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Baihui Duan
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Transmission in Post-Imjin War Korea

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INTRODUCTION

The Imjin War had devastating consequences for both humans and the environment on the Korean peninsula. Trees were cut down, arable land was left overgrown and uncultivated; human and nonhuman animals were decimated by violence and disease.¹ The demographic impact was severe and long-lasting—population numbers did not begin to recover until the 1630s and failed to achieve pre-war levels until the 1680s.² This article examines how the ecological and social devastation of the war, as well as concurrent climatic anomalies, created conditions for epidemic outbreaks, and traces how displaced people from Korea’s northern borderlands transmitted diseases southward in the aftermath of the Imjin War, particularly during the 1610s. It also reevaluates government responses to epidemics and displacement, arguing that the combination of delayed epidemic reporting, administrative neglect, and inadequate transregional relief coordination revealed fundamental communication and logistical failures that created barriers to crisis management during the 1610s. By examining the interconnected dynamics of environmental deterioration caused by warfare and climatic anomalies, population displacement, and government intervention, this approach provides a more nuanced understanding of disease ecology in early

seventeenth-century Korea than climatic explanations like the Little Ice Age framework alone can offer.

I show how the mountainous topography and harsh climate of Korean northern borderland, mainly Hamgyŏng province ([See Figure 1fig. 4](#)), made it especially vulnerable to poor harvests, famines, and epidemics. When post-Imjin-war reconstruction efforts met with a series of environmental calamities such as destroyed farmlands, locust infestations, unstable precipitation, volcanic eruptions especially in 1597, and subsequent famines, people were forced to take flight, either crossing into Jurchen territory or moving internally within the Korean peninsula, becoming vectors for epidemic transmission along their routes of travel. These movement patterns created specific pathways along which epidemics were transmitted, with the mountainous Korean topography significantly shaping the movement and spread of disease.

While the existing scholarship has acknowledged that displaced people were an important vector in epidemic transmission, no research has demonstrated precisely how such transmission occurred or analyzed comprehensively the environmental factors that drove displacement.³ Previous studies have treated epidemic outbreaks and displacement as separate fields of inquiry. Social historians have analyzed the politics of displacement throughout the Chosŏn dynasty, while medical historians have typically focused on the epidemic spikes of 1612 and 1613, their treatment in medical manuals, and the contributions of Hŏ Chun (1546-1615), a prominent royal physician of that period.⁴ By integrating social, medical, and environmental approaches, this article illuminates how post-Imjin War environmental degradation – especially farmland destruction and seventeenth-century climatic anomalies, including but not limited to the Little Ice Age – created conditions of extreme vulnerability that prompted mass movement and facilitated disease spread, detailing how these intersected with

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government relief measures to shape both the flow of people and the spread of epidemics.

This integrated analysis also contributes to the emerging field of Korean environmental history by moving beyond mono-causal explanations for epidemics. In the 1990s, Yi T'aejin first quantified the number of reports mentioning various disasters and extraordinary natural phenomena in the *Chosŏn wangjo sillok* (the Veritable Records of the Chosŏn Dynasty or the *Sillok* hereafter) and introduced the Little Ice Age framework into Korean scholarship.⁵ Since then, Korean scholarship has primarily attributed seventeenth-century disasters including epidemics, droughts, floods, famines, and various social phenomena, such as transitions in medical thoughts, emerge of pharmacies, and innovations in agriculture, to the global cooling phenomenon in the seventeenth-century Northern Hemisphere known as the Little Ice Age, despite regional variations in severity and duration.⁶ While acknowledging temperature changes as one factor, in this study I demonstrate that the southward transmission of epidemics from the northern borderlands resulted from multiple interacting variables beyond climate alone: post-war environmental devastation, climate anomalies, and most critically, human adaptive responses to these environmental challenges. In doing so, I contextualize the sources obtained from the *Sillok* with qualitative analysis of the *Pibyŏnsa tŭngnok* (Records of the Border Defence Council), private diaries, collected works, and medical manuals to comprehensively examine epidemic outbreaks in the 1610s.

Methodologically, this article employs historical geographic information systems (GIS) to visualize the spatial relationship between displacement and epidemics.⁷ GIS is a methodology used in spatial epidemiology and medical geography, and the present study has much in common with these two fields; however spatial

epidemiology and medical geography usually work with large-scale modern datasets like census and public health data. Although recent scholarship has witnessed a significant rise in interest in studying the geographies of epidemics, few studies have applied historical GIS to premodern epidemics and population displacement patterns, primarily due to the paucity of historical sources suitable for both quantitative and qualitative analysis. Nevertheless, even with relatively small data sets, historical GIS can help us to visualize and analyze premodern epidemics and displacement patterns, revealing clear correlations between displacement routes and disease spread that might otherwise remain hidden in the textual record. Here, I show how, in the post-Imjin period, epidemic transmission followed pathways created by human mobility in response to environmental crisis, while the mountainous Korean topography significantly shaped these spatial patterns.

The final section examines these findings in dialogue with the governmental relief measures implemented in the borderlands by analyzing their impacts on epidemic transmission and displacement. Measures such as the provision of grain and a policy of returning displaced people to their towns of origin were intended to rejuvenate the region by addressing environmentally induced migration; however, I show how these policies also facilitated the movement of goods and people, creating pathways for epidemic transmission. These central measures depended on collaboration among regional governments; however, the peripheral northern borderlands did not draw much attention from the central government and the weakened post-war administrative infrastructure and finance at both central and local levels prevented adequate cooperation, making direct relief distribution to individuals virtually impossible. These post-disaster interim measures ultimately foreshadowed the limitations of centralized epidemic relief policies in the post-Imjin War period.

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~~Figure 1. Map of the Korean peninsula showing Hamgyŏng province in the north.~~~~<FIGURE 1 HERE>~~

KEY TERMS, DATA SOURCES AND METHODS

The existing scholarship on the phenomenon of displacement in the modern period has classified displaced people into refugees, asylum seekers, internally displaced persons, and stateless persons.⁸ The working definition of displaced people used in this article on premodern Korea draws upon these definitions, in dialogue with the Korean words *yumin* 流民 (lit. flowing people) or *imin* 移民 (lit. moving people), which appear in the primary sources cited in this study. In the case of Hamgyŏng province, the fleeing villagers have been described in previous modern literature as ecological migrants or environmental refugees. This is because the term refugee is usually reserved for a displaced person who has been forced across an international border, and previous literature has focused on people fleeing from Hamgyŏng into Jurchen territory, from whence they traveled further into Ming territory in search of a better life (See ~~Fig. 2~~Figure 2).⁹

~~Figure 2. Map of Northeast Asia in the early seventeenth century with the Korean Six Garrisons.~~~~<FIGURE 2 HERE>~~

Although the terms, “ecological migrants,” “environmental refugees,” “climate migration,” and “war refugees,” do cover a part of the experience of some people in question, who crossed state borders, others among their number remained within the Korean peninsula, moving to other provinces of Chosŏn Korea. Their experience thus

has more in common with the definition contained in the United Nations Guiding Principles on Internal Displaced People, who

have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border.¹⁰

Although this definition is rooted in modern conceptions of displacement and the nation state, it broadly matches the displacement experienced by the Chosŏn Koreans at the time in question; and so for the purposes of this article, I will describe them as internally displaced people.¹¹

Turning to the question of methodology, the quantitative analysis below hinges on records relating to epidemics from the three main official documents of the Chosŏn dynasty: the *Sillok*, the *Pibyŏnsa tŭngnok*, and the *Sŭngjŏngwŏn ilgi* (Journal of the Royal Secretariat). The *Sillok* was the main official source recording the events of each ruler's reign and had strict rules around its compilation, such that it is generally regarded as authoritative. However, it should be noted that during the compilation process, the official court historians could choose to include or omit records of epidemics on a small scale. In the Confucian worldview, epidemics along with other natural phenomena were underpinned by the doctrine of "Mandate of Heaven" (*ch'ŏnmyŏng*), so disasters like famines and epidemics were believed to be signs of divine punishment for moral and political failings, requiring rectification through good governance and moral rulership.¹² Hence, adding or subtracting from their number recorded in the *Sillok* might conceivably be a way for historians to create the impression of a particular reign as having been virtuous or, on the other hand, to offer a subtle

critique of a particular king.¹³ Thus, the records contained in the *Sillok* cannot be taken in isolation as an unproblematic source of outbreak numbers.

I therefore combined the *Sillok* epidemic records with two other official sources, the aforementioned *Pibyŏnsa tŭngnok* and *Sŭngjŏngwŏn ilgi*. In comparison to the *Sillok*, the *Pibyŏnsa tŭngnok* includes more discussions about border defense with a spatial focus on the northern borderlands, and thus provides clues about the movement of Koreans displaced by the Imjin War and Jurchens fleeing post-epidemic disasters from Manchuria coming to the Korean peninsula. The *Sŭngjŏngwŏn ilgi* covers important court affairs, including everything that was reported to kings, necessary drafts from the Six Ministries, and the main contents of memorials to the throne. It also records royal decrees and daily reports from extraordinary natural phenomena from the Kwangsanggam (Office of Astronomy), which adds more details to the epidemics recorded in the *Sillok*.

The criteria I used for determining whether a record pertains to epidemics are based on references to terms suggesting infectious diseases. These include direct mentions of *yŏk* 疫, *ryŏ* 癘, *on* 瘟, referring to epidemics, as well as terms implying an infection, such as *akchil* 惡疾 (“evil disease”), *ran* 染 (“transmission”), and specific infectious diseases, namely *tu* 痘 or *ch’ang* 瘡 (smallpox), *chin* 疹 (measles), *sanghan* 傷寒 (“cold damage”), and *ijil* 痢疾 (dysentery). These terms refer to the infectious nature of certain illnesses as understood in their historical context, but they do not necessarily correspond directly to modern classifications of infectious diseases. For example, massive deaths likely caused by malnutrition and starvation in times of famines and warfare were also recorded as epidemics in premodern Korean context, while they may not be considered epidemics by modern epidemiology standards.¹⁴ Records containing these terms were compiled in a spreadsheet, categorized by source,

which allowed for the creation of a graph (See Figure 3-3) to visualize the number of relevant epidemics reports and an overview of epidemics in the first half of the seventeenth century.

Figure. 3. Numbers of official records mentioning epidemics.

<FIGURE 3 HERE>

The timeline starts in 1599, the year after the Imjin War ended, and terminates in 1650, a few years after the Manchu forces took control of Beijing, ending the Ming Dynasty in 1644 and launching a new era of cross-border relations with Korea. The timeline of epidemics shows when the epidemics started, peaked, and subsided. The figure shows a dramatic increase in epidemic reports after the 1610s, with a noticeable peak between 1611 and 1613, and extending until 1617 or 1618—the main focus of this study.

As can be seen in **Figure. 3**, the official sources contain few or no records of epidemics for some years, but this does not necessarily mean there were no epidemics in Korea then. Record loss and compilation practices immediately following the Imjin War most likely explain these gaps, particularly those in the *Pibyŏn*sa *tŭngnok* before 1617 and the *Sŭngjŏngwŏn ilgi* before 1623, leaving sources primarily from the *Sillok* for the current study of the 1610s epidemics. To complement the quantitative data, therefore, I have also used private diaries and collected works for qualitative analysis of eyewitness information about epidemics in the 1610s. While the majority of these existent sources originate from the southern regions, these sources still employed the same keyword—*Tanghongyŏk* (red pox from Tang)—used in the *Sillok* and other medical manuals with a specification of northern borderland origins to refer to the same type of epidemic in

the 1610s. These local sources offer valuable insights into the nationwide view of this outbreak; however, a more detailed analysis of their impacts on the northern borderlands remains challenging due to the limited availability of firsthand accounts from Hamgyŏng province.

Additionally, for the GIS mapping, entries were selected based on their spatial information (location) and temporal information (month, year), especially focusing on two distinct periods: the 1610s outbreak (See Figure 5) and the 1638-1640 epidemic (See Figure 7). The earliest recorded times of infection for each province were identified from these entries, and then arranged in chronological order. The extracted data, detailing the earliest infected time for each province were compiled into a new table and imported into ArcGIS software, which enables the creation of maps with different colors representing the speed of epidemic transmission (See Figures 5 and 7).¹⁵ For example, although a few records mention epidemics in the Six Garrisons, only the earliest infected time was included in this new table and Hamgyŏng province, the first to be infected, was represented in the darkest red in the ArcGIS-generated map in Figure 5.

The ArcGIS maps presented in this article utilize the default horizontal coordinate system—WGS84. The base map of the Korean peninsula is derived from modern administrative boundaries; however, the provincial boundary lines have been redrawn to reflect historical geography.¹⁶ Due to limitations of the records, each province is treated as a single region on the maps. The only available official sources for the early 1610 outbreaks are the *Sillok*, which primarily provide accurate data at the provincial level except for the Six Garrisons. For example, a report from Hamgyŏng province noted that eight counties, represented by Anbyŏn, were affected by epidemics.¹⁷ Because this source did not provide more detailed spatial information on

the other seven counties, it is impossible to map them at the county level. Nonetheless, it should be acknowledged that there may have been variations in epidemic severity among different counties even within the same province. Further details of this methodology are contained in notes on the relevant figures.

ECOLOGIES OF THE NORTHERN BORDERLAND

Hamgyŏng province was at the mercy of its geographical location and climate and often suffered from poor crop outcomes. To the north lay Paektu Mountain, an active volcano that added further uncertainty to this already vulnerable borderland area. The high mountain range in the north, to which Mt Paektu belonged, cannot block cold air from Siberia, which combined with the local sub-arctic climate to produce extremely cold winters.¹⁸ To the east, the province was bordered by the East Sea and had a maritime climate, which was easily affected by cold ocean currents.¹⁹ In addition, two large rivers flowed through the region: the Amnok (C. Yalu) and the Tuman (C. Tumen). Towns and county headquarters were established in shallow river valleys amid the mountains and hinterlands (See Figure 4). Due to the mountainous terrain with a scarcity of arable land and inclement weather, the northern lands did not produce cotton, which was essential to keep warm in winter, and edible crop harvests were also poor compared to other provinces.²⁰ Poor agricultural outcomes caused frequent financial difficulties, arduous civil life, and brutal revolts in the region even before the Imjin War.²¹

<FIGURE 4 HERE>

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Figure. 4. Map of Hamgyŏng province, Atlas of Korea (Haedong chido). Ca. 1750s²⁴,
Source: Kyujanggak Institute of Korean Studies, accessible online
<https://kyudb.snu.ac.kr/>, Kodae 4709-41-v.3, South Korea.

Mountains and two large rivers naturally demarcated the Jurchen territory across the border from Hamgyŏng province. Administratively, Hamgyŏng was divided into northern and southern parts; however, unless otherwise noted in this study, “Hamgyŏng province” refers to both the northern and southern sections. King Sejong (1418-1450) established six frontier towns known as the Six Garrisons along the Tumen River in Hamgyŏng in 1449 as an important strategic base from which to defend against the Jurchens by mobilizing the southern Korean populace. From that time onwards, Koreans and other ethnic groups, such as the Pŏnho (frontier, border, or vassal Jurchen), began to dwell together and this region became known as a zone of encounter, which contributed to regional movement, especially during difficult times.²²

The Imjin War period and the decades immediately following this conflict were no exception in the long history of troubles faced by Hamgyŏng. For example, there were locust infestations in the province in 1597, 1599, and 1603. On each of these occasions, a dry summer provided a favorable environment for eggs to incubate in the ground, and the damage to crops was considerable.²³ Famines also occurred frequently in the 1610s because of unstable precipitation patterns.²⁴ The early decades of the seventeenth century saw much abnormal weather, with storms of 1617 followed by an unprecedented drought from 1618 to 1619, which resulted in a prolonged period of starvation and malnutrition for the people of Hamgyŏng, who became early victims of the epidemics discussed below.²⁵

Another geographical feature of the area was the unpredictability of Ch'ŏnji (C. Tianchi), the active volcano on Paektu Mountain on the border. During the Imjin War, between the 26th and the 28th day of the eighth month of 1597, eight earthquakes were reported in Hamgyŏng: walls and roofs collapsed, livestock and wild animals were frightened, and people fell ill.²⁶ At the same time, Ch'ŏnji erupted and dark clouds of smoke were reported to have suddenly filled the sky, accompanied by deafening sounds. A record in the *Sillok* reports that "red muddy water sprang out of the ground and the rivers were colored, white, yellow, and red," which likely refers to volcanic sediment.²⁷ Based on the descriptions seen in historical sources, scientific research suggests that the event in 1597 was a volcanic eruption despite an ongoing debate as to its magnitude.²⁸ A final factor that made the region prone to displacement is that the environmental conditions of the province limited the variety and quantity of goods that could be traded, and this resource scarcity contributed to economic difficulties that forced people to leave. Being located at an intersection with Manchuria, Hamgyŏng had the opportunity to trade with the Jurchens via a few markets at the Six Garrisons in the early seventeenth century, where the northern inhabitants could exchange handcrafts and cotton transported from other regions with Jurchens for rice, pelts, and ginseng.²⁹ The climate and agricultural conditions of the province limited the variety and quantity of goods that could be used in transactions. For example, cotton was not grown in significant quantities in Hamgyŏng and was instead purchased from its southern neighbor, Kangwŏn province and then exchanged with Jurchens.³⁰ Although such trade could not completely solve the difficulties caused by the harsh environment, famines, diseases in the north, or the issue of displaced people, it served as a means to supply domestic markets and alleviate food shortages in the north.³¹

DISRUPTIONS DURING AND AFTER THE IMJIN WAR

The already vulnerable living conditions of the northern borderlands were further exacerbated by the Imjin War, intensifying both environmental degradation and depopulation in the region. During the Imjin War, residents left to fight against the invaders. The Japanese daimyos Katō Kiyomasa (1562-1611) and Nabeshima Naoshige (1538-1618) invaded Hamgyōng with a force of 20,000 in the seventh month of 1592 and crossed the Tumen River into the territory of the Jurchens. Immediately after the Japanese soldiers arrived, a guerrilla group of *Righteous Soldiers* (Ŭibyōng) from Hamgyōng province was organized by local elites and peasants.³² For example, Sin Hal (1548-1592), a military general from Hamgyōng province, organized 930 mounted troops and with the course of the warfare, they went to the southern battlefields but did not return after the war.³³ Such was the devastation caused by the Japanese invasion that no more than one-tenth of the population of Hamgyōng remained in 1601.³⁴ In the mid-sixteenth century, only a few hundred people had fled every year, but by comparison, in one report from 1605 only ten to twenty percent of people remained in the town of Hoeryōng, one of the main towns of Hamgyōng province. By the fifth month of 1605, the registers record that over 2,700 people from the Six Garrisons had fled, and the exact depopulation figures probably went far beyond this number.³⁵

The fear of potential destruction of crops by the Japanese forces during the war also contributed to displacement. Along their invasion route, the Japanese armies occupied the fortress of Chongsōng and looted and burnt three more counties. Their actions destroyed over half of the arable lands near the two rivers of Hamgyōng province, the Tumen River and the Yalu River. In fear of further invasion, locals refrained from farming, leaving these lands untended. The ripe grain had also not been harvested before the incursion, further depriving the local people of food.³⁶ In the Ming-

Chosŏn border area, “starving and with no means of maintaining their livelihood,” many Koreans “relied on help from Ming armies,” “dyed their clothes,” and “crossed the river” in 1593.³⁷ Likewise, in the Jurchen-Hamgyŏng frontier, the chaos of the war rendered innumerable people homeless and they spread across the Korean peninsula.³⁸

However, it is important to note that it was not only the impact of the Imjin War but also continuous regional conflicts that caused locals in Hamgyŏng province to scatter during the early seventeenth century.³⁹ Soon after the Imjin war, between 1601 and 1603, the Ula, a Jurchen tribe, appeared in the Tumen River area and launched raids against north Hamgyŏng. Their success in these raids gained the Ula dominance over the Pŏnho tribespeople, who were Jurchens living in Chosŏn territory, as well as trading privileges with Chosŏn before the Jurchen Chieftain, Nurhaci’s rise to hegemony in 1613.⁴⁰ The post-Imjin rehabilitation period of the early seventeenth century thus coincided with an increase in tensions among Ming Chinese, Koreans, and Jurchens, which culminated in two Jurchen or Manchu invasions of Korea. Jurchen invaders came in 1627 as the Later Jin dynasty (1616-1636) and again in 1636, having renamed themselves the Manchu people and declared the establishment of the Qing dynasty (1636-1912). The continuous regional conflicts as listed in Table. 1 directly led to the social instability and population diffusion in the north.

Table. 1 Conflicts in the northern zone of encounter

Conflicts	Time
Imjin War	1592-1598
Nurhaci attacked and conquered Hada	1599, 1603
Nurhaci launched an expedition against Ula	1613
Battle of Fushun, Liaodong	1618
Battle of Sarhu, Liaodong	1619

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First Manchu invasion of Korea	1627
Second Manchu invasion of Korea	1636

These persistent exterior threats from Japanese and Jurchen forces compelled the Chosŏn Korean government to intensify its military presence along the northern border, significantly increasing the burden of military service obligations on the local population.⁴¹ For example, around one hundred men from Hamgyŏng province were selected to guard the border in 1601. These men left home in the third month and were permitted to return only in the ninth month, precisely during the critical agricultural season. Attempts to negotiate with the generals to modify this schedule proved futile.⁴² With many men perishing in warfare, abandoned farmlands required women to shoulder a greater share of agricultural work. Households deprived of male laborers faced even more dire circumstances as wives and children often succumbed to starvation. These desperate conditions drove some families to bury their newborn infants before fleeing to survive. This practice extended even to male infants, valued more in Chosŏn Korean society, as families recognized that boys would eventually face military conscription.⁴³

Due to these challenges, displacement and depopulation remained long-term problems in the north following the Imjin War. The massive depopulation of Hamgyŏng province following the Imjin War and continuous regional conflicts created waves of displaced people moving southward. As residents fled from the ecological vulnerability, military instability, and social burdens of the northern borderlands, they also formed distinct pathways that would later serve as channels for epidemic spread in the 1610s.

MAPPING DISPLACEMENT AND EPIDEMICS

The ecological conditions of the northern borderlands, compounded by environmental deterioration in the aftermath of the Imjin War, established the foundational context for regional depopulation, subsequent population displacement, and nationwide epidemic transmission. During the first decades of the seventeenth century, continuous infectious diseases appeared in the region of the Six Garrisons in northern Hamgyŏng (See Figure 2). The exact origins of the epidemics are still unclear, but Koreans at the time attributed them to China. Outsiders and immigrants have often been blamed for introducing new microbes and spreading epidemics in a transnational context.⁴⁴ During the mortality crisis of the 1610s, the peak years 1612 to 1613 were known as epidemic years for *tanghongyŏk*, *tangdokyŏk* (poisonous epidemics from Tang), *tang'on* (epidemics from Tang), *tangjil* (disease from Tang) or even *okon* (epidemics in prisons).⁴⁵ The use of the word *tang* in these expressions literally means the Tang Dynasty (618-907), but by the sixteenth century, the term had long been used in Chosŏn Korea to refer to the Ming Empire or China in general. These expressions thus provide a clue to the imagined geographical origins of the epidemics but do not necessarily prove the epidemics came from Ming China. During the 1610s, Ming China and Jurchen territory were frequently struck by epidemic outbreaks.⁴⁶

The geographical proximity and frequent communicable movement in the northern borderland suggest that these epidemics may have initially entered the Korean peninsula through interactions among soldiers or civilians from Hamgyŏng and the Jurchens. In 1613, a smallpox epidemic raged in Usu, a Yehe Manchu city occupied by Nurhaci's troops.⁴⁷ Chosŏn Korean soldiers were dispatched to the frontier during the Qing and Manchu conflicts and harsh climatic and military conditions may have

contributed to outbreaks among them as evidenced by their reports of epidemic outbreaks in 1606 and 1619.⁴⁸ Concurrently, Jurchens also migrated to the Korean peninsula as war refugees during the conflicts in the 1610s.⁴⁹ Because most Chosŏn Koreans did not have a clear and objective perception of the geography of Jurchen tribes, they used the imagined geographies to name the epidemic and to trace its origin, considering the nomadic Jurchens to be barbarians.⁵⁰

Furthermore, the usage of the word “red” in the Korean expression *tanghongyŏk* suggests that the main symptom of this epidemic was the outbreak of red spots on the patients’ bodies.⁵¹ Given other descriptions of sore throat, fever, and headache, historians argue that the disease was likely to have been some kind of scarlet fever.⁵² In addition, local diaries also record other symptoms, such as sweating, shortness of breath, coughing, lack of appetite, and edema of the cheeks, which also hint at the possible type of epidemics albeit with no degree of certainty.⁵³ Some of the symptoms were lethal and highly infectious, such that entire families were infected at once.⁵⁴

Traditional Korean medicine attributed epidemics to several factors, including imbalances in the five elements within the body, disruptions in the flow of internal energy—*qi*, natural forces, and vengeful spirits. The well-known royal physician Hŏ Chun then attributed outbreaks in the 1610s to overheating (K. *hwaun*), in line with the Theory of Vital Energy (K. *ungi-non*) as well as the presence of inauspicious spirits and an unclean environment following the Imjin War.⁵⁵

The epidemic of 1611 initially broke out in Hamgyŏng province in the winter. The Provincial Governor reported that an outbreak occurred in Onsŏng county, which was the most northern garrison, and soon spread to other towns around the end of 1611, such that they were in urgent need of medicine. Consequently, in the first month of 1612, Kyŏnghŭng county reported continuous deaths from infectious diseases. By the

fifth month, the Six Garrisons in the northern and southern counties had all been infected and were eager for medicine.⁵⁶ In addition to the locals, numerous deaths also occurred among soldiers stationed at the northern border.⁵⁷ By the end of 1612, a list of officials from Hamgyŏng province who had passed away due to the epidemic included a Tosa (Assistant Inspector, Jr. 5) and [P'yŏngma] Uhu (Army Inspector, Sr. 3), both relatively high-ranking officials. According to the statistics in 1614, the epidemic outbreak claimed over ten thousand people in the northern borderland.⁵⁸

From Hamgyŏng, the outbreak of epidemics in 1612 “gradually spread to the southern regions, thus claiming many thousands of lives,” and it soon became a nationwide epidemic.⁵⁹ As one medical text put it: “From the autumn to winter and until the spring of 1613, none of the eight provinces was uninvolved.”⁶⁰ The epidemic also severely struck Hamgyŏng’s southern neighbor, Kangwŏn province. In the twelfth month of 1612, local officials contacted the central court to request the dispatch of doctors to the province.⁶¹

The proximity of Kangwŏn province explains why the epidemic appeared quickly in Kangwŏn after the initial outbreak in Hamgyŏng, but geographical proximity to Hamgyŏng province did not seem to affect epidemic transmission to its western neighbor P’yŏngan province. This is most likely because of the mountainous terrain of western Hamgyŏng and eastern P’yŏngan provinces that presented natural barriers to travel. Kangwŏn province, the southern neighbor, had conditions more conducive to agriculture, was more easily accessible via coastal plains, and being close by was a popular destination for displaced people from Hamgyŏng, thereby rendering it vulnerable to the faster spread of infections and more severe outbreaks. Below, we will return to these spatial considerations.

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Displaced people from Hamgyŏng, joined by others from neighboring regions, also flooded south into Hansŏng, the Chosŏn Korean capital, which similarly prompted an outbreak there. Records show that stories of the hardships told by the northern displaced people reached the ears of central officers at the end of 1612.⁶² This suggests that there was a significant degree of contact between the displaced people and the local populace of the capital, which formed a possible transmission route. The widespread infection also posed a threat to the royal palace, so the government re-established the Agency for Saving the Destitute (*Hwarinsŏ*), which was first founded in 1392 to provide medical treatment for the poor but destroyed during the Imjin War, in order to quarantine and treat infected officials.⁶³ The epidemic also reached the suburbs of the capital where the crowded and unsanitary prisons were located. It was not long before one infected prisoner transmitted the disease to the rest.⁶⁴ Aside from internal transmission, the traffic between the capital and other provinces also supported a quick transmission across all the eight provinces in the peninsula by the spring of 1613 (See Figure 5).⁶⁵

The fear of contracting *tanghongyŏk* prompted communities across Chosŏn Korea to flee their homes and hide in the wilderness, which in turn exposed them to other diseases. The visibility of the epidemic disease, which manifested itself in red blotches all over the body, and the high prevalence and lethality of the epidemic likely played a direct role in prompting this drastic response. Local diaries illustrated the plight of elite families and their perceptions of this frightening epidemic.⁶⁶ Many desired to flee their communities, in which the epidemic was rampant, and seek refuge in a safe place, but they often encountered more problems in the uninhabited places to which they fled.⁶⁷ The living conditions in mountains tended to be harsh and unsanitary and increases in movement provided more possibilities for exposure to various

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10 nationwide epidemics.⁶⁸ This caused new symptoms to arise in addition to those
11 associated with the epidemic disease, such as diarrhea or dysentery. Usually, wealthy
12 *yangban* elite families were fortunate enough that they could still prepare food before
13 departure and acquire food with the help of friends, while other starving displaced
14 people were forced to scavenge for weeds, roots, and bark.⁶⁹ In the long term,
15 malnourishment also lowered disease resistance.

20
21 Continuously, a series of calamities shattered the lives of Jurchens and Chosŏn
22 people: a heavy flood, a failed harvest, a great famine in 1616, and continuous conflicts
23 in Manchuria.⁷⁰ As noted above, an increasing number of Jurchens also fled to Chosŏn
24 in these years and they became visible and could be seen “naked and begging for
25 food.”⁷¹ A provincial military commander from P’yŏngan Province expressed concern
26 that if food were to be granted to alleviate them, officials would run out of relief
27 provisions for locals and risk further exhausting national resources.⁷² In fact, the arrival
28 of Jurchens and the severity of the famine put increasing pressure on official relief
29 availability, while a report by the Border Defense Council also depicted the catastrophe
30 of 1617 in Hamgyŏng province: “the starving were desperate for food, and corpses piled
31 up on the streets. People unashamedly abandoned their babies in muddy valleys, left
32 them in tree branches, or threw them off bridges.”⁷³

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42 Spatial analysis of the historical records further shows that when northern
43 inhabitants fled their hometowns to avoid the effects of famines and epidemics, they
44 would typically move in one of two directions, either north into the Jurchen area (and
45 further into Ming China), or south to Kangwŏn province (from whence many went even
46 further the south). For example, ~~ffig. 5 notes that~~ displaced people from Mach’ŏlryŏng,
47 the southern part of Hamgyŏng province, drifted between Ch’ŏllyŏng or to Hoeyang to
48 pursue a living in 1617 ([See Figuref 5](#)).⁷⁴ In historical times, whenever epidemic
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engulfed one place all the other regions between Ch’öllyŏng and Mach’ölryŏng would be infected quickly.⁷⁵

To the south, the tribute route between the Pŏnho and the Korean capital could provide some clues as to which route the displaced people might have taken, because the government forbade displaced people to use the main road to Kangwŏn province.⁷⁶ In the fifteenth to sixteenth centuries, when Jurchen envoys presented themselves at the capital before the Chosŏn monarch, they started from areas near the Tuman River, went to Kyŏngsŏng, where they boarded boats, and they sailed along the eastern coast down Kangwŏn province to Yangyang. From there, they turned inland to the capital Hansŏng as shown in Figure 5.⁷⁷ The displaced people may have taken this route and ended up in Hansŏng. Some arrived even further south. For example, a household register from Ulsan, Kyŏngsang province (1609) suggests some families came from the northern town of Kilchu in Hamgyŏng, while the 1687 household register of Ich’ŏn county in Kangwŏn province also records that one resident’s grandfather was originally from Puryŏng, one of the Six Garrisons in Hamgyŏng province.⁷⁸

~~Figure. 5. Map of epidemic transmission and displacement in the 1610s~~**<FIGURE 5 HERE>**.⁷⁹

Basic temporal information, including the month and year of infection, is labeled on the maps. In cases where precise day information was unavailable, seasonal data was used as a substitute. There are some regions without specific recorded times for this epidemic outbreak that spread quickly so they are colored as the last to be infected. The temporal and spatial data for epidemics (endnotes 56-61) and displacement (endnotes 62-65, and 74) are based on primary sources cited in the endnotes. The reference for the tribute routes is listed in the endnote 77.

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Via the lens of spatialization, the flow of displaced people and epidemic-stricken areas during the 1610s outbreaks, as seen in Figure -5, suggest that the most severely affected regions overlapped with where the people displaced from Hamgyŏng preferred to go, such as Kangwŏn, the capital, and Kyŏngsang province. With the movement of displaced people, the epidemics originated in the northern part of Hamgyŏng, then spread to its southern neighbor Kangwŏn province and on to the Kyŏnggi province where the capital Hansŏng was located and to Ch'ungch'ŏng province, south of Kyŏnggi province. From there, the epidemics spread to Kyŏngsang province in the southeast. Given the higher population density in the capital zone, the wider Hansŏng area and even Kyŏnggi province were almost always epidemic hotspots. This process is known as urban-hierarchical diffusion, where urban centers often serve as hubs from which epidemics spread to more remote areas.⁸⁰ Like the spatial analysis based on official documents, private diaries also confirm that the infection threatened towns in the southern part of the Korean peninsula in 1612, resulting in persistent illness within families.⁸¹ The transmission of infectious diseases reached its most critical point in 1612 and 1613 but continued to affect the Korean peninsula until 1618 when this outbreak was still referred to as *Tanghongyŏk* or *Tangyŏk* in many private diaries from Kyŏngsang province.⁸²

As noted above, despite having been a nationwide epidemic, it is noticeable that the epidemic was transmitted relatively faster along the eastern coastline from the Six Garrisons to Kyŏngsang province rather than spreading to the western parts of the peninsula. The mountainous terrain of the Korean peninsula likely decelerated the epidemic transmission especially within the mountainous areas between Hamgyŏng province and its western neighbors P'yŏngan province and Hwanghae province (see red

shape inserted into Figure 6). It was only via the very southern part of Hamgyŏng province that people could go west to the southern part of Pyŏng'an province and Hwanghae province.

Figure 6. Topographic Map of the Korean peninsula. From a collection of maps of the eight provinces produced after 1822, *Ch'ŏnggu p'alyŏkdo*. Source: Kyujanggak Institute for Korean Studies, Ko 012.51-C422c, South Korea. **<FIGURE 6 HERE>**

In Figure 6, the different colored, round cartouches are county offices, and their different colors mark the different provinces. The lines indicate continuous mountain ranges. The red insert shape highlights a very mountainous, sparsely populated region between Hamgyŏng and P'yŏngan provinces, which blocked the spread of the outbreak east to west and forced it southwards.

The analysis above is based on the epidemics of the 1610s, but it is worth noting that the lesser outbreak, which occurred between 1638 and 1640, displayed a similar epidemic transmission pattern as to the 1610s. Hamgyŏng province, especially the Six Garrisons, started to report a severe outbreak from the fourth month of 1638 and reports continued into the subsequent months (See Figure 7). From Hamgyŏng, people headed to neighboring provinces with their family members: west to Hwanghae and P'yŏngan provinces and south to Kangwŏn province.⁸³ Probably because of the flow of displaced people, the governor of Kangwŏn reported that the epidemics originated from the northern border, and along with famines, the epidemics had become severer in the first month of 1639.⁸⁴ By early in 1639, Ch'ungch'ŏng province and the capital reported the infection and later it was found in Kyŏngsang province, thus forming another large-scale epidemic outbreak, with patterns that mirrored the outbreaks of the 1610s.⁸⁵

Figure. 7. Map of epidemic spread and transmission in the Korean peninsula, 1638-1640<FIGURE 7 HERE>.⁸⁶

As in the 1610s, in contrast to the regions along the eastern coastline of the Korean peninsula, when infections were rampant in Hamgyŏng and Kangwŏn provinces between 1638 and 1640, Hwanghae and P'yŏngan provinces on the western seaboard could still enjoy good harvests and remain relatively safe.⁸⁷ Even though displaced people did take flight to the west, the mountainous local terrain made it difficult for them to reach the central towns of P'yŏngan, which in turn protected that region from infection. Such similar transmission patterns suggest that later epidemic outbreaks for the first half of the seventeenth century would have followed similar routes of dispersal as dictated by geography, but confirmation of this hypothesis awaits further research. Rather, the analysis that follows here explores political factors (relief and repatriation) that also affected disease dispersal in the first forty years of the 1600s.

RESPONSES TO EPIDEMICS AND DISPLACEMENT

The Chosŏn Korean government recognized the interconnected nature of disasters and often categorized famines, displacement, epidemics, and deaths as related phenomena; unfortunately, this awareness did not ultimately enable them to curb the spread of disease in the post-Imjin period. The economic devastation of warfare severely hampered the government's ability to provide essential relief to the northern borderlands, which officials attempted to address through the implementation of a policy of returning displaced people to their towns of origin and through the transregional transportation of emergency provisions from other provinces. However,

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relief provisions were delayed due to lack of regional collaboration and locals often fled before aid arrived. The return policy was rarely enforced as both local officials and displaced people lacked any motivation to move back to the northern borderlands, and the policy was temporarily paused due to famines. As a result, government relief efforts proved largely ineffective in managing epidemics of the 1610s. The case of Hamgyŏng province serves as an example of how this unfolded in practice.

The remote location of Hamgyŏng meant that the news of famine and displacement took a long time to arrive to the court, thus delaying relief efforts and prevention of large-scale epidemic transmission.⁸⁸ The difficulty in obtaining news meant that the central authorities were often ignorant of goings on in this area. For example, a confession from the Ministry of Taxation (*Hojo*) in 1617 stated that despite numerous reports on the arduousness of life in the north, they had never clearly known the severity of the famines in Hamgyŏng province; they had only grasped fragments of the situation via displaced people.⁸⁹ This corroborates a complaint from the governor of Hamgyŏng in 1613, who reported that “it is pitiful that the court has provided no aid to Hamgyŏng province as if it were a forgotten and abandoned area.”⁹⁰ Delayed epidemic outbreak news and continuous administrative neglect revealed fundamental communication failures that hampered the government from providing timely medical supplies to relieve the local people before the massive spread of epidemics in the 1610s.⁹¹

Although most regions faced challenges during the post-war famine and epidemic years, the delayed relief provisions for Hamgyŏng province suggest its perceived political and cultural insignificance in the eyes of other provinces. The northern borderlands were often viewed as remote and even barbaric, inhabited mainly by immigrants, and soldiers were reluctant to settle there. Some records even claimed

the epidemic of the 1610s originated in Hamgyŏng province, reinforcing its stereotype as a land of disease and wilderness.⁹²

In regions with less favorable environmental conditions, the central government acted as a mediator, reallocating medicinal and food resources across the country by transporting medicine, prescriptions, and crops from the capital to regional areas and from the south to the north. To alleviate the possibility of famines occurring in tandem with the epidemics of the early seventeenth century, the central government ordered southern provinces to transport their food provisions to the north. However, such orders often went unfulfilled due to a lack of regional cooperation. In an example from 1613, three to four hundred *sŏk* (approximately 27,000-36,000 liters) of tax rice from the southern province of Yŏngnam (modern-day Kyŏngsang province) were granted to Hamgyŏng province to relieve the poor.⁹³ The Yŏngnam authorities claimed that they had to prepare for unpredictable Japanese piracy and small boats could not sail far on a dangerous sea, thus the request for transregional provision was refused.⁹⁴ The second example, a cross-regional relief project, collapsed again in another epidemic year in 1617.⁹⁵ Yŏngnam continued to reject orders to help, protesting that their food supplies were insufficient to even meet their own needs. Despite an official order from the Ministry of Taxation, most provinces avoided fulfilling their responsibilities.⁹⁶

The failure of regional cooperation exposed a fundamental weakness in post-war Chosŏn Korean administrative infrastructure that had direct impacts on disaster relief efforts. When southern regions like Yŏngnam refused to provide rice to Hamgyŏng despite central government directives, they demonstrated not only regional self-interest but also the center's inability to coordinate an effective disaster response across provincial boundaries. This administrative breakdown indirectly facilitated population displacement and further geographic spread of epidemics beyond regional confines.

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Although ultimately, medicine, prescriptions, winter clothes, and crops were transported across regions in 1612, they could not reach every individual in need of aid.⁹⁷ Due to inadequate support and the prolonged wait for relief provisions, starving residents left their hometowns to neighboring regions in search of food security, leaving a depopulated region according to a report in 1617.⁹⁸

This pattern of administrative failure foreshadowed similar challenges that continued to plague Korean disaster management as also shown in the 1638-1639 epidemic. When famines and epidemics struck Hamgyōng province in the fourth month of 1638, significant numbers of people had already begun to take flight, yet the central government’s orders to provide medical relief to the northern borderlands did not arrive until the seventh month. By then, the neighboring Kangwŏn province reported thousands of deaths at the end of the eighth month of 1638 and still required substantial medical aid in early 1639.⁹⁹ In this way, central relief policies, including grain redistribution, medical supply dispatches, and provincial cooperation, repeatedly failed due to insufficient implementation capacity at both central and regional administrative levels.

In addition to relief measures, a policy of returning displaced people operated as the second main arm of the Chosŏn Korean government’s approach to dealing with displacement, famines and epidemics. This policy, which existed before the Imjin War period, was adapted in the post-war period to mitigate the outflow of displaced populations from this strategically significant borderland. Since the fifteenth century, the Chosŏn government had operated a policy of returning displaced people to their regions, banning them from settling in the places to which they had fled.¹⁰⁰ During the late sixteenth and early seventeenth centuries, censors (*swaehwan ŏsa*) were dispatched to the Six Garrisons to oversee the enforcement of the policy, and they were also tasked

with regulating the behavior of the local administration who unlawfully occupied private farmlands and exacted excessive taxes on the populace.¹⁰¹ The censors investigated and registered the displaced and returned people of Hamgyŏng province, regardless of their social status, in a booklet. However, information such as the locations of returnees, their names, and their occupations, was often unclear and the court lamented that many records were missing.¹⁰²

The vulnerability of depopulated northern borderland to Jurchen incursions also prompted the central government to strengthen legislation on returning displaced people in 1602, when King Sŏnjo issued an edict ordering that not only were escapees—those returned displaced people who then fled again—to be punished but county officials were also to be held responsible for their escape.¹⁰³ Furthermore, as the Office of the Censor-General (*Saganwŏn*) attributed the persistent displacement issue to the laws not being powerful enough to deter displaced people in 1612, the Chosŏn government insisted on strengthening the directives for return by relocating displaced people back into their hometowns or other places designated by officials.¹⁰⁴ This suggests the core of the government's approach to solving displacement was to restrict these people within their original living space by blocking the routes along which northern displaced people tended to flee and preparing for potential Jurchen incursions or regional revolts by locals, revealing the underlying military objectives behind relief policies. In theory, this measure was designed to limit epidemic transmission, but in an epidemic year like 1612 returning people, many of whom carried disease, simply increased the flow of people and spread of epidemics (See Figure 5).

Further weakening the effectiveness of the return policy, famines typically precipitated a temporary policy change. In the northern borderlands, the return policy was suspended and only reinstated once the famines subsided. This policy adjustment

took into account whether displaced individuals had access to arable land and was first initiated in the late sixteenth century, recurring intermittently throughout the seventeenth century before being abandoned in the eighteenth century.¹⁰⁵ Without such access, returning displaced populations to their hometowns was ineffective, as they were unable to sustain themselves and given other previously mentioned concerns, they were forced to flee again.¹⁰⁶ The provinces in which northern people had resettled also perceived them as their own residents as they received new sources of labor and tax revenue and therefore had little motivation to assist in enacting the return policy.¹⁰⁷ Also as shown above, the further afield displaced people took flight, the wider epidemics were transmitted (See Figure 5). Therefore, the central government temporarily allowed displaced populations to resettle in other regions, which at least reduced the risk of social unrest and stabilized local societies in times of famines such as in 1617 before it led to a nationwide epidemic outbreak. Despite the temporary suspension of the return policy in 1617, local officials were also ordered to observe the situations in their hometowns so that the displaced people could be sent back once the famines had subsided.¹⁰⁸ In this way, the government postponed the return of displaced people until these environmental issues had abated.

CONCLUSIONS

This article has delineated the process by which local epidemic outbreaks and displacement from Hamgyŏng province worked in tandem to produce epidemics on a nationwide scale on the Korean peninsula during the early seventeenth century. Spatial analysis is crucial to show that the displaced people transmitted epidemics to the areas where they moved—the capital zone and the eastern coastline of the peninsula. From there, epidemics spread from high population density regions to the western part of the

country via tightly-knit transport networks connecting the capital to all regions. Nevertheless, the mountainous terrain of the northern Korean peninsula helped to explain some differences in the speed of epidemic transmission between the western and eastern coastlines. This case study thus provides an example of how mapping historical data containing geographic information can illuminate relationships that might go unnoticed were it not for spatial visualization.

This study has also shown how, due to the connections between displacement and epidemics, the post-war measures enacted by the central Chosŏn government had overlapping consequences. Relief provisions were intended to address the epidemic-stricken northern borderland, but grain arrived too late, prompting those waiting to flee. The delay was largely due to the region's remote location, which hindered both the reporting of disasters and the transport of supplies. It was further exacerbated by a weakened post-war central government that failed to attend to a peripheral region with essential relief or to redirect grain from the southern provinces.

The return policy, meant to repopulate the northern borderlands, also exacerbated the situation, as large-scale displacement had already occurred and returning them likely transmitted diseases. As a result, during the post-Imjin period the Chosŏn central government gradually learned it was desirable to occasionally pause their return policy during times of famine to allow the displaced to stay and complete their harvests. These post-disaster central relief measures ultimately functioned only temporarily and foreshadowed the limitations of post-war administrative infrastructure lacking central and regional as well as transregional cooperation. This institutional fragmentation would later manifest in crisis management in the seventeenth century such as another case of epidemics in the 1630s mentioned in this study. Regarding returning policy specifically, this regulation persisted until the eighteenth century when

the government abandoned the policy altogether.

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¹ See for example, Lee, “Postwar pines,” 319-32

² Ho et al., “Korean Expansion and Decline,” 262.

³ E.g. Pyŏn, “Chosŏn hugi yumin ūi,” 15-7.

⁴ Park, *Sovereignty Experiments*. C.f. Bohnet, *Turning toward Edification*; Pak H., “Imjin Waeran sigi Myŏng nara,” 253–98; Wang G, “Mingdai zhongchao bianjiang,” 37–60; Wu, 58–69; Pyŏn, “Chosŏn hugi yumin ūi,” 195–223. For medical history, Cho, “16-17 segi Chosŏn ūi pyŏkyŏk ūisŏ,” 29–47; Cho, “17 segi ch’o Chosŏn esŏ yuhaenghan,” 311–43; Kim H, “16 segi mal 17 segi ch’o yŏkpyŏng,” 120–46.

⁵ See more studies on the impacts of the Little Ice Age on Korea, Yi T., “Sobyŏnggi,” 203–36; Kim Y., “Han’guk ūi sobyŏnggi kihū,” 1-16; Yi C., “Chosŏn sidae kihū pyŏndong,” 425-6; Yi C. and Yi S., “Chosŏn sidae kisang yibyŏn,” 269-96.

⁶ For the term Little Ice Age, Parker, *Global Crisis*, 1. for medical impacts, see Chŏn, “Chosŏn sobyŏnggi ūiyak sasang,” 34-377; Yi H, “Chosŏn ūi sobyŏnggi,” 3-29; for agricultural impacts, see Pak K, “17segi Chosŏn ūi kihū wa nongŏp,” 123-160. Recent Korean scholarship also acknowledges the limitations of directly applying the Little Ice Age framework to seventeenth-century Korean history, see Kyŏng, “Chosŏn hugi wigi tamnon,” 67-92; Kye, “Kungnae Han’guk sahakkye ūi hwan’gyŏng kihū munje,” 11-48.

⁷ Private diaries and collected works include *Kyŏngdang ilgi*, *Kyeam illok*, *Sŏnjo Chosŏngdang illok*, *Choya ch’ŏmjae*, *Chibong yusŏl*, *Chuksŏkkwan yujip*, and *Manhoejip*. Schlichting, “Historical GIS,” 191-196; Hong, “Korean Historical Geography,” 568-591. GIS is a methodology used in spatial epidemiology and medical geography, and the present study has much in common with these two fields; however spatial epidemiology and medical geography usually work with large-scale modern datasets like census and public health data, while premodern studies like this one are limited to relatively small datasets. Smallman-Raynor and

Cliff., *Atlas of Refugees*; Welford, *Geographies of Plague Pandemics*. For seminal studies on spatial epidemiology, and medical geography, see Kirby, Delmelle, and Eberth, “Advances in Spatial Epidemiology,” 1–9 and Meade and Michael respectively.

⁸ Smallman-Raynor and Cliff, *Atlas of Refugees*, 5–6.

⁹ Pace, “Shifting terrains of risk,” 40; Zhao, “15 zhi 19 shiji Tumenjiang,” 8–15.

¹⁰ UNOCHA, *Guiding Principles on Internal Displacement*, 1–5.

¹¹ Lee, “Protect the Pines,” 145–48.

¹² Kyōng, “Chosŏn hugi chaeiron,” 307.

¹³ Kahm and Lee, “Begging for Rain,” 5–6.

¹⁴ For more discussions on this, see Trambaiolo, “Translating the Inner Landscape,” 189; Gao, “The Cognitive Evolution,” 189.

¹⁵ For more examples of using ArcGIS in historical analysis, see Kheraj, “The Great Epizootic of 1872–73,” 495–521; Zizzamia, “Restoring the Paleo-West,” 130–156.

¹⁶ The locations of the Six Garrisons are based on the historical map cited in figure 6 and Tongyōdo 東與圖 [Atlas of the Eastern State], available at https://kostma.aks.ac.kr/e-map/mapSearch_AN.aspx?lang=ko&mType=anciNm&sType=anSearch&sWord=.

¹⁷ *Kwanghae-gun ilgi* 22:40a (1613.2.18).

¹⁸ Takaya and Hisashi, “Cold Siberian High,” 4423.

¹⁹ Kang S, *Chosŏn hugi Hamgyōngdo*; Kim P, “Chosŏn sidae Hamgyōngdo,” 1–62.

²⁰ *Kwanbuk Ŭpchi*; *Sŏnjo sillok* 34:32a (1601.2.24). Throughout this article, citations *Sillok* are given in the following standard format: names of kings, volume numbers, and folio numbers, followed by the Christian year and lunar calendar months and days in brackets.

²¹ Yi U, “17-18 segi pŏmwŏl sagŏn,” 148; Kim M, “Imjin waeran’gi Ilbon’gun,” 161.

²² *Sejo sillok* 43:2a (1467.7.2). Before the Imjin War in 1591, it was estimated there were 8,523 households of Pŏnho in Hamgyōng. Bohnet, 39, 45 and 87.

²³ *Sŏnjo sillok* 89: 17b (1597. 6.13); 114: 27a (1599.6.29); 165: 15b (1603. 8. 11).

²⁴ *Sŏnjo sillok* 190: 22b (1605. 8.7).

²⁵ *Kwanghae-gun ilgi* 41:26a (1617.8.23). Kim Yōng, *Kyeam illok* 3, 1618.4.18, 1619.4.29.

²⁶ *Sŏnjo sillok* 58:22b (1597.9.16).

²⁷ *Sŏnjo sillok* 93: 3b (1597.10.2).

²⁸ Chu et al., “Volcanic eruptions,” 11–27; Yun S, “Paektusan,” 466. While proving direct causation lies beyond the scope of this paper, volcanic eruptions are known to inject ash and aerosols into the atmosphere, which can temporarily alter climate conditions—often cooling temperatures and disrupting rainfall patterns. In an agrarian premodern Korean society heavily dependent on local harvests, even minor climatic shifts could have had significant effects on

food security. For a comparative case see Wood, *Tambora*, 90-95; Fell et al., “Volcanism and Global Plague Pandemics,” 36–46.

²⁹ *Sŏnjo sillok* 163: 2b (1603.6.4); 189: 4b (1605.7.6); 121: 19b (1600.1.26). Han S, “Chosŏn kwa Yŏjin,” 9-42; Zhao, “15zhi19shiji Tumenjiang,” 114; Bohnet, 77.

³⁰ *Myŏngjong sillok* 33: 59b (1566.10.24).

³¹ Comparisons can be drawn with other Eurasian countries such as Britain, France, Netherlands, Denmark, China, and Japan, which attempted to address shortages of arable lands, fuel, or building materials through long-distance trade with less densely populated areas in the seventeenth and eighteenth centuries. Pomeranz, *The Great Divergence*, 20, 83.

³² Masayuki, “Righteous Army,” 141–62.

³³ *Sŏnjo sillok* 26:1a (1592.5.2). Kuksa p'yŏnch'an wiwŏnhoe, “Chosŏn chunggi ūi oech'im.”

³⁴ *Kwanghae-gun ilgi* 40:113b (1617.7.28). *Sŏnjo sillok* 135: 21a (1601. 3.19).

³⁵ *Ch'ungjong sillok* 94:24a (1540.11.3). *Sŏnjo sillok* 187: 5a (1605.5.15).

³⁶ Turnbull, *Samurai Invasion*, 79–80. *Sŏnjo sillok* 35: 26b (1593.2.16); 56: 25a (1594.10.11).

³⁷ *Sŏnjo sillok* 56: 11a (1594.10.8); 54: 31a (1594.8.25). See also Bohnet, *Turning toward Edification*, 63.

³⁸ *Sŏnjo sillok* 34: 39a (1593. 1. 25).

³⁹ *Sŏnjo sillok* 190:1a (1605. 8.1).

⁴⁰ Bohnet, *Turning toward Edification*, 78-9.

⁴¹ *Sŏnjo sillok* 30:12b (1592.9.15); 135: 21a (1601. 3.19); See also Min, “Pukpang Yŏjinjok e taehan wigi,” 179–218.

⁴² *Sŏnjo sillok* 135: 21a (1601.3.19).

⁴³ *Kwanghae-gun ilgi* 40:113b (1617.7.28).

⁴⁴ Crosby, *The Columbian Exchange*.

⁴⁵ Kim R, *Kyeam illok* 2, 1614.8.2, 1614.9.12. Son, *Modang ilgi* 5, 1617.11.24-5. *Kwanghae-gun ilgi* 26:25a (1613.10.25). Yi S., *Chibong yusŏl* 17, insa, jilbyŏng.

⁴⁶ Hanson, “Late Imperial Epidemiology,” 269.

⁴⁷ *Ibid.*

⁴⁸ *Sŏnjo Sillok* 205: 1A (1606.11.2); *Kwanghae-gun ilgi* 50:122A (1619.8.21).

⁴⁹ E.g., *Kwanghae-gun ilgi* 19: 107 A (1612.8.8); *Kwanghae-gun ilgi* 28: 59A (1614.5.16).

⁵⁰ For more research on the intersection between geographic imagination and epidemics, see Hanson, *Speaking of Epidemics*, 21.

⁵¹ Bruno. “Terms used for smallpox,” 169–170.

⁵² Hŏ. *Pyŏgon sinbang*, 1613. Kim Ho, 1993, 136; Cho et al., 2004, 337-339; Miki, *Chŏsen ihakushi*, 14.

- ⁵³ *Kwanghae-gun ilgi* 26:25a (1613.10.25). Because it presented similar symptoms to pox, sometimes diaries would mistake *Tanghongyŏk* for *tuyŏk*, literally translated as “epidemics of pox”, which usually referred to smallpox. Son, *Modang ilgi* 5, 1611.4.4, 1612.10.12. Past diagnoses do not correspond to modern disease categories and should be asserted with care.
- ⁵⁴ Son, *Modang ilgi* 5, 1611.2.3.
- ⁵⁵ Hŏ. *Pyŏgon sinbang*, 1613; Cho, “16-17 segi Chosŏn ūi pyŏkyŏk ūisŏ,” 29–47; Cho, “17 segi ch’o Chosŏn esŏ yuhaenghan,” 311–43; Kim H, “16 segi mal 17 segi ch’o yŏkpyŏng,” 120–46.
- ⁵⁶ *Kwanghae-gun ilgi* 17:32a (1611.12.29); 17:59a (1612.1.22); 18:160a (1612.5.28).
- ⁵⁷ *Kwanghae-gun ilgi* 20:70b (1612.10.1).
- ⁵⁸ *Kwanghae-gun ilgi* 21: 79a (1612. Intercalary11.17); 28:103a (1614.6.25).
- ⁵⁹ The indication of epidemic transmission process was recorded in the *Shinch’an pyŏgonbang*. In response to the infection, King Sŏnjo ordered Hŏ Chun to gather physicians at the Naeŭiwŏn (Office of Royal Physicians) to compile this medical guide for treating epidemics.
- ⁶⁰ *Ibid.*
- ⁶¹ *Kwanghae-gun ilgi* 21:105a (1612.12.12).
- ⁶² *Kwanghae-gun ilgi* 21:79a (1612.Intercalary11.17).
- ⁶³ *Kwanghae-gun ilgi* 21: 108a (1612.12.15).
- ⁶⁴ *Kwanghae-gun ilgi* 28: 64a (1614.5.19).
- ⁶⁵ Author unknown. *Choyach’ŏmjae*, 1612.2, <http://diary.ugyo.net>.
- ⁶⁶ Chang, *Kyŏngdang ilgi* 2, 1615.1.4, 1615.6.18.
- ⁶⁷ Kim T, *Chosŏng tangillok* 3, 1617.4.27.
- ⁶⁸ Another outbreak of smallpox 痘疹 quickly became inveterate in 1619. Kim Y. *Kyeam illok* 3. 1619.4.28, 1619.5.1, 1619.5.6.
- ⁶⁹ Kim T. *Chosŏng tangillok* 2, 1616.9.18.
- ⁷⁰ Son. *Modang ilgi* 1617.11.24; Kim Y. *Kyeam illok* 3 1617.4.22.
- ⁷¹ *Kwanghae-gun ilgi* 39:22b (1617.2.13).
- ⁷² *Kwanghae-gun ilgi* 39:22b (1617.2.13). Bohnet, *Turning toward Edification*, 86.
- ⁷³ *Pibyŏnsa Tŭngnok*, 1617.3.8.
- ⁷⁴ *Sŏnjo sillok* 135: 21a (1601. 3.19); 142:16b (1601.10.28). Yi U, 2010, 148.
- ⁷⁵ Sŏ. *Chuksŏkkwan yujip* 6. Hamgyŏng namdo amhaeng pyŏlta.
- ⁷⁶ *Sŏnjo sillok* 135: 21a (1601. 3.19).
- ⁷⁷ Bohnet, *Turning toward Edification*, 40.
- ⁷⁸ Ulsan hojŏk taejang (Ulsan household register, 1609) in Pukmyŏn, Kyŏngsang province. Kyujanggak Institute for Korean Studies, kyu14986, 40, <http://kyujanggak.snu.ac.kr/>. Ich’ŏn-bu hojŏk (Ich’ŏn county household register, 1687). See Han S, “17 segi puk-Kangwŏn saramdŭl.”

⁷⁹ This Map was generated by ArcGIS.

⁸⁰ Benedict, *Bubonic Plague in Nineteenth-Century China*, 80.

⁸¹ Kim R, *Kyeam illok* 2, 1614.8.2; Yu, *Imja illok*, 1612.3.9.

⁸² Kim R, *Kyeam illok* 2, 1614.8.2, vol. 3, 1617.4.22; Son, *Modang ilgi* 5, 1617.11.24; Sin. *Sangch'on'go*, nyönbo 1617.

⁸³ *Injo sillok* 36:30a (1638.4.2); 37:15b (1638.8.10).

⁸⁴ *Injo sillok* 38:4a (1639.1.17).

⁸⁵ *Injo sillok* 38:4a (1639.1.23); 38:8a (1639.2.5); 41: 23a (1640.12.11).

⁸⁶ Temporal and spatial data were drawn from the sources cited in the endnotes 8383-85. Records mention northern transmission routes and consistent outbreak timelines in various provinces, providing clues that these refer to the same epidemic.

⁸⁷ *Injo sillok* 37:15b (1638.8.10).

⁸⁸ Kang Sökhwa. “*Chosönhugi Hamgyöngdo*,” 19-22.

⁸⁹ *Kwanghae-gun ilgi* 39:100b (1617.4.8).

⁹⁰ *Kwanghae-gun ilgi* 24:16a (1613.6.6).

⁹¹ *Kwanghae-gun ilgi* 59: 4b (1612.11.1).

⁹² *Choya ch'ömjae*, 1612.2; Son, *Modang ilgi* 1613.2.26. <http://diary.ugyo.net>.

⁹³ *Kwanghae-gun ilgi* 24:16a (1613.6.6).

⁹⁴ *Pibyönsa tūngnok*. 1617.9.6.

⁹⁵ *Pibyönsa Tūngnok*. 1617.3.8; *Kwanghae-gun ilgi* 39:100b (1617.4.28); 41:33a (1617.8.29).

⁹⁶ *Pibyönsa Tūngnok*. 1617.9.6. *Kwanghae-gun ilgi* 48:17b (1618.10.9).

⁹⁷ *Kwanghae-gun ilgi* 59: 4B (1612.11.1); 17: 32A (1611.12.29); 20:70B (1612.10.1).

⁹⁸ *Kwanghae-gun ilgi* 39: 100b (1617.4.8); 40: 90 (1617.7.12); 40: 113b (1617.7.28).

⁹⁹ *Injo sillok* 36: 30a (1638.4.2); 37:15b (1638.8.10); 38:4a (1639.1.17).

¹⁰⁰ *Sejong sillok* 1:11a (1418.8.22).

¹⁰¹ *Sönjo sillok* 30:21a (1592.9.25).

¹⁰² *Sönjo sillok* 171: 4b (1604.2.10).

¹⁰³ *Sukyo chimnok*, Pyöngjön, Yumin. 1602, Sönjo 35.

¹⁰⁴ *Kwanghae-gun ilgi* 21: 70a (1612. Intercalary 11.10).

¹⁰⁵ Pyön, “Chosön hugi yumin üi,” 158-9, 172; For more examples, see *Sönjo sillok* 167: 6b (1603.10.16); *Pibyönsa Tūngnok*. 1649.10.13, 1650.7.20, 1684.2.7.

¹⁰⁶ *Sönjo sillok* 202: 21b (1606.8.27); 190:1a (1605. 8.1).

¹⁰⁷ *Sönjo sillok* 134:1b (1601.2.1).

¹⁰⁸ *Pibyönsa Tūngnok*. 1617.8.17.

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Fig. 1. Map of the Korean peninsula showing Hamgyŏng province in the north
1458x2063mm (72 x 72 DPI)

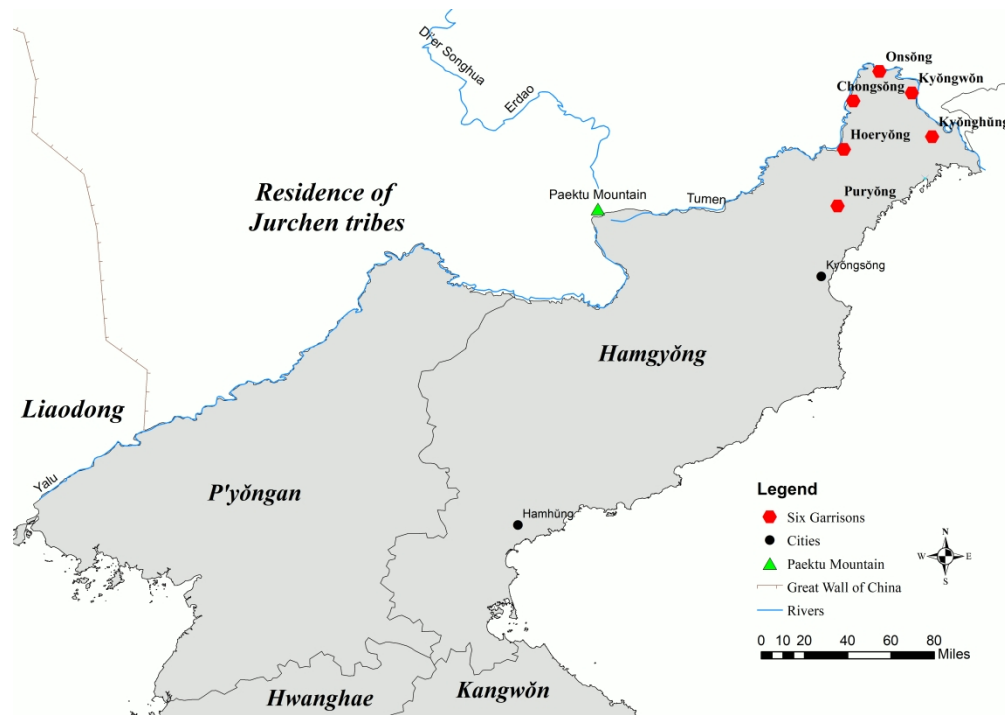


Fig. 2. Map of Northeast Asia in the early seventeenth century with the Korean Six Garrisons.

2063x1458mm (72 x 72 DPI)

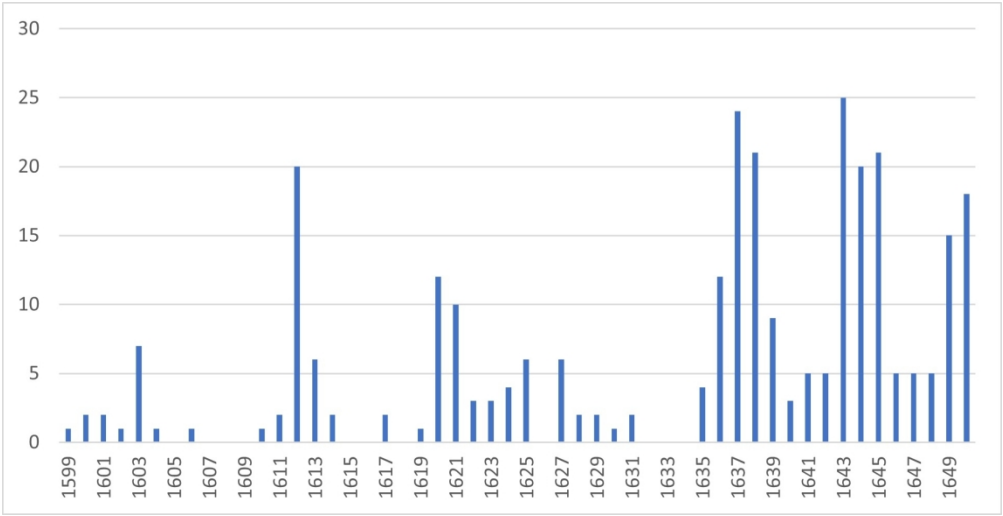


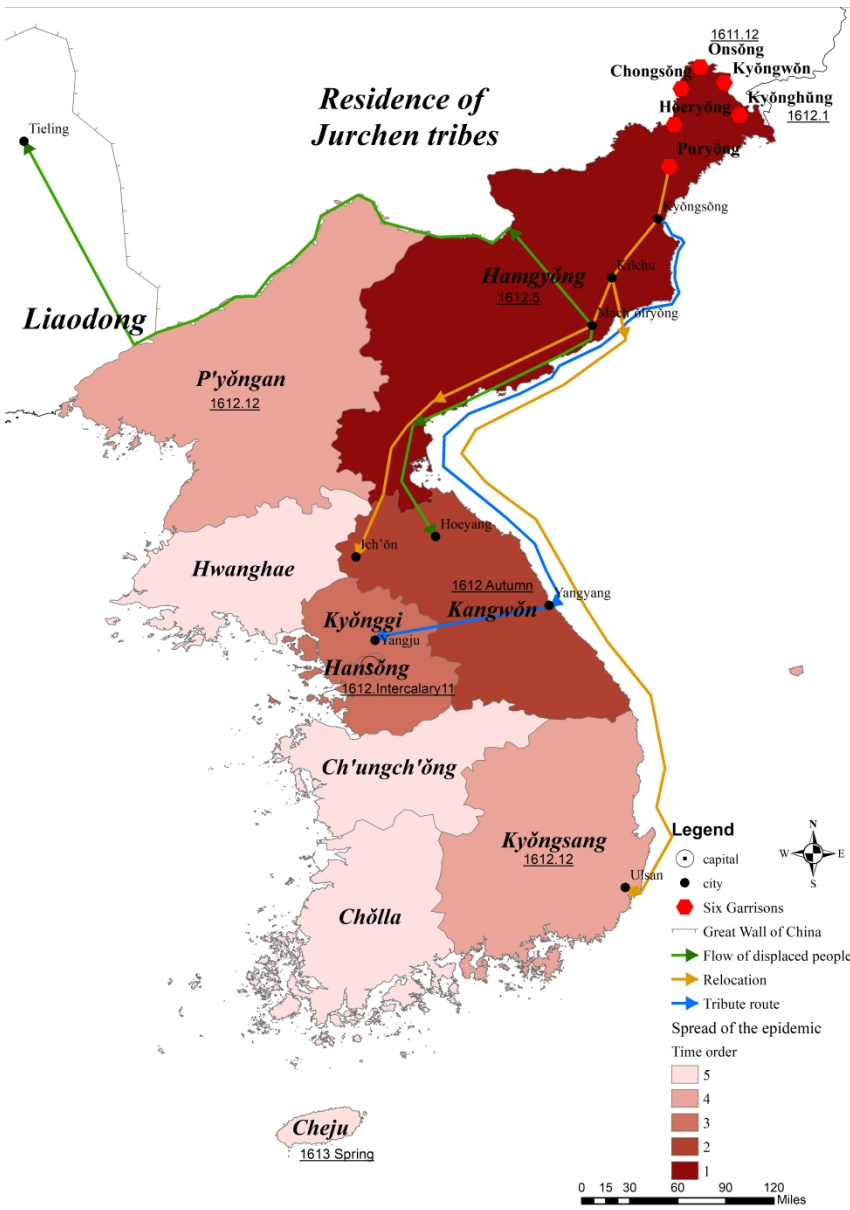
Fig. 3. Numbers of official records mentioning epidemics.

148x76mm (330 x 330 DPI)



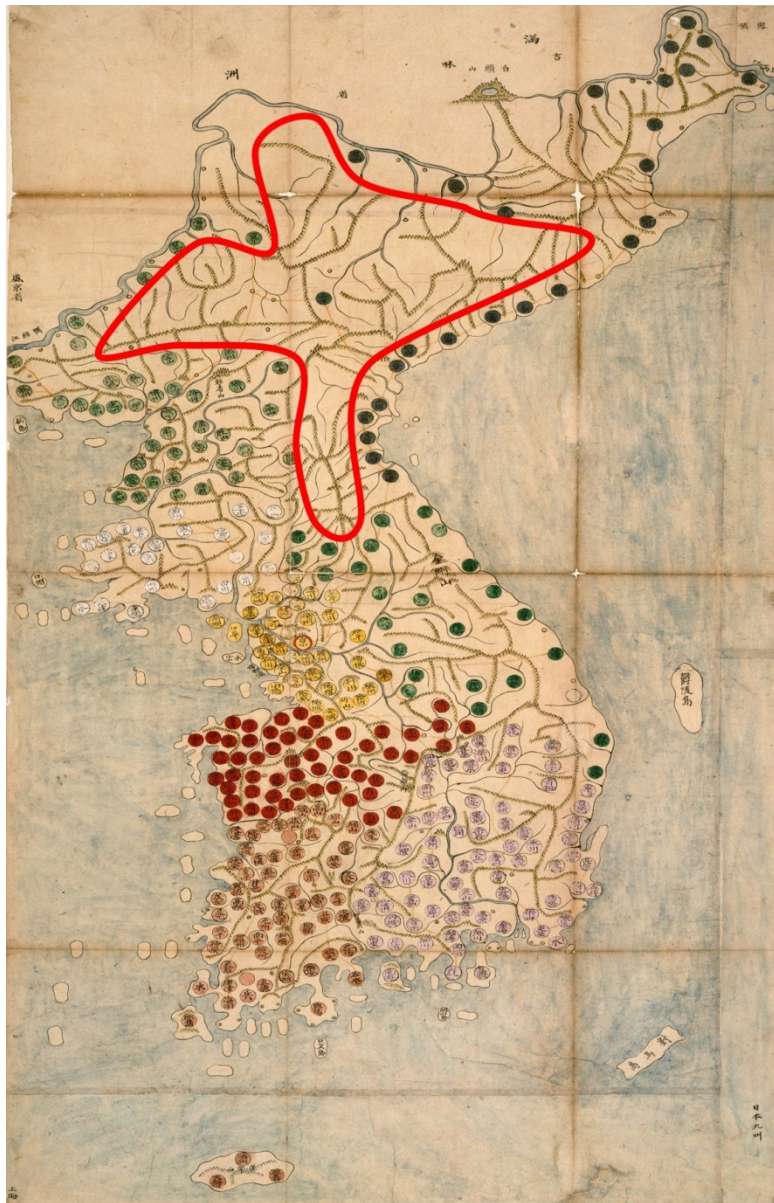
Map of Hamgyŏng province, Atlas of Korea (Haedong chido).

1249x970mm (72 x 72 DPI)



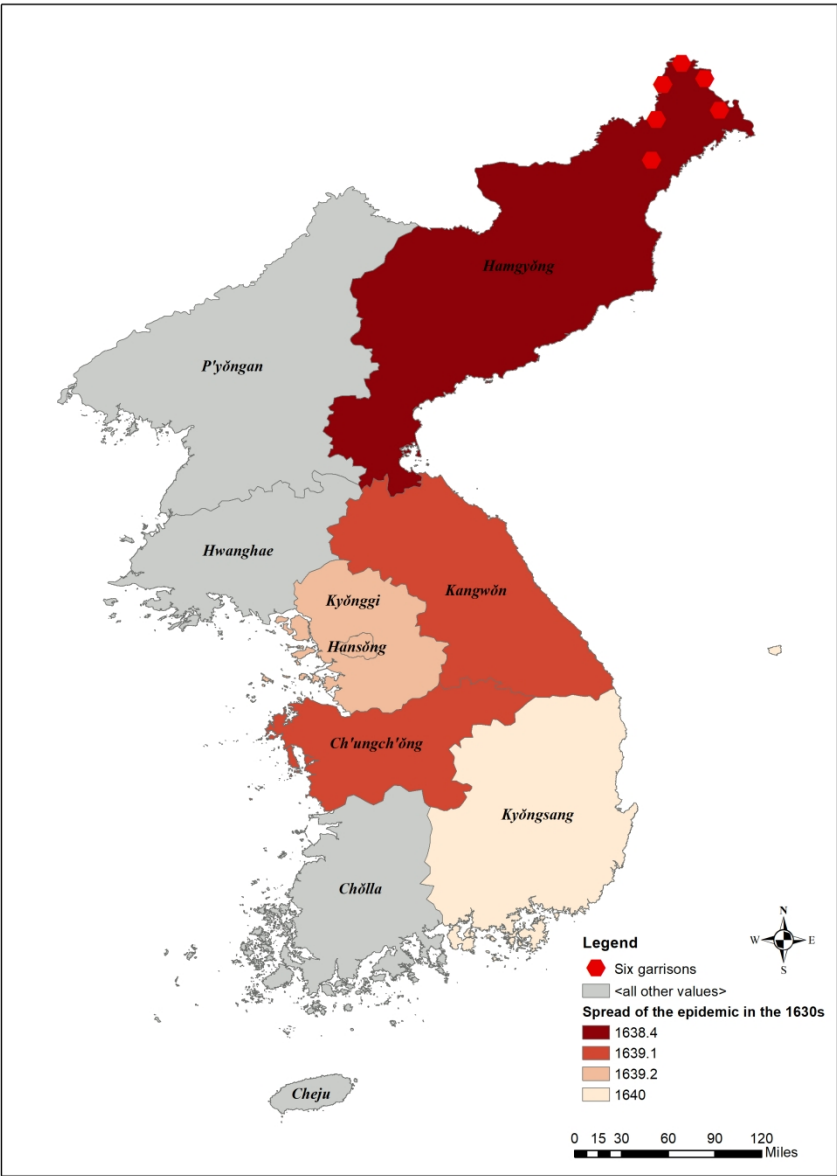
Map of epidemic transmission and displacement in the 1610s

210x297mm (500 x 500 DPI)



Topographic Map of the Korean peninsula.

89x138mm (330 x 330 DPI)



Map of epidemic spread and transmission in the Korean peninsula, 1638-1640

875x1237mm (72 x 72 DPI)