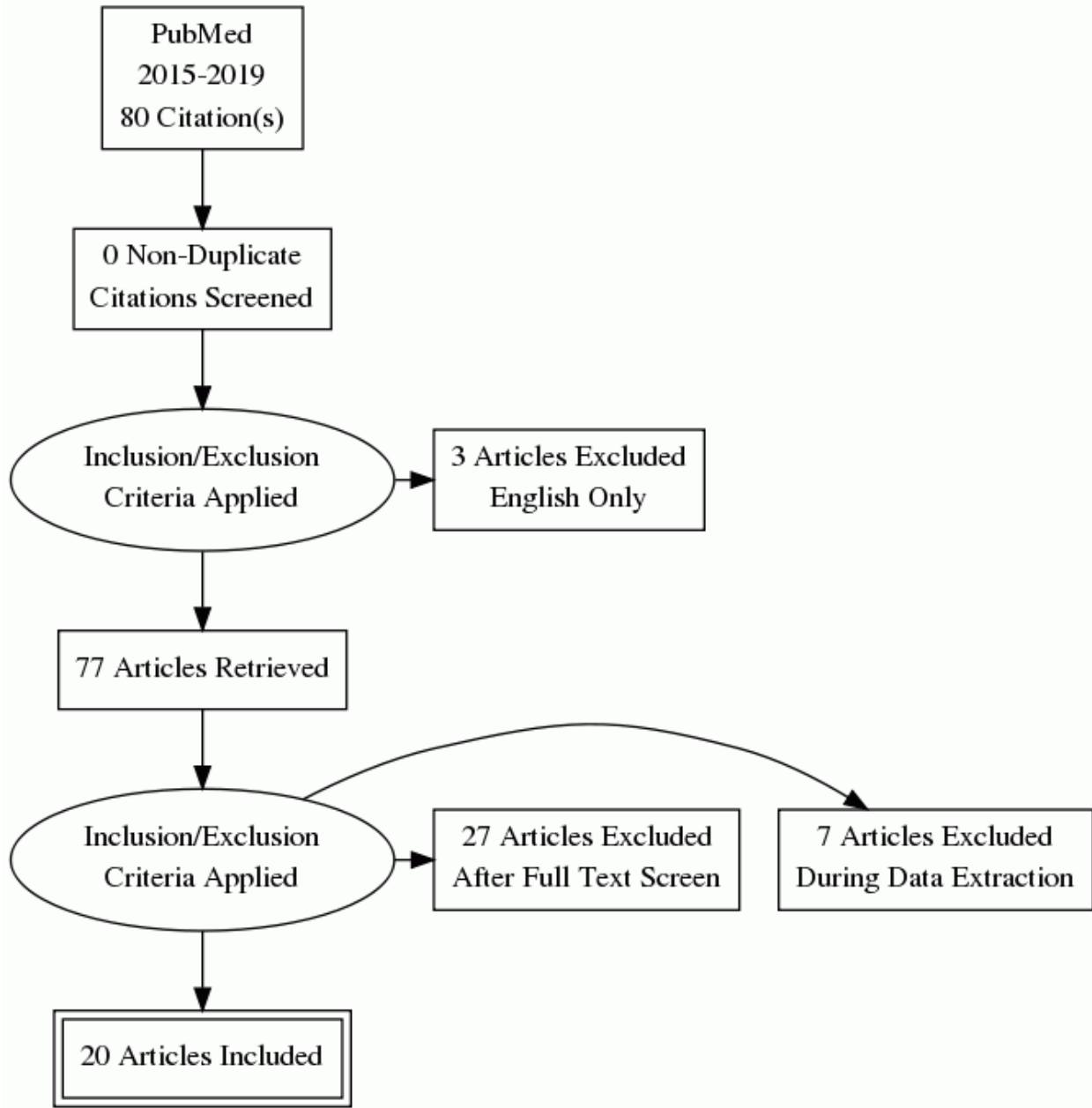


Figure 2: Prisma Flow Chart (PubMed) (Source: created)

Appendix 2: Extraction table of the selected literature

Table 1:Extraction Table (Source: created)

	First Author	Database	Year	Publication Country	Study Population	Purpose	Main Findings
1	Choi, S.K.	Pubmed	2010	ROK	Defectors	North Korean young adult defectors in South Korea	North Korean young adult defectors in South Korea show continued poor nutrition and physique
2	FAO	FAO	2019	DRPK	DPRK & World	Food security snapshot	About 40 percent of the population estimated to be food insecure and in urgent need of assistance
3	Grigoriev, P.	Pubmed	2019	Germany	Germany through Unification	Health Convergence Between East and West Germany Reflected in Long-Term Cause-Specific Mortality Trends	Life expectancy at birth (comparative figure); long-term mortality trends by causes of death (comparative figure)
4	Hong, J.	NIKS	2018	ROK	ROK&DPRK&Defectors	Comparing healthcare systems and condition in ROK and DPRK	Testimony by defectors from DPRK providing current information on public health condition in DPRK
5	Lee, C.	NIKS	2017	ROK	DPRK&Defectors	Analyzing DPRK through data collected by residing UN agencies in DPRK	Much improvements on children nutritional condition in the past twenty years; data collected by the INGO often not matching with the witnesses from defectors.
6	Lee, K.	NIKS	2018	ROK	DPRK&Defectors	DPRK public health condition through human rights perspectives	Kim Jong-Un's emphasis on public health; testimonies not meeting the national policy

7	Park, H	NIKS	2018	ROK	DPRK&ROK	DPRK domestic and external political developments and public health	Recent political developments among DPRK, ROK, and the US; the legal context of DPRK healthcare system
8	Lee, Y.H.	Pubmed	2013	ROK	Unified Korea	A Strategy Toward Reconstructing the Healthcare System of a Unified Korea	Roadmap composed of four successive phases
9	Ministry of Reunification	Ministry of Reunification	2015	ROK	Germany through Unification	Germany Unification Policy White Paper	Backgrounds and aftermaths of German unification, especially concerning healthcare
10	Ministry of Reunification	Ministry of Reunification	2018	ROK	DPRK	Understanding DPRK	<i>Juche</i> , self-reliance, has served as a foundation for politics, society, and economics since the 1950s
11	Ministry of Reunification	Ministry of Reunification	2018	ROK	DPRK	Understanding Unification	Despite many challenges, much progress has been made
12	Ministry of Reunification	Ministry of Reunification	2018	ROK	DPRK	Unification White Paper	Co-sponsoring of Winter Olympic as positive progress; many challenges
13	Nolte, E.	Pubmed	2000	Germany	Unified Germany	Ten years of German unification	East Germany had some successful health policy which has been lost since the unification
14	Nolte, E.	Pubmed	2000	Germany	East&West Germany&Poland	East and West Germany and Poland: long term trends of morality pattern changes	The contribution of age and cause of death to the overall changes in life expectancy at birth between 1974 and 1988-89 (comparative figure)

15	Park, K.B.	Pubmed	2018	UK, US, China	DPRK&World	Embargo on DPRK	The United Nations Security Council and the United States (US) prohibit all exports to North Korea that are directly and indirectly related to the arms proliferation in DPRK.
16	Rodong Sinmun	Rodong Sinmun	2019	DPRK	DPRK	Kim Jong Un's Policy Speech	'Juche-oriented stand,' 'self-development,' and 'self-reliance,'
17	Rodong Sinmun	Rodong Sinmun	2019	DPRK	DPRK	Self-Reliance	logic and purpose of a nation reinforced through independent efforts
18	Ryu, G.C.	Pubmed	2013	ROK	Germany	Lessons From Unified Germany and Their Implications for Healthcare in the Unification of the Korean Peninsula	Korea must develop a well-prepared road map that considers all possible situations
19	UNHR	UNHR	1996	Geneva	World	International Covenant on Economic, Social and Cultural Rights	Anyone should not be deprived of own means of subsistence.
20	UN DPRK	UN DPRK	2016	DPRK	DPRK	DPRK United Nations Strategic Framework 2017-2021	Food and Nutrition Security; Social Development Services; Resilience and Sustainability; Data and Development Management
21	UN DPRK	UN DPRK	2018	DPRK	DPRK	DPRK Korea Needs and Priorities	People in need (18 million), people targeted (13 million), people reached (6.5 million)

22	UN DPRK	UN DPRK	2019	DPRK	DPRK	DPRK Korea Needs and Priorities	Even reliefs already collected by charities and international organizations have encountered barriers in financial transactions and shipments
23	UN DPRK	UN DPRK	2019	DPRK	DPRK	DPRK Needs and Priorities Plan	In the health sector, 92 percent of assistance is directed to children under five and women
24	UN Security Council	UN Security Council	2019	US	DPRK & World	UN resolution	Specific conditions on DPRK are listed. Stronger measures since 2017.
25	US Dept of State	US Dept of State	2018	US	DPRK	US on DPRK	The US and Japan do not maintain diplomatic relations with DPRK.
26	US Dept of Treasury	US Dept of Treasury	2019	US	DPRK & World	US sanctions on DPRK	Sanction measures. Other countries who violate these conditions also to be subjected to sanctions from the US.
27	WFP	WFP	2019	DPRK	DPRK & World	Interim Strategic Plan (2019-2021)	Reports needs based plan of 161,070,534 (USD); only 24 \$ of fund acquired
28	Busse R, Riesberg A.	WHO	2004	Germany	Germany through Unification	Discussion over the German health system and policies in transition	The HiT profile: Main sources of financing over years & Trends in health care expenditure
29	IHME	IHME	2015	ROK&DPRK	ROK&DPRK	Comparison between ROK&DPRK: causes contributing to change in life expectancy	Over 15 years, ROK witnessed a significant rise in life expectancy and DPRK with the minimal rise in life expectancy

30	Central Bureau of Statistics of the DPR Korea and UNICEF	UNICEF	2018	DRPK	DPRK & World	Household indicators as evidence for vulnerable population aids	Despite general improvements, the population requires further aids.
----	--	--------	------	------	--------------	---	---

Table 2: Extraction Table (Unified Germany) (Source: created)

TYPE OF TEXT	POPULATION REPRESENTED	OUTCOME MEASUREMENTS
(1) Document analysis; P. Grigoriev & M. Pechholdova	East Germany, West Germany	Life expectancy at birth (comparative figure); Long-term mortality trends by causes of death (comparative figure);
(2) The HiT profile; European Observatory on Health Systems and Policies	Germany: Health Care Systems in Transition	Main sources of financing over years (table) ; Trends in health care expenditure (table)
(3) Journal article; F. Winston	Traffic-related mortality of reunified Germany	Death rates for occupants of cars (figures and table)
(4) Journal article; E. Nolte, V. Shkolnikov, M. McKee	East and West Germany and Poland: long term trends of morality pattern changes	The contribution of age and cause of death to the overall changes in life expectancy at birth between 1974 and 1988-89 (comparative figure)