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AN ENIGMATIC DISEASE: MAKING MELIOIDOSIS VISIBLE IN THAILAND

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PhD Social Anthropology

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Declaration

I declare that, except where otherwise indicated, this thesis is entirely my own work, and that no part of it has been submitted for any other degree or professional qualification.

Aphaluck Bhatiasavi

May 2024

Abstract

This thesis is about the complexities and challenges surrounding the understanding and management of a lesser-known infectious disease within global health framings in Thailand. Through fourteen months of multi-sited ethnography, my research attempts to make sense of how a highly fatal disease, melioidosis, remains largely neglected despite significantly impacting rice farming communities. Although epidemiological data and biomedical research show that rice farmers are at the highest risk of melioidosis infection, the disease is little heard of even in endemic areas where the microbe is dispersed in the environment.

This is the first anthropology and social science study on melioidosis. I trace melioidosis through spaces of public health, medical research, hospital care, and health policy, to investigate how it becomes known, to whom it remains unknown and why. I explore melioidosis in public and scientific spaces, and in spaces where policies and practices on infectious diseases that impact people's lives and livelihoods are made. I investigate the efforts made by scientists to draw attention to melioidosis nationally and internationally.

My thesis shows melioidosis to be what I call an "enigmatic disease", which remains difficult to know and control despite first being identified over a century ago. The biology of the disease contributes to its enigmatic character. Melioidosis is caused by bacteria that live in tropical soil and water and can therefore be present in diffuse environments, making its transmission difficult to control. Melioidosis can cause a wide range of symptoms and can mimic tuberculosis, pneumonia, and sepsis. The disease can impact multiple body organs and melioidosis patients can develop co-infection with diabetes or multiple infections of other diseases. Patients treated for melioidosis can develop a relapse or become reinfected with the disease. Furthermore, the nature of the disease-causing microbe makes it challenging to identify, even in scientific spaces like laboratories where multiple tests are performed to make it visible.

The thesis follows efforts by researchers, clinicians, patients, and public health officials to know melioidosis and make it visible through what Annemarie Mol (2002) terms multiple enactments, in different spaces, including hospitals, laboratories, offices, fields and homes. I focus on one place where melioidosis has been consistently made visible and known in a

coherent form over several decades. This is in Sunpasitthiprasong Hospital where this visibility has been enabled by long-term international investments in biomedical research on the disease.

However, contrary to Mol's argument that diseases can be simultaneously multiple and 'hang together' as a single object, I argue that it is very difficult to make different enactments of melioidosis cohere across different spaces. This is in part because public health response to the disease is divorced from the policies and practices that promote rice cultivation, which I argue is due to the cultural value and political economy of rice in Thailand. The failure to fully recognise the epidemiological association between melioidosis and rice cultivation limits the public health response to the disease which is narrowly focused on individual-based behaviour change activities, while public communication on the disease is almost absent. This lack of public activity on melioidosis leads to confusion, leaving patients and their family caregivers to experience the disease in isolation.

In addition to the importance of the cultural politics of rice cultivation and the biological uncertainties associated with melioidosis, I argue that *barami*, a form of Thai social capital contributes to, and complicates its visibility. In biomedical research, clinical medicine, and public health policies and practices, *barami*, which is associated with Thai Buddhist values, facilitates the construction of scientific knowledge and public health policies and practices on melioidosis in Thailand. On the other hand, *barami* complicates the visibility of melioidosis in other public and social spaces where people interact and engage with each other.

Each chapter of this thesis discusses how melioidosis is made visible or problematic in different spaces. My research contributes to medical anthropology and the anthropology of global health in the study of infectious diseases by reviewing the interconnected biological and social factors that shape the visibility of a disease. This includes paying close attention to the social construction of the disease as much as its biology to understand how they influence one another.

Lay Summary

This thesis is about the complexities and challenges surrounding the understanding and management of melioidosis, a lesser-known infectious disease that largely impacts rice farming communities and can cause high fatality. Through a fourteen-month multi-sited ethnography, my thesis shows melioidosis to be what I call an “enigmatic disease”, which remains difficult to know and control. Despite first being identified over a century ago, the biological characteristic of melioidosis contributes to the difficulty in understanding the disease. The disease-causing microbe is dispersed in the environment, particularly in rice fields, and is not easy to identify even in hospital laboratories. Melioidosis can cause a wide range of symptoms and impact multiple body organs.

My research contributes to medical anthropology and the anthropology of global health in the study of infectious diseases by reviewing the interconnected biological and social factors that shape the visibility of a disease. The thesis follows efforts by researchers, clinicians, patients, and public health officials to know melioidosis and make it visible in different spaces, including hospitals, laboratories, offices, fields, and homes. I argue that it is very difficult to make melioidosis coherently known across these different spaces, and this is in part because the public health response to the disease is divorced from the policies that promote rice cultivation. Public health interventions are narrowly focused on individual-based behaviour change activities and public communication on the disease is almost absent. This lack of public activity on melioidosis leads to confusion, leaving patients and their family caregivers to experience the disease in isolation.

In addition to the importance of the cultural politics of rice cultivation and the biological uncertainties associated with melioidosis, I argue that *barami*, a form of Thai social capital that is associated with Thai Buddhist values, contributes to and complicates its visibility.

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This thesis is dedicated to the people in Thailand and other parts of the world who are left to experience infectious diseases in isolation. I would like to express my heartfelt gratitude to melioidosis patients, village health volunteers, community health workers, Sunpasit Hospital staff, MORU researchers and public health officials who allowed me to spend time with them and gave me the information which helped me understand melioidosis in multiple ways. Without them, this research would not have been possible. Special thanks to P'Tukta, Moo, Kwang, Aunty Dum, Aunty Orn, Mixx, Kai, Ole, Poo, Neng, Jo, Tukta, P'Kid, Kratai, Tan, Puy, Ann, Aim, Thames, Kib, Laor, Mick, Gum, Taeng, P'Taew, P'Lek, Claire, Dr Tew and others who have helped me navigate my way in the different ethnographic sites.

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Abbreviations

AMR	Antimicrobial resistance
BP	Burkholderia pseudomallei
GHSA	Global Health Security Agenda
HIS	Hospital Information System
ICD	International Classification of Diseases
LIS	Laboratory Information System
MOPH	Ministry of Public Health
MORU	Mahidol Oxford Tropical Medicine Research Unit
NNDSS	National Notifiable Disease Surveillance System
NTD	Neglected Tropical Diseases
R506	Report 506
UHC	Universal Health Coverage
VHV	Village Health Volunteers
WHO	World Health Organization

List of Thai terms

Barami	Prestige, honour, respect, dignity,
Bun	Merits
Isan	Northeast region of Thailand
Kam	Karma
Khao	Rice
Khwam pen Thai	Being Thai or 'Thainess'
Krasuay	shuttle/cable
Kreng jai	considerate
Mor Farang	Caucasian doctor
Muan pen phi pen nong	Like siblings
Nata	Face
Phueng pha kan	Depend on each other
Phra Phum	Spirit house
Saan Ta Yay	Shrine of grandfather and grandmother
Tham bun	Make merits

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Introduction

Melioidosis remains an enigmatic disease, and the global footprint of the causative soil and water bacterium, Burkholderia pseudomallei (BP), continues to be redefined. What remains unclear is how much of this is an unmasking of endemic BP in regions where it has long been present but limited clinical and laboratory resources have precluded culture and identification; and how much represents more recent expansion of BP endemicity through anthropogenic and even climate-related drivers.

- Dr Bart Currie, Royal Darwin Hospital, Australia (Currie 2022).

I met YaySai¹ and Nuan during an impromptu stop in their village. I was on my way from the sub-district² where I had been carrying out fieldwork and was heading to Ubon Ratchathani, to meet the head of Mahidol-Oxford Tropical Medicine Research Unit (MORU) in Sunpasitthiprasong (Sunpasit) Hospital. Google map showed me that there were two silk-weaving villages along the drive, so I decided to make a brief visit to the one nearest to the highway. In the village, I stopped in front of a house where some people were sitting and asked if there was a village centre or somewhere I could see some silk weaving and they told me that most of the houses in the village were contracted by a few renowned shops in the municipality. They said they were not allowed to show me their patterns which belonged to those big shops. They however directed me to YaySai's house saying some families continued to independently weave and sell their own products. When I got to YaySai's place, she was sitting at her usual weaving station. I told her that I just stopped by out of curiosity. She told me that she could show me some *sinn*³ she recently wove and pulled out a couple from a

¹ Yay means grandmother. Kinship terms are used pronominally in the everyday spoken Thai language to demonstrate solidarity, and to establish hierarchy based on seniority in the Thai social structure.

² Thailand's local administrative units are categorised from village to sub-district, district, province, region and national levels. According to Thailand Information Centre website, there are 12 villages and 2,165 households in this sub-district.

³ Long traditional sarong or skirts worn by women.

nearby bamboo basket. I began to ask her about the different patterns, and we chatted. She later told me that she had won several awards when she was younger, and brought out two big bundles of *sinn* and scarves wrapped in white muslin cloth to show me her work of art. She told me that she did not want to join the others in the village as contractors for big silk shops because she wanted flexibility.

YaySai asked me what I was doing and what led me into the village. When I told her about my research on melioidosis, she asked me what the disease was and if there was someone in the province infected with it. When I began discussing melioidosis with her, stating that doctors from Sunpasit Hospital, a tertiary care facility have been researching it and have identified that most patients get the disease from being in rice fields, she shouted out for her granddaughter Nuan, who was in another room. She told me that she was not sure, but it sounded like the same disease her daughter-in-law became critically ill with and almost died of about twenty years ago. YaySai said *mor farang* (Caucasian doctors) were researching in Sunpasit Hospital. She said during that period, her daughter-in-law was admitted to the hospital multiple times in three to four years. Nuan told me that her mother was first treated for tuberculosis for many months but did not recover. She said a *mor farang* from Sunpasit Hospital confirmed that it was caused by another disease, for which she was later treated and recovered. She said she was of school age at that time and remembered that she had to miss school often, to be with her mother in the hospital in the municipality area. Nuan told me that she could not remember the disease's name, and apart from her mother, she did not know any other person infected with it. For her, it was a "rare disease". She said the doctors told her mother not to go into rice fields, and because her mother was afraid of becoming sick again, she took up silk weaving and did not go back into rice fields.

Returning to Sunpasit Hospital, I wanted to find out if the disease YaySai and Nuan were talking about was melioidosis or not. Initially, I was not sure of it, but this became clear to me after the head for research in Sunpasit Hospital confirmed that MORU was the only external research institute present in the hospital during that period, and their team involved having Caucasian doctors visit the patients in the wards.

* * *

I first heard of melioidosis in a casual conversation over coffee after a regular “morning meeting” where updates on disease outbreaks from across the world were discussed at the World Health Organization (WHO) in Geneva. This was in 2015. Pierre, a WHO viral haemorrhagic fever specialist asked me if I had heard of melioidosis incidents in Thailand. I was surprised to hear of the disease and ashamed that despite having worked as a journalist in the country for over a decade before joining WHO, I had never heard of this disease before. Since then, I began to research melioidosis and later learned that it is endemic in Thailand and tropical areas in multiple countries across the world. Melioidosis is often misdiagnosed and undiagnosed (Hinjoy et al. 2018; Kaewrakmuk et al. 2023; Hantrakun et al. 2019; Hantrakun 2019). It is a fever-based infectious disease that can cause a spectrum of illnesses in patients. It was first documented in 1911, and although epidemiological data and biomedical research show that rice farmers are at the highest risk of infection, the disease is little heard of among rice farmers in endemic areas where the microbe is dispersed in the environment, as the vignette above shows. Melioidosis can be fatal. It often causes hardship and uncertainty among those affected and their families. Yet, melioidosis receives little attention, compared to other diseases like AIDS, bird flu, dengue, or COVID-19.

This is the first anthropology and social science study on melioidosis. This thesis is based on a multi-sited ethnography where I attempt to make sense of how a highly fatal disease remains largely neglected despite predominantly impacting rice farming communities. I trace melioidosis through the spaces where it is known to investigate how it is known, what makes it known, and how it remains largely unknown. I explore melioidosis in the public and the scientific spaces, and in spaces where policies and practices on infectious diseases which impact people’s lives and livelihoods are made. I investigate the efforts made by scientists to draw attention to melioidosis nationally and internationally.

My thesis demonstrates that melioidosis is what I call an “enigmatic disease”. I began the thesis by quoting Dr Bart Currie, an Australian melioidosis expert who says the disease and its causative microbe remain difficult to understand. The disease biology makes it difficult to prevent and control. The nature of the disease-causing microbe is challenging to identify even in spaces of scientific practice like laboratories where multiple tests are performed to make it visible. To better understand infectious disease, historian Randall Packard (2016) emphasises on the importance of paying close attention to the disease’s biology as well as its social

characteristics. He attributes the success of the smallpox eradication campaign largely to its biosocial characteristics. While the biology of melioidosis complicates its identification in spaces like laboratories and in patient wards where the clinical research is carried out, melioidosis is nonetheless made visible through what Annemarie Mol (2002) terms multiple enactments in different spaces, including hospitals, laboratories, offices, rice fields and homes. Through her study of atherosclerosis Mol demonstrates that there are different ontologies of a single disease which can be understood in multiple ways through multiple activities in various spaces. My research pays special attention to one place where melioidosis has been consistently made visible and known in a coherent form over several decades. This is in Sunpasit Hospital where long-term international investment in biomedical research on the disease has been made to understand melioidosis and enable it visible to the international scientific community.

Mol goes on to argue that although a disease is known in multiple ways, it is coherently held together as a single disease through what she terms “coordination” which involves alignment of different practices, and negotiations of meanings, values, and priorities of those involved. She highlights coordination as contingent on maintaining order, adding that it can resolve any disagreement or difference through the establishment of a hierarchy. However, contrary to Mol’s argument that diseases can be simultaneously multiple and “hang together” as a single object, I argue that it is very difficult to make different enactments of melioidosis coherent across different spaces. Despite challenges, this thesis demonstrates that melioidosis hangs together in specific spaces like Sunpasit Hospital where provisions are made for biomedical research on the disease. In other spaces, melioidosis remains problematic, and this has implications for how the disease is managed nationally and internationally.

This thesis also shows that *barami*, a form of Thai social capital has contributed to the visibility and may have a role in obscuring melioidosis. In biomedical research, clinical medicine, and public health policies and practices, *barami*, which is associated with Thai Buddhist values, facilitated the construction of scientific knowledge and public health policies and practices regarding disease in Thailand. On the other hand, *barami* may have complicated the visibility of melioidosis in spaces where people interact and engage with each other at community level.

In the paragraphs that follow, I begin by introducing melioidosis to provide a brief history of the disease where I highlight three significant incidents which brought attention to melioidosis from the late twentieth century onwards. I then discuss what is known of melioidosis thus far, and how I have conceptualised my research. After that, I discuss the methods I deployed for this research and provide a brief outline of the chapters in this thesis.

Introducing melioidosis

Melioidosis is caused by *Burkholderia pseudomallei* (BP), a microbe dispersed in the environment, particularly in rice fields of Thailand's *Isan* or Northeast region. The disease is said to be endemic in Northern Australia and Southeast Asia, but studies and public health investigations in recent years show that the microbe is present in wider geographical areas than earlier understood. Melioidosis patients have been reported in Southeast and South Asia, Northern Australia, and Latin America (Limmathurtsakul and Dance 2019). Environmental research carried out in recent years shows the presence of the bacteria in the soil and water in multiple countries across the world, including India, Pakistan, Sri Lanka, and Bangladesh in South Asia; Kenya, South Africa, Sierra Leone and Uganda in Africa; and Brazil, Haiti, Mexico and Venezuela in the Americas (ibid.). More recently, the United States announced the identification of the melioidosis-causing microbe in the soil and water in Mississippi in 2022 (Petras et al. 2023; Hall et al. 2023). Modelling estimates show that globally, 165,000 people get infected with melioidosis annually, of which 89,000 die (Limmathurtsakul et al. 2016).

Figure 1 shows a global map of countries where BP, the melioidosis-causing microbe, is reported in humans, animals, and the environment. This compilation is based on varying qualities of evidence obtained from scientific publications, government reports and media articles compiled by MORU. Countries are represented in colours scaling from red to orange and yellow, where red represents those with strong evidence of the presence of melioidosis while yellow with indeterminate quality of evidence. On the other hand, countries shown in green indicate the absence of melioidosis. Different shades of green represent the quality of

evidence, with dark green as having good evidence while poor evidence is represented in light green⁴.

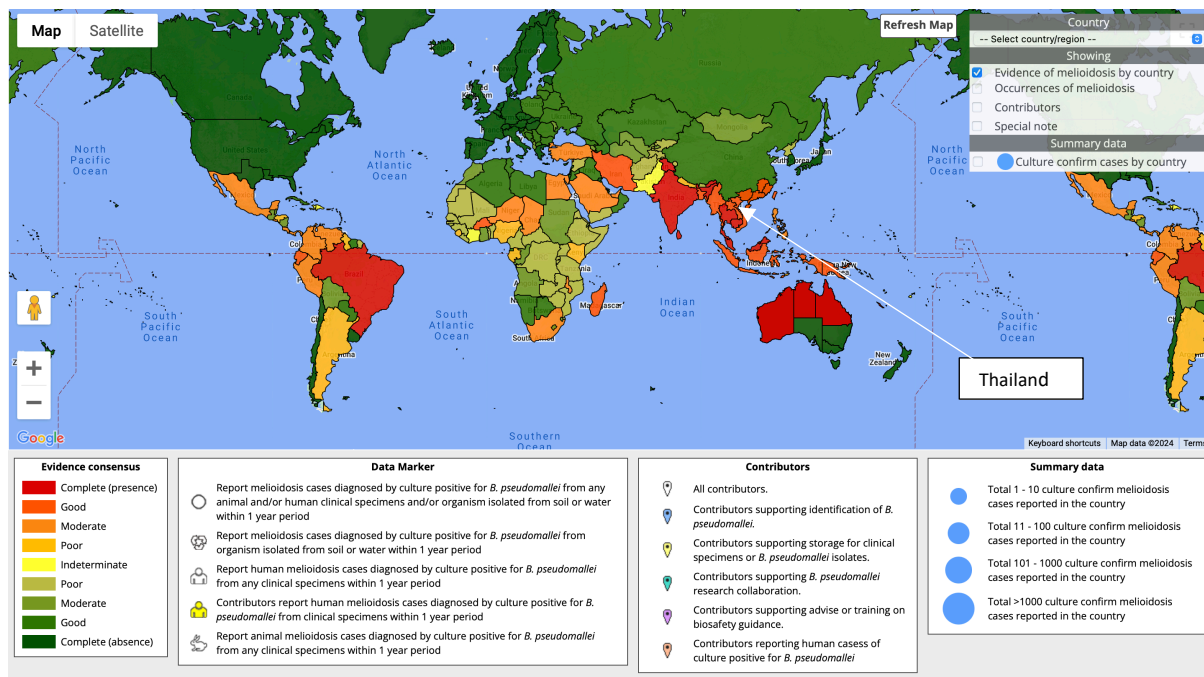


Figure 1: The global map of reported incidences of melioidosis.

This open-source database is compiled and managed by MORU. Source: (Meioidosis.Info) [Accessed: 15 January 2024].

Melioidosis can infect both humans and animals but does not generally transmit among or between species. Human-to-human and animal-to-human infections have been documented but are considered rare (Dance 2009). Animal infections have been reported in Thailand (Limmathurotsakul et al. 2012; Rachlin et al. 2019; Kwanhian et al. 2020), Australia (Choy et al. 2000), France, The Netherlands and other countries (Birnie, Biemond, and Wiersinga 2022). Humans can become infected with melioidosis when exposed to contaminated soil or water through inhalation of small dust particles or droplets, through cuts or wounds in the skin, or through ingestion of contaminated food or water (Limmathurotsakul and Dance 2019). Studies show an increase in hospitalisation of melioidosis patients following severe weather conditions such as typhoons and floods (Currie 2015; Merritt and Inglis 2017).

⁴ Note that the map was not updated on the website with new melioidosis confirmations, including from the United States.

Melioidosis patients can develop a spectrum of illnesses from mild flu-like symptoms to high fever resembling malaria, severe lung infections or severe blood infections which can be fatal (Hinjoy et al. 2018). Their identification can be challenging because melioidosis can mimic tuberculosis (Rubel et al. 2022), pneumonia (Meumann et al. 2012; Currie 2003), and sepsis (Chaowagul et al. 1989). The disease can also result in abscesses in multiple organs of the body, including the liver and the spleen, and can cause inflammation of the bones (Churuangsuk et al. 2016; Limmathurotsakul and Peacock 2011). Additionally, melioidosis patients can develop coinfections and multiple infections with other diseases which can complicate treatment. Additionally, patients can develop a relapse (Chaowagul et al. 1993) or become reinfected with melioidosis (Limmathurotsakul et al. 2006).

Bacteria culture is the recommended diagnosis for melioidosis as serological diagnosis remains problematic due to its low sensitivity which can result from prior infection (Currie 2022). Testing for melioidosis is often overlooked or delayed because the disease symptoms are like other fever-based diseases (Limmathurotsakul and Dance 2019). Delays in the identification of melioidosis can lead to delays in treatment and impact patient survival, especially among those with underlying health conditions like diabetes (Wiersinga et al. 2018). Studies show that the disease can cause high mortality. It is estimated that about forty percent of laboratory-confirmed melioidosis patients die in hospitals (Somayaji et al. 2021; Limmathurotsakul et al. 2016). This is because many patients arrive at the hospital in critical condition (Hantrakun et al. 2019) and it takes several days for melioidosis to be diagnosed (Wuthiekanun et al. 1990). Timely identification of melioidosis can lead to effective treatment and patient survival (Hantrakun et al. 2015). Melioidosis patients generally receive two stages of antibiotic treatment, the first involves two-weeks of intravenous treatment, while the second involves oral consumption of drugs for at least five months.

A brief history of melioidosis

In April 1910, K.C. Krishnaswami, a pathologist based in Rangoon General Hospital in Burma (Myanmar) had the opportunity to conduct an autopsy on some patients who died in the hospital to determine the cause of their deaths (Whitmore 1913; Krishnaswami 1917). He

identified lesions from their corpses which looked like but were not the same as glanders⁵ which is an animal disease. It can in rare circumstances infect humans, mostly among those with close contact with horses. During that period, glanders were observed among *gharry* (horse) rickshaw men but the hospital began seeing morphine addicts with similar lesions. Krishnaswami reported this phenomenon to his boss, Dr Alfred Whitmore, a colonial surgeon who was based in the hospital and they decided to conduct bacteria culture. This confirmed that it was caused by a pathogen different from glanders. Whitmore published the findings in The Royal Medical Gazette in 1912, making it the first documentation on melioidosis (Whitmore and Krishnaswami 1912; Dance 2005). Krishnaswami reported the observation in a Burma Assistant Surgeon's Association meeting in 1917 (Krishnaswami 1917). This detailed report is published in The Indian Medical Gazette.

The disease was initially referred to as “morphia injector's septicemia” in post-mortem records (ibid.). It was later named Whitmore disease (Dance 2005). Eight years later, in 1924, following the first reports of infections outside Burma, two French doctors and their assistant stationed in the Federal Malay State (Malaysia) renamed the disease “melioidosis” (ibid.). A.T. Stanton, William Fletcher, and their assistant K. Kanagarayer, rationalised the new name to correspond with two Greek words *melis* meaning the bacteria's ability to infect animals and *oeides* which indicates an abnormal condition or disease (Männikkö July 2011; Stanton, Fletcher, and Kanagarayer 1924). In the early years of their research, Stanton and Fletcher described melioidosis infections in humans with zoonotic links. They based their rationale on observations made in Burma, Malaya, French Indochina and Ceylon in 1932, linking human infections with rodents (Stanton and Fletcher 1925; Vietri and Deshazer 2007). They, however, shifted their understanding from zoonotic to environmental exposure as the cause of infection after conducting multiple studies that involved guineapigs, horses, rats, monkeys, and rabbits (Stanton, Fletcher, and Kanagarayer 1924; Dance and Limmathurotsakul 2019; Currie 2015).

⁵ Glanders is caused by *Burkholderia mallei*, a pathogen was historically used to kill horses of allied forces during World War 1. See (Dance 2009)

The emerging significance of melioidosis

Since the second half of the twentieth century, three incidents led to a resurgence of interest and significant changes in the ways melioidosis is considered. The first incident was the observed infection among American soldiers deployed to Southeast Asia during the Vietnam War between 1955 and 1974. Melioidosis was predominantly reported among helicopter crew soldiers, which led to the hypothesis that they may have been infected through inhalation of tiny dust particles fanned from the ground during landing and take-off of the helicopters in and around rice fields (Stone 2007). That incident increased the United States' military interest in melioidosis and led to routine screening among military personnel deployed to Southeast Asia and Australia (ibid.). The bacteria is also popularly referred to as the "Vietnamese time bomb" by American military doctors and war veterans (ibid.). From this regular monitoring they found that soldiers continue to develop symptoms decades after their first exposure (Currie 2003). This led to the hypothesis that the bacteria can remain dormant in a person's body for decades before they develop the disease (ibid.). An American war veteran who spent years as a prisoner of war in Japan, Burma, Indonesia, Malaysia, Singapore and Thailand developed severe forms of melioidosis sixty-two years after returning home to Texas (Ngauy et al. 2005).

The second incident was when Sunpasit Hospital in Ubon (shown on the map in Figure 2) began observing unusual numbers of illnesses and deaths among hospitalised patients in the 1980s. At that time doctors were struggling to identify the right treatment for melioidosis patients early enough to save their lives. This was during the period when the needed antibiotics were expensive and had to be imported into the country. With support and funding from British institutions Oxford University and Wellcome Trust, decades of research collaboration began between MORU and Sunpasit Hospital. MORU was established as a research collaboration for tropical medicine between Thailand's renowned medical research institute Mahidol University and Oxford University in 1979, with continued funding from Wellcome Trust, more of which will be discussed from Chapter Three onwards. The first joint clinical study between MORU and Sunpasit Hospital demonstrated a significant reduction in patients' deaths by half from appropriate antibiotic prescriptions (White et al. 1989). This study led to the establishment of a standardised treatment for melioidosis patients in Thailand

and internationally (Dance 2014). Their success in research and collaboration paved the way for decades of melioidosis work in Thailand, which is what this thesis is about.

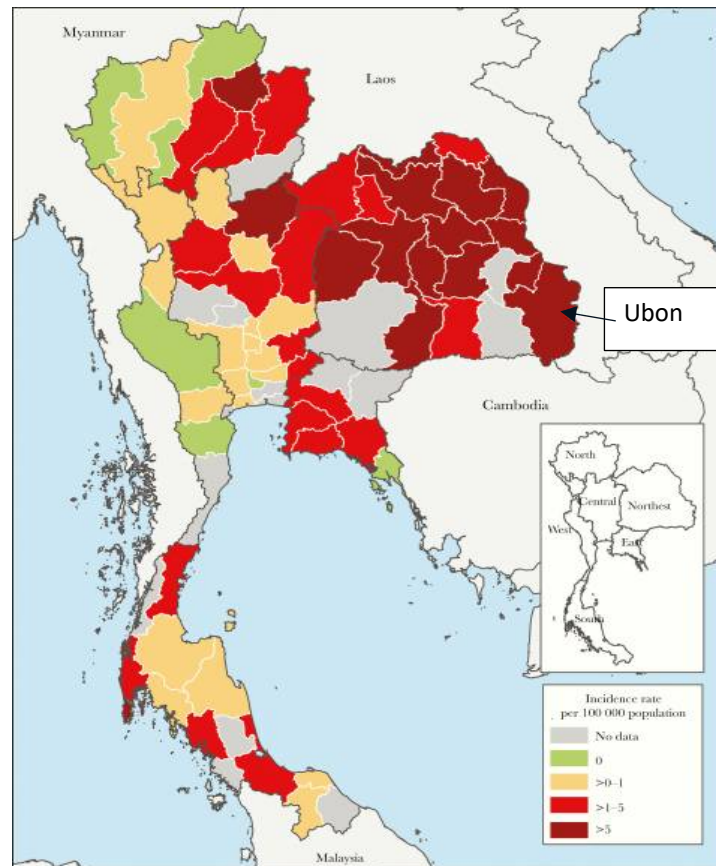


Figure 2: Map of Thailand showing reported melioidosis infections in humans.

Provinces reported with over five infections per 100,000 people are shown in maroon, while those with one to five infections per 100,000 people are shown in red, provinces with less than one infection per 100,000 people are shown in yellow, and provinces with no reported infection are shown in green. There is no data for the provinces shown in grey. Source: (Hantrakun et al. 2019).

The third incident relates to the historical manipulation of a microbe from the same family as BP as a biological weapon during World War I, and the anthrax attacks in the United States around the same period as the attacks on the World Trade Centre in September 2001. *Burkholderia mallei*, the bacteria that causes glanders in horses is said to have been used to kill horses of the Allied forces during World War I (Fong and Alibek 2005). Since then, the microbe has been closely monitored under the watchlist of governments of Russia, the United

States and the United Kingdom (Dance 2009). Following the anthrax attack in the United States in 2001, renewed attention was placed on the control of biological agents that could be manipulated into biological weapons. This led to the revised classification of biological agents and laws governing them in the United States. These revisions influenced changes in laws in other countries through the international partnership established under the Global Health Security Agenda (GHSA) in 2014 which is discussed in Chapter Three. The United States law listed both melioidosis and the BP bacteria as a security threat (Dance 2009), classifying it as a pathogen that can be used in bioterrorism and requires control under the Public Health Security and Bioterrorism Preparedness and Response Act. The law issued in 2002 establishes procedures for preparation for any bioterrorism or public health emergency event (Information 2002). In Thailand, as I discuss in Chapter Three, immediate notification to national health authorities is required for melioidosis along with over eighty other diseases governed under the national communicable disease control law (Department of Disease Control 2015).

Melioidosis and what is currently known

My research moves away from the biological weapon aspect of melioidosis towards its occurrence in the environment where humans interact with microbes on a day-to-day basis. More than a century has passed since melioidosis was first documented but scientists believe that there has been little advancement in obtaining new knowledge and understanding of the disease. As indicated in the beginning of the chapter, Dr Currie acknowledges that although extensive research has been conducted on melioidosis in recent decades, much remains unknown. The current knowledge about melioidosis and the BP bacteria that cause the disease is predominantly based on clinical research and laboratory studies carried out in controlled settings. These studies have made melioidosis visible to the international biomedical research community through publications in renowned international medical journals. A significant number of studies were carried out in Northern Australia, Thailand, and other Southeast Asian countries, covering a range of issues from epidemiology (Currie 2022, 2008; Currie and Kaestli 2016; Wolf 2016; Currie 2015; Hassan et al. 2010; Chowdhury et al. 2022; Hantrakun et al. 2018; Hantrakun et al. 2019; Limmathurotsakul et al. 2013;

Limmathurotsakul, Wongratanacheewin, et al. 2010; Churuangsuk et al. 2016; Stewart et al. 2017; Currie et al. 2000; Li, Lu, and Han 1994), to disease manifestation in patients (Patamatamkul et al. 2017; Chantratita et al. 2023; Churuangsuk et al. 2016), diagnosis (Ashdown 1979; Limmathurotsakul, Jamsen, et al. 2010; Wuthiekanun et al. 1990; Peacock et al. 2005) and treatment (White et al. 1989; Dance et al. 1989; Suputtamongkol, Rajchanuwong, et al. 1994; Barnes et al. 2022). Microbiology research has led to some understanding of the life of the bacteria in controlled laboratory settings (Wuthiekanun et al. 1996; McCombie, Finkelstein, and Woods 2006; Pumpuang et al. 2011; Wuthiekanun, Smith, and White 1995) and in the soil and the water in some tropical areas (Hall et al. 2019; Wuthiekanun et al. 1996; Bhaskaran et al. 2022; Baker et al. 2015; Gassiep et al. 2023; Chewapreecha et al. 2019; Chewapreecha et al. 2017; Chuah et al. 2017; Inglis et al. 2009; Rachlin et al. 2020). Studies reveal that BP can survive in nutrient-depleted environments (Hantrakun 2019; Hantrakun et al. 2016), thus confirming its resistant capacity compared to other common illness-causing microbes.

Limited studies have been carried out on the public's awareness of melioidosis. A survey acknowledged that there is little public awareness of the disease even in endemic areas in Thailand (Chansrichavala et al. 2015). A multi-year behaviour change study conducted in Ubon recommends changing the behaviour of rice farmers to prevent melioidosis infection (Suntornsut et al. 2016; Suntornsut et al. 2021). Researchers also advocate for more awareness and capacity building for health workers so that the disease can be identified, and patients can be treated (Birnie et al. 2022; Smith et al. 2022; Bory et al. 2018).

Media reports on melioidosis have been ad-hoc and are mainly based on interviews given by researchers following the publication of their studies or are based on warnings issued by health authorities. For instance, in 2005, *Nature* (Aldhous 2005) published an article based on interviews with researchers from MORU and the National Institute of Allergy and Infectious Diseases. In 2016, *Aljazeera* (Duggleby 8 August 2016) published an article on melioidosis, highlighting the work of the Melioidosis Clinic in Sunpasit Hospital. The Thai media occasionally report on melioidosis, mainly based on public health warnings issued in recent years by the Ministry of Public Health (MOPH) (Matichon 11 July 2018, 12 September 2023; Tangprasert 22 October 2023).

Towards an anthropology of melioidosis

This thesis is about the complexities and challenges surrounding the understanding and management of melioidosis within global health⁶ framings in Thailand. In my previous work with WHO, I have witnessed unrealistic “quick fix” garnered towards responding to infectious disease threats which focus on responses that lead to control of people in various forms. These include control of movement and behaviour, as witnessed in outbreaks of COVID-19, Ebola, bird flu and other infectious diseases, with little or no understanding of local realities. These measures may be useful for filling the gaps in performing certain kinds of work, but attention is needed towards long-term structural issues that undermine care provision (Willis and Chandler 2019). I came across the online Ebola Response Anthropology Platform⁷ when I was in Liberia for the Ebola outbreak in West Africa in 2014-2015. The platform introduced me to anthropology and I became particularly interested in the challenges related to the rapid spread of rumours which was caused as a result of the nation’s politics and history. I began to obtain information to try to understand the underlying logic of local concerns. After that, I had the opportunity to work with some anthropologists in disease outbreaks and humanitarian situations. I was drawn towards anthropology and decided to pursue further training in the discipline.

Anthropology can contribute to understanding melioidosis in various ways, firstly by reviewing the biological and social characteristics of the disease and how they relate to one another (Packard 2016; Parker, Polman, and Allen 2016b; Kleinman et al. 2008). This includes considering the disease biology as Packard did in his review of smallpox and malaria eradication campaigns, along with social factors that drive the disease, its policies and control measures. These include considerations of the history of medical research (Geissler and Molyneux 2011) and the politics that influence policies and practices (Harper and Parker 2014; Parker, Polman, and Allen 2016a). They also include the local contexts (Lock and Kaufert 2001;

⁶ By global Health, I refer to a network of institutions including academics, NGOs, governments, and philanthropists mainly from the global north who forged alliances with the realisation to strengthen public health programmes in the global south to prevent the spread of diseases that could spread globally.

⁷ An online platform with social science and anthropological research and field notes to support the Ebola response. See (Ebola Response Anthroplology Platform 2024)

Lock 2017), where the understanding is situated (Haraway 1988; Mol 2002) and varies based on scales and temporalities (Seeberg, Roepstorff, and Meinert 2020). In what follows, I outline key themes through which I review an anthropology of melioidosis in Thailand.

Studying melioidosis in Sunpasit Hospital

When I first heard of melioidosis in around 2015, I thought it was a rare disease. After actively searching for information on the disease, I realised that significant research and documentation of the disease has been carried out in multiple countries across the world. A notable number of studies were conducted at Sunpasit Hospital in Ubon. Located over six hundred kilometres northeast of the capital Bangkok, Ubon borders Laos in the East and Cambodia in the South. The province is recognised as an important economic corridor for facilitating trade between China and other ASEAN⁸ countries.

What makes Sunpasit Hospital an ideal site for ethnographic inquiring is its capacity to accommodate the social orders and disorders that emerge out of relationships between science, society and power (Street 2014). Anthropologies of biomedicine and hospital ethnographies depart from the Foucauldian approach to show hospitals as spaces of multiple practices not exclusive to biomedicine (Chabrol and Kehr 2020; Seo 2020). They consider hospitals as spaces where people are made visible through infrastructures of fragility (Street 2014) or infrastructures of violence (Varma 2020). In her ethnography of a Papua New Guinea hospital, Alice Street (2014) demonstrates that scientific knowledge can be produced through fragile hospital infrastructures despite their ontological uncertainty and instability. Hospitals, she shows, are also a site of experimentation where technologies and bureaucracies provide opportunities to make persons visible in unpredictable and powerful ways. Saiba Varma's (2020) ethnography in a Kashmir hospital situates psychiatry as a humanitarian strategy where she discusses the close bounds between militarism and care, demonstrating how disruptions

⁸ The Association of Southeast Asian Nations was formed since 1967 to foster economic collaboration among member countries which include Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Laos, the Philippines, Singapore, Thailand, and Vietnam.

caused as a result of curfews and strikes impacted access to medicines, causing mistrust and malpractices within clinical settings.

In Chapters Five, Six and Seven, I trace melioidosis through its visibility in different spaces in Sunpasit Hospital. My research significantly focuses on the hospital as a site where melioidosis is made visible through infrastructures and the social relations that take shape between patients, research staff and hospital staff. Chapter Five discusses the stability of the hospital infrastructure, including the *krasuay* (cable) system which facilitates the movements of biological materials from patients' bedsides to the hospital's clinical laboratory. These specimens are then shared with the research laboratory to perform multiple tests to make melioidosis visible. With international research support, MORU was able to establish its research laboratory in the hospital. The MORU laboratory is an external entity located within the hospital. It is decontextualised from its immediate geographical surroundings (Gieryn 2008), and strictly considered a research space outside the remits of the hospital's main activities.

Although the hospital's stable infrastructure facilitates the visibility of melioidosis, its fragility is revealed through its dependence on international research funding for making melioidosis visible. These infrastructures and investments are shown to be fragile and potentially fleeting, while they often fail to secure visibility of the disease beyond hospital walls. A melioidosis clinic was established in the hospital's outpatient department with funding support from research. Chapter Six discusses the functioning of the clinic which was discontinued after about ten years due to the end of funds. The chapter also discusses the relationships between melioidosis researchers, hospital staff and patients fostered in the spaces of the melioidosis clinic. Chapter Seven is about efforts being made to make melioidosis visible outside hospital spaces. The chapter discusses ways in which researchers and health officials are experimenting with different tools and templates to make epidemiological data on melioidosis visible in the national disease surveillance system. They believe that reflecting true numbers of melioidosis in the national system will make melioidosis more visible nationally and internationally.

Anthropological studies have also shown hospitals as spaces of speculative medical futures (Kehr, Dilger, and van Eeuwijk 2018), in their capacities as training grounds for doctors

(Wendland 2010) and as markets for commodification of health care (Wendland 2012). In following medical students on their pathway toward becoming doctors in a Malawi Hospital, Claire Wendland (2010) discusses the challenges medical trainees go through in understanding, embodying, and building and rebuilding their identities, in spaces where they are morally expected to provide care in the absence of material technologies. She shows how they reconceptualised their roles after facing the painful realities of disease risk, overwhelming workload, and expectations to bring order to the medical infrastructure, while their foreign counterparts make short visits as “clinical tourists” (Wendland 2012). In Sunpasit Hospital, the training of medical students played a role in fostering differences between Thai research institutions involved in melioidosis research. Chapter Four discusses the collaboration between Sunpasit Hospital and a medical school in neighbouring Khonkaen province which eased decades of tensions between the two institutions competing for research funding and attention to melioidosis-related work.

Diseases are studied and made known through the human body, with and without lives (Good 1994; Nichter and Nordstrom 1989; Haraway 1988; Lock 1993; Mol and Law 2004). Anthropologists have paid attention to the study of diseases through the objectification of human bodies to commodify suffering (Nichter and Nordstrom 1989) through the establishment of expertise (Lock and Nguyen 2018). In *Medicine, Rationality and Experience*, Byron Good (1994) says rather than seeing a patient’s body as an object of sustained attention, the cultural constructs that form their personhood, embodied experiences, thoughts, and personality should also be considered. On the other hand, Mol and John Law (2004) say that the issue is beyond idolizing the body as a way to relate to being in the world. They argue that knowledge about the body we have and the body we do are different things, calling for diseases to be understood through ways in which different parts of the body are practiced.

Medical anthropology studies demonstrate the different ways in which diseases can be made visible in hospitals, from the manipulation of modern medical technologies (Mol 2008) or the absence of them (Street 2014), to unsound infrastructure (Chabrol 2018) or improvisation due to their lack of (Livingston 2012). Fanny Chabrol (2018) shows us that diseases can be made visible not by those seeking care, but by those seeking to save the lives of their family members. Mol (2002), in *The body multiple: ontology in medical practice*, argues that a disease can be made visible through multiple practices that take place in multiple locations. Based on

her ethnography in a Dutch university hospital, she demonstrates that atherosclerosis can be understood variously through different enactments. In Sunpasit Hospital, melioidosis is known in different spaces, including in clinical trials and laboratories through different practices. In following Mol's multiple enactments of disease, my research shows that melioidosis is made visible in Sunpasit Hospital through research, patients' diagnosis, and treatment. Chapter Four discusses the infrastructures and capacities that existed in Sunpasit Hospital as the impetus for MORU's decision to collaborate on melioidosis research. Multiple clinical trials on the use of antibiotics have contributed to the standardisation of treatment for melioidosis patients (White et al. 1989). Chapter Six is about the melioidosis clinic in the hospital's outpatient department. The practices in the clinic have led to the understanding that treatment regimens for patients need to be modified to avoid relapse of melioidosis (Chaowagul 2000) and that patients cured of the disease can be reinfected (Limmathurotsakul et al. 2006; Maharjan et al. 2005).

Although the clinical laboratory of Sunpasit Hospital could culture the bacteria before the collaboration with MORU began, their joined research led to the visibility of melioidosis. Clinical trials carried out in the hospital and the research laboratory have been published in renowned international medical journals in English, making them accessible to the international medical research community. Chapter Five discusses the multiple ways in which melioidosis is made visible in the MORU research laboratory, an external entity within the hospital space. The proximal presence of MORU in Sunpasit Hospital facilitated their access to biological materials transported from patients' bedsides to the hospital laboratory and to the MORU research laboratory. Their proximal presence also allowed them to negotiate their multi-positionality (Vernooij 2017). MORU was expected to perform different tests on melioidosis to facilitate the hospital's laboratory confirmation of melioidosis in patients. These include bacteria culture, microscopy, and drug resistance and susceptibility tests. With this responsibility, MORU was able to compile data on laboratory-confirmed melioidosis infections similarly expected of the hospital. With this data, they were able to identify gaps in data reported to national authorities which is a legal requirement in Thailand.

For MORU, data collection is seen as a research project that entails collecting clean and accurate data (Biruk 2018, 2012). It is viewed as an influential tool for policy advocacy. Although scientific data production is situated in local contexts that are influenced by power

dynamics, historical legacies and cultural norms as Crystal Biruk (2018) argues, MORU and MOPH officials are working towards the ordering of data so that it can accurately represent “true” numbers of melioidosis in the country. Numbers can also be used to negotiate power and display political resistance, says Marlee Tichenor (2016) who shows how Senegalese health workers retained malaria data as a form of strike to highlight the lack of equipment and infrastructure in the country’s health system. While in the Senegalese case, the government required data to report back to donors, in this case, MORU is influencing health officials to fix the data problem so that more attention can be drawn to melioidosis nationally and internationally. They want health authorities to introduce more tools to generate data so that the epidemiology of melioidosis is accurately reflected in the national disease surveillance system. This is discussed in Chapter Seven. They are conditioning data production by enumeration of technological fixes (Tichenor 2017). These methods, I argue, may lead to the production of more similar fragile data.

With different practices carried out by different actors in different locations, Mol’s research shows that it cannot be assumed that an agreement is always made between different actors involved. In case of a conflict, the issue is resolved through what she terms “coordination”, which extends beyond the alignment of actions. They involve negotiations of meanings, values, and priorities, where a resolution is met through the established hierarchy. It is this coordination that shapes how melioidosis reporting to the national disease surveillance system is desired. With conflicting numbers represented in the laboratory database and epidemiology database, MORU is advocating for laboratory data to be reported along with the epidemiological data. Through the establishment of this hierarchy where the laboratory data is considered superior to the epidemiology data, I argue that melioidosis can be cohesively held together as a singular in specific spaces like Sunpasit Hospital. This is because this space is what Thomas Gieryn (2018) terms “truth spots”. It is the space where scientific facts are produced. Sunpasit Hospital is where biomedical research on melioidosis has led to the systematic identification of patients with the disease over the decades. This is the space where scientific facts are constructed (Latour, Salk, and Woolgar 2013) and maintained (Gieryn 2018). Truth spots, according to Gieryn, are places where trustworthy and credible scientific knowledge is developed to lend credibility to beliefs and claims about natural and social reality, about the past to the future, about identity, and the transcendent. Scientific

publications on melioidosis attest to Sunpasit Hospital as an expert site for clinical research on the disease, and MORU as an expert producer of scientific knowledge on melioidosis.

Sunpasit Hospital is different from other hospitals in Thailand in that within the hospital space, melioidosis is made visible through multiple tests performed daily. I argue that, although melioidosis is coordinated as a single disease through multiple enactments in this particular space, it remains problematic in other spaces. Chapter One discusses the confusion melioidosis patients and their families go through in trying to make sense of a disease they first hear of when the patient is diagnosed with it. The explanation doctors give on the possible cause of infection complicates their understanding of the disease. Patients are told that melioidosis is caused by spending long hours in rice fields. While this explanation goes against the experiences of some patients who do not spend long hours in rice fields, it leaves others wondering if this is the case, and why has there been no information given on melioidosis in relation to rice cultivation outside the hospital. Public discussion about the disease in the context of a health concern is commonly observed in Thailand which has also received praise from WHO for complying with the standards set out in the International Health Regulations (Chuensukjit 2020). MOPH and health-related NGOs in Thailand are recognised for their proactive campaigns on disease risks, prevention and control which were expanded since the HIV/AIDS epidemic in the 1990s and were more recently observed during the COVID-19 pandemic. Health authorities and NGOs proactively communicate health risks and convey educational messages on disease prevention and health protection. Campaigns for neglected tropical diseases (NTDs) like dengue and leptospirosis are familiar to rice farming communities because related activities are frequently observed with loud campaign jingles and performances at the community level. The absence of a public health activity on melioidosis leaves patients and their families confused and are left to experience the disease in isolation, I argue.

Knowing melioidosis biosocially

Melioidosis is a neglected NTD. Researchers have advocated for the disease to be recognised as an NTD, a brand they believe can draw attention to research funding, policy, and public health programmes (Savelkoel and Dance 2024; Savelkoel et al. 2022; Limmathurotsakul and Dance 2019). Since the disease is under-reported, modelling studies have been carried out to

estimate the global burden of the disease. Calculated with disability-adjusted life-years (DALYs), studies show that the global burden of melioidosis is higher than NTDs like leptospirosis and schistosomiasis (Savelkoel et al. 2022) or dengue (Limmathurotsakul and Dance 2019).

Melioidosis is an enigmatic disease. Its biology complicates its visibility. Chapter Five demonstrates how laboratory technicians perform their tasks challenged by the biology of melioidosis by paying close attention to the microbe. Because of its characteristics, BP is often referred to as a “shy” or “stubborn” bacterium by laboratory technicians and microbiologists. “Shy” because it is a slow-growing microbe. It is often covered under other faster-growing bacteria that commonly infect humans like *E. coli*. Additionally, BP does not grow well in bacteria culture plates generally used in hospital laboratories⁹ in Thailand. Their growth is most visible in Ashdown agar which is used in the MORU research laboratory (Wuthiekanun et al. 1990). “Stubborn” because research shows that it can survive in distilled water without nutrients for at least sixteen years at a temperature of twenty-five degrees Celsius (Pumpuang et al. 2011). Experiments also show that BP can survive in carbonated drinks from days to weeks at temperatures ranging from four to thirty-seven degrees Celsius (Wuthiekanun et al. 2020). These challenges posed in identifying BP, even in laboratory spaces, can complicate its prevention and control, as Packard (2016) demonstrates in *A History of Global Health* where he compares the successes and failures of smallpox and malaria eradication programmes. He says although several factors contributed to the successful eradication of smallpox, its biology significantly contributed to its rapid detection. Smallpox was a highly contagious disease that spread easily from person to person and its symptoms were clearly visible. This facilitated early detection of infected persons, and since humans were the only known natural hosts of the virus, its spread was rapidly contained. Unlike smallpox Packard discusses, melioidosis can cause a spectrum of symptoms from flu-like illnesses to fever and mimic other diseases like pneumonia and tuberculosis as I have earlier discussed. What further complicates the identification of melioidosis is that it can occur concurrently with one or more diseases.

⁹ Sunpasit hospital microbiologist told me that laboratory hospitals in Thailand generally use agar (food to feed the bacteria) like McConkey and blood which can grow most common human disease-causing bacteria.

Despite its complex biological characteristics, I draw on anthropological studies of NTDs to understand what makes melioidosis neglected even from being recognised as an NTD. Anthropologists studying NTDs argue for more attention to social phenomena that causes diseases to be neglected such as poverty and its entanglements with agriculture, urbanisation, labour, and access to health care (Manderson et al. 2009; Parker, Polman, and Allen 2016a, 2016b; Harper and Parker 2014; Harper 2006; Nading 2014; Kelly and Beisel 2011). They say NTDs exist and persist for social, economic, and political reasons (Parker, Polman, and Allen 2016a; Harper and Parker 2014) and that considerations should be made for gender differences, ecological factors and social and economic variables that influence relationships between communities and the health consequences of dealing with NTDs (Nading 2012; Manderson et al. 2009).

In the discursive review of the melioidosis literature I made, I found that melioidosis research is almost exclusively based on a biomedical understanding of the disease. As I reflect on the biosocial considerations of melioidosis, I realize that melioidosis researchers have thus far failed to convince WHO to include melioidosis as an NTD because of the gap in biosocial knowledge of the disease. Packard (2016) says that successes and failures of responses to infectious diseases like AIDS, Ebola, yellow fever and malaria depend on several factors. He argues for attention towards the social determinants of health like poverty, inequality, and access to basic healthcare as much as investing in vertical disease control programmes. In *The Making of a Tropical Disease* (2011), he shows that malaria prevention and control programmes rely on addressing issues of agriculture, labour and trade entanglements with the ecology and the epidemiology of the disease. These shifting alignments of different forces are what determine the distribution and global expansion of mosquitoes, their breeding sites, and malaria. With regards to melioidosis, researchers have yet to demonstrate the social and ecological factors that perpetuate the disease. I discuss the political economy of rice cultivation and melioidosis as a contested space in Thailand in Chapter Two, where I argue that this contestation contributes to the enigmatic characteristic of melioidosis. The chapter attempts to understand why discussions about melioidosis are not made in relation to the policies and practices that promote rice cultivation when research and epidemiological data confirm the association between melioidosis infection and rice cultivation. While avoiding addressing these links, in Chapter Three, I argue that the government's public health

responses to melioidosis are narrowly focused. By the government I refer to elected and non-elected political leaders and institutions which form policies and influence the governance of the country. The chapter discusses the government's health advocacy for melioidosis prevention and control which centres around changing the behaviours of individual rice farmers with diabetes.

Knowing melioidosis also involves understanding the history of how MORU came to establish its research in Sunpasit Hospital and how the hospital became a site for storage of the largest archives of the BP bacteria for future research. Wenzel Geissler (2011b) says scientific ethos is shaped by historical, political and economic circumstances that influence the production of scientific knowledge in particular locations, by particular actors, during particular times. MORU came to establish its research presence in Sunpasit Hospital during the period when the government's focus was on the expansion of health services to rural areas as part of the nation-building strategy which began in the mid-1970s (see Baker and Phongpaichit 2009, Anderson 1993). Chapter Four is about the research potential that existed in Sunpasit Hospital, which led to the collaboration with MORU. Additionally, it demonstrates that the lack of day-to-day interaction with the hospital administrators facilitated the execution of research which led both MORU and Sunpasit Hospital to be recognised as melioidosis experts. Within this context, MORU has been able to collect and securely store BP in locked freezers in their research laboratory for future research, which I discuss in Chapters Four and Five. With MORU's expertise and with the *barami* of Thai researchers involved, MORU has been an influential actor in the establishment of Thailand's public health policy on melioidosis which is discussed in Chapter Three. It is difficult to describe *barami* in one word in English. The Thai-English Cambridge Dictionary translates it as prestige, while the Royal Institute defines it as "accumulated goodness" (The Royal Institute 2542 B.E. 2003: 625 in Persons 2008).

Barami and the visibility of melioidosis in Thailand

In hospital spaces, biomedical practices have also been studied in the context of rituals. Anthropologists have furthered Bronislaw Malinowski's work in bringing science into conversation with magic and religion (van der Geest 2005). They also discuss care in

generative and disruptive forms which involve physical, emotional, personal, institutional, biomedical and spiritual enactments elicited in relation to the demands of others (Seo 2020). Buddhism constitutes an essential part of Thai healthcare practice where *bun* (merits) and *kam* (karma¹⁰) influence the construction of *barami*, a form of social capital unique to Thai society. Morality is politically deployed to maintain the Thai social and political discipline says Felicity Aulino (2019), adding that religious beliefs legitimise certain forms of power relations which manifest and are embodied in the everyday lives of the Thai people.

Narratives of *barami* emerged in the late eighteenth and early nineteenth centuries in the context of legitimising the role and influence of Thai kings during the period when Western colonial rulers were establishing prominence in neighbouring territories (Jory 2002). It goes on to say that a king possesses *barami*, which is based on high virtue and the good deeds accumulated from the previous life that has led them to their present kingship, and it is this *barami* that legitimises their power (Keyes 4-8 July 1999). It is related to the patronage system (Jones 2021; Winichakul 2019; Jackson 2021; Sopranzetti 2021).

In the last two decades, scholarship on *barami* has extended from relationships between kingship and Buddhism to its significance outside conformist Buddhists (Jackson 2021), and in political and military leadership (Sopranzetti 2021). A person's *barami* is associated with charisma and leadership, symbolised in rituals and religious ceremonies that reinforce relations and moral legitimisation for the political order (Keyes 4-8 July 1999; Jackson 1999). It refers to the accumulated social prestige, influence, and moral authority of an individual or a group acquired through acts of generosity, public service or adherence to traditional values and customs. Unlike other forms of social capital such as *wasta* studied in the Arab world or *chakari* observed in Nepal, *barami* is disconnected from corruption. It has been conceptualised with moral and political influence (Keyes 4-8 July 1999). *Wasta* relates to connections cultivated towards developing influence, including through bribes (Marktanner and Wilson 2018), while *chakari* refers to patronage relations based on kinship or family alliance which extends into the bureaucratic system (Justice 1989). Peter Jackson (2021) and Edoardo Siani (2018) discuss *barami* in the context of materialism while Claudio Sopranzetti

¹⁰ A person's action, whether it is carried out in the present or the previous life with beliefs of reincarnation, can bring upon them a good or bad result in the present life.

(2021) reviews it with political power and authority. Jackson says the interconnectedness between capitalism and *barami* in the new cults of wealth that emerged in the early 2000s involves a complex mix of Buddhist, Chinese Indian and royal rituals that symbolise wealth. The presence of diverse cultural approaches and religious rituals observed in Thai society has allowed for the commercialisation and mediatisation of this cult, he says. Siani says *barami* is a form of divine power made foreign to ordinary people through cosmologies mediated by astrology.

In Sopranzetti's study of *barami* with power, he argues that it has coexisted and legitimised politicians and military leaders with *amnat* or authority in Thai politics. Despite seeming contradictory *barami* and *amnat* have coexisted under good governance. In her study of *barami* and health governance in Thailand, Daena Funahashi (2017) argues that the perceived enigmatic moral power of *barami* complements the scientific knowledge required for health governance in Thailand. This magic, she says, leads to trust in health experts (2016). Larry Persons (2016) meanwhile discusses *barami* as a crucial characteristic of Thai leadership, which includes the association with Westerner or Western values. A leader's *barami* can increase through their association with Westernisation, he says. In Chapter Four, I discuss the presence of Caucasian doctors as contributing to the *barami* of Thai researchers. The association of expertise with the engagement of Caucasian doctors enhanced the *barami* of Thai researchers who were able to influence the national policy on the disease.

In this thesis, I extend the study of *barami* to the everyday practices and relations that take shape in hospital spaces that facilitate the construction of scientific knowledge on melioidosis. Chapter Four discusses the acknowledgement my interlocutors make on the influence their *barami* has in positioning melioidosis in Thailand's public health policy. Chapter Five demonstrates the influence *barami* had in facilitating melioidosis research in the clinic. *Barami*, I argue, can also be observed as a strategy deployed to maintain political order in the economy of rice cultivation. The assumption I make in Chapter Two to explain how *barami* may have contributed to the enigma of melioidosis is also based on my observations of the government's responses to outbreaks of other infectious diseases like bird flu, which is linked to the political economy of poultry consumption and export. During the outbreak in 2003-2004, the government deliberately concealed poultry outbreaks until human infections were reported, following which they were pressured to respond (Chuengsatiansup 2008; Safman

2009; Pongcharoensuk et al. 2011). Their response was, however, driven by measures aimed at protecting large poultry exporters (ibid.). In the context of melioidosis, I suggest that they may have deployed what Lindsay McGoey (2019) terms “strategic ignorance” to avoid being liable for making rice cultivation safe for farmers. In discussing the relationship between ignorance and power, McGoey argues that true power lies in the ability to convince others of where the boundaries between ignorance and knowledge lie. She explores the duality of strategic ignorance which she defines as an action that mobilises, manufactures, or exploits unknowns in a wider environment to avoid liability for earlier actions. She also considers it from a situation where people create unknowns to generate support for future political initiatives instead of avoiding liability for a past mistake.

The biological and social characteristics of melioidosis studied in different spaces of hospitals, laboratories, people’s homes, rice fields, public health policy and research demonstrate that melioidosis is an enigmatic disease. While it is made visible through different enactments of biomedical practices and with the influence of *barami*, it remains confusing in spaces like rice fields and people’s homes. The cultural value of rice, farming, and the political economy of its cultivation contribute to the enigma of melioidosis. This thesis contributes to the understanding of how melioidosis is understood in different spaces, by different actors. It also contributes to the understanding of what is done with the knowledge, and by whom, to make sense of the social relations between humans and non-humans configured (Kelly, Keck, and Lynteris 2019) around melioidosis.

Fieldwork

Before embarking on my fieldwork, I was hoping to explore melioidosis from a multispecies entanglement aspect by considering the interactions between humans and non-humans in rice fields, with the soil and the water, and in other spaces, including in the laboratories in the hospital. I intended to study melioidosis in relation to climate change. However, my fieldwork took me through an alternative path. I carried out my research during the COVID-19 pandemic. COVID-19 dominated my life and the lives of my interlocutors, as it did to millions of people across the world. I went through multiple mandatory quarantines while moving through

various sites, transitioning from the university in Scotland to begin fieldwork in Thailand. I spent at least two weeks in mandatory quarantine every time I travelled, including from Edinburgh to Bangkok, from Bangkok to Ubon, and through various locations, including in the sub-district where I was based. Access to various spaces, including the villages and the hospital, also depended on the local pandemic prevention measures and the national policies. In the villages, I was always accompanied by a community health worker and some village health volunteers¹¹ (VHV).

Throughout my fieldwork, I was continuously asked why I was studying “a disease not many people know of or care about, especially during this period”. Some interlocutors, including melioidosis researchers and health officials, suggested that I change my research topic to COVID-19 as it was “on everybody’s mind” during that period. They told me that they were worried I may not be able to collect data on melioidosis. I must admit that I was worried and felt frustrated for several months. I became uncertain about my ability to do fieldwork on melioidosis during COVID-19. As I kept thinking of ways to pursue my fieldwork, one day, I had an epiphany to find ways to understand the anthropology of melioidosis through what I could observe around me. COVID-19 gave me insights into exploring melioidosis in the context of a highly visible and highly political disease that impacted lives in multiple ways. It allowed me to compare, contrast and reflect on where and in what way melioidosis is known, and what makes it largely unknown although it has been around for at least a century and can have a severe impact on people’s lives.

This ethnography demonstrates how global health impacts local practices through the implementation of public health measures which are influenced by national and global political and economic forces. I conducted a multi-sited ethnography for over fourteen months from October 2020 to November 2021. By ethnography, I mean studying the social relations across domains and scales beyond the local (Geissler 2011b), to understand the lives of the microbe, the people, the scientists, the health workers, and the materials, including scientific publications by paying close attention to the ways the in which they interact, relate,

¹¹ VHVs are members of the villages, formally recognised as key to delivering Thailand’s primary health care. Depending on number of houses, each village has about 20 VHVs, and each VHV is responsible for ten to fifteen houses. They played a key role in disease detection and delivery of information and essential medicines for chronic diseases like diabetes during the lockdown due to the COVID-19 pandemic.

or disconnect. I began by conducting a discursive review of the medical literature, public health reports and media articles on the disease. Most of the data I had access to was from renowned international medical journals published in English, with some media reports and policy documents available in Thai. This data was mainly accessed online, with some documents shared with me by email or through social media. I also reviewed the literature on Thailand's history and public health, which I mapped out in an Excel file to document the periods during which significant events that shaped Thailand's public health and medical research took place. With these materials, I deployed the strategy to trace melioidosis in spaces where it is visible, to understand what makes it visible and how. These pathways have also expanded my understanding of the reason why melioidosis remains significantly obscure.

My interlocutors include melioidosis patients and their family carers, community health workers and VHV, rice farmers, Sunpasit Hospital staff, public health policymakers, and researchers. Most of my fieldwork was carried out in Ubon, where I divided my time between a sub-district health promotion hospital and Sunpasit Hospital. I had initially planned to begin my fieldwork in Sunpasit Hospital and the MORU laboratory before moving to other spaces, but due to delays in obtaining ethics clearance from various bureaucratic institutions at different administrative levels in Thailand, I began my fieldwork by going with the flow, wherever and whenever I had the opportunity. Tukta, an NGO who works in Ubon introduced me to health workers from several health promotion hospitals in different districts and sub-districts. I began research in the sub-district where the head of the health promotion hospital agreed to allow me to conduct an observation, and then went from there to the MORU research laboratory and then to other spaces in Sunpasit Hospital. In the sub-district, I conducted participant observation and supported the staff where needed, including ushering patients from the waiting area into the nurse's examination room. I also followed Deer, a local health worker and my local host for community outreach activities along with several VHV. They helped me connect with melioidosis patients and accompanied me to their homes for interviews and visits. At Sunpasit Hospital, I spent significant time at the MORU research laboratory. I also spent some days in the various spaces of the hospital, including the main clinical laboratory, internal medicine wards where melioidosis patients were treated, and the outpatient department where patients first meet their doctors or visit for follow-up.

Photographs and short video clips I took with an iPhone served as a reminder of the details I observed in various sites during my fieldwork. Photographs taken in the research and the clinical laboratories in Sunpasit Hospital allowed me to further explore information through the internet and seek clarification from my interlocutors on the use and importance of various objects critical to producing scientific knowledge on melioidosis. Photographs taken in the homes of my interlocutors like that of Aunty Som enabled me to recall our conversations which I also documented in my field notes. These materials helped me to reflect on the time I spent with her in her kitchen and during our walks into her fields. The images of rice fields and rice farmers served as a reminder of the geographical scale of rice fields that spread across Ubon and other *Isan* provinces. They remind me of the importance of rice cultivation and the value of rice to us in Thai society. The photographs also triggered the importance of the human and non-human engagements I observed in laboratories and rice fields. They form an important part of my documentation (Pink 2007) and facilitated me with the thick description (Geertz 1973) which is a large part of this thesis.

Ethics

Before traveling to Thailand, I obtained ethics clearance from the University of Edinburgh. In Thailand, I spent several months applying for ethics clearance at different bureaucratic levels. MORU advised me to obtain ethics clearance from the Central Research Ethics Committee (CREC) to have access to their research laboratory. CREC informed me that my ethics clearance would be considered only after obtaining ethics clearances from the provincial health office and Sunpasit Hospital. However, after waiting for several months, I was informed that the hospital would give me an ethics clearance after I received approval from CREC. After exchanging emails and telephone calls back and forth, I was granted permission at all levels. I was granted Ethics clearance from Ubon Ratchathani Provincial Health Office (SSJ.UB2563-107) in October 2020, the Ethics Committee of Sunpasit Hospital (079/63 S) in April 2021, and the CREC (CREC005/63SCm-SBR) at the national level in May 2021.

For the national level clearance, I had to submit full proposals in English and Thai, along with other relevant materials, including participant information sheets for various groups of

stakeholders and consent forms. Additionally, I was required to submit a certificate on Good Clinical Practice although I insisted that my research was anthropological. Additionally, I was not granted permission to interview melioidosis patients in the hospital. My documents were reviewed in detail and revisions were proposed, including to the participant information sheets where I was asked to include offering gifts to my interlocutors as an expression of appreciation for their time. To this, I insisted to CREC officials that I would express appreciation only in subsequent or follow-up meetings as I did not want to be perceived as incentivizing my stakeholders into the interviews.

I obtained consent from eighty-seven interlocutors, most of whom participated in individual interviews, while some attended focus group discussions. Most of my interlocutors gave written consent, while some gave audio or video-recorded consent. My interlocutors gave me permission to use their photographs and their names, but for anonymity, I have changed their names in the thesis.

Chapters outline

This thesis begins by focusing on what melioidosis is and does to patients who develop the illness and their families. Chapter One is based on interviews with melioidosis patients and their family carers in their homes. It opens key issues related to the isolated illness experience melioidosis patients and their families go through in trying to make sense of the disease. It centres around the confusion melioidosis patients have when their doctors inform them of their infection with the disease. Despite being in a province that has vast areas of rice fields, they hear of melioidosis for the first time when they are diagnosed with it. What further complicates their understanding of melioidosis is the absence of the government's response to the disease. Melioidosis patients are advised by their doctors to avoid going into rice fields.

Melioidosis patients, their families and community health workers are curious as to why there has been no health advocacy or awareness campaign on melioidosis, similar to what they have observed for other infectious diseases of local concern like leptospirosis or dengue. They associate the government's health advocacy and awareness campaigns with disease severity

and risks. The absence of this for melioidosis leaves them wondering whether it is a severe, common, or rare disease.

In Chapter Two, I attempt to trouble with the epidemiology and the political economy of melioidosis and rice cultivation in Thailand. This chapter discusses the significance of rice cultivation to the Thai culture, society, economy, politics, and ideology. I hypothesise that the linkages between rice and melioidosis is a contested space and for this reason, discussion about melioidosis is abstracted from the broader discussion on rice cultivation in Thailand. This chapter argues that the importance of rice cultivation to Thai culture and political economy contributes to the obscurity of melioidosis.

Chapter Three discusses the recent recognition of melioidosis in Thailand's public health policy and priority health responses. The chapter is about the influence melioidosis researchers have in Thailand's public health policy on melioidosis. In discussing the first national guideline on melioidosis and priority activities, I demonstrate that the public health priorities are based on narrowly focused individualised responses which argue responsibilise rice farmers to act and change behaviours related to rice cultivation. Such responses fail to consider the interconnectedness of the biological characteristics of the disease and the social, political, and economic factors that influence its occurrence.

Chapter Four is about the emergence of melioidosis research and how it came to be established with international funding at Sunpasit Hospital in Ubon. The chapter discusses decades of melioidosis research which has made it visible in Thailand and internationally. This chapter argues that *barami*, a form of Thai social capital associated with Thai Buddhist values contributed to the significance of melioidosis research recognition in Thailand. This recognition facilitated melioidosis researchers' access to health officials and their influence in advocating for a national public health policy on the disease.

Chapter Five discusses the infrastructural stability and the relationships between two laboratories involved in the production of knowledge on melioidosis. Both the laboratories, the MORU research laboratory and the hospital's clinical laboratory are in Sunpasit Hospital. This chapter argues that despite challenges posed by the biology of the BP bacteria, the laboratories can regularly identify melioidosis infections in patients. The chapter describes the

multiple tests carried out in the laboratory to make melioidosis visible, thus making the hospital and the laboratory truth spots for melioidosis.

Chapter Six centres around a particular period during which melioidosis was most visible in Thailand. Through the story of the work carried out in the melioidosis clinic which was established in Sunpasit Hospital's outpatient department for over a decade, the chapter argues that *barami* contributed to the construction of melioidosis research in the clinic. This chapter discusses the cultivation of *barami* which fostered relationships between melioidosis patients and a research assistant, demonstrating that the relationship was mediated by the desire of the research assistant to *tham bun* (make merits), which was reciprocated by patients through returning to the clinic for follow-up.

Chapter Seven is about the efforts hospital staff go through in collating melioidosis data from different spaces of the hospital to report to the national disease surveillance system. Melioidosis researchers advocate for laboratory data, which they consider to be more reliable than epidemiological or clinical data, to be reported to the national disease surveillance system. They believe that making melioidosis visible through national disease surveillance data can attract policy and donor attention to the disease. To do so, they and health officials are introducing new tools and templates to collect more of the same data, which I argue, potentially leads to the production of more of the fragmented data on melioidosis.

This thesis concludes by stating that melioidosis remains an enigmatic disease because it is difficult to know and control. The disease biology contributes to its enigmatic character in multiple ways, from the microbe being diffused in the environment to challenges in its diagnosis and treatment of patients. Drawing on Mol's multiple enactments, I argue that while the biological aspects of melioidosis complicate its identification, it is made visible through multiple enactments in spaces of biomedical practice, including laboratories and patient wards where clinical research is carried out. Mol argues that despite the multiple practices and understandings of disease in multiple spaces, these multiples hold together cohesively as one. Contrary to Mol's argument, I further argue that it is difficult for melioidosis to hold together cohesively in other spaces in Sunpasit Hospital. Outside the hospital where decades of research has been carried out on the disease, melioidosis remains obscure. In addition, I argue that *barami*, a form of Thai social capital associated with Buddhist values, contributes

to the visibility of melioidosis in the hospital while complicating its visibility in other public and social spaces where people interact and engage with each other.

Chapter 1: Experiencing melioidosis in isolation

I don't feel the same, I feel weak. I used to be quite active.

- Lom, a melioidosis patient, 2021.

What is this disease?

Are you sure there are patients with it [melioidosis] in our district?

I have never heard of it.

- Deer, a health worker in a sub-district Health Promotion Hospital in Ubon, 2021.

When I first discussed my research with Deer, the sub-district¹² health worker who hosted me during my fieldwork in the area, she asked me if I was certain that there were melioidosis patients in the area because she has been working in the health promotion hospital¹³ for decades but has never heard of the disease before. She was surprised to see the document I obtained from the provincial health office which provided data on the number of melioidosis patients from different villages in Ubon. This was part of the database regularly reported from hospitals to provincial health officials, who transmitted the data onwards to the central level to form the national disease surveillance data (see Chapter Seven). A few days later, she was able to obtain more information on melioidosis patients from her contacts in the District

¹² Thailand's local administrative units are categorised into village, sub-district, district, province, region, and national levels. The Thailand Information Centre website says there are 12 villages and 2,165 households in this sub-district.

¹³ In 2009, the health ministry renamed health centres as "health promotion hospitals", to project closer proximity between doctors and patients, but many of these primary healthcare facilities continue to face shortages of doctors and nurses.

Health Office and from volunteers in the villages or VHVs. She and some VHVs helped me contact melioidosis patients. We learnt from some families that some patients had died. We were able to visit nineteen patients, some of whom were still on antibiotics for melioidosis eradication.

This chapter is based on interviews with melioidosis patients, their families, local health workers and VHVs. I attempt to make sense of what melioidosis is and does to patients who develop the illness and their families. I unpack the tensions between what is known, what is said, and what is practiced in relation to melioidosis, and the prevention measures patients are advised to follow. Further elaboration on these issues will be made in the other chapters that follow. The main questions I raise here are what does it mean for a patient to be infected with a disease they hear about for the first time when they are diagnosed? What implications does it have on their everyday lives which revolve around living in an environment where the disease-causing microbe is widespread? How do they make sense of melioidosis?

In what follows, I provide a glimpse into the views of melioidosis patients and their families. I do so by acknowledging the limits of this presentation, which in no way represents their lived experiences with the disease (Briggs and Mantini-Briggs 2016; Kleinman 1997; Mattingly and Garro 2000). I wish to use this space to generate dialogue on the multiple ways in which melioidosis knowledge and understanding can be produced, through multiple practices (Mol 2002), and how certain forms of knowledge can be dominant, while others remain blurred (Brown 2019).

This includes knowing melioidosis through different narratives, including through cultural interpretations (Kleinman 1988; Good 1994; Mattingly and Garro 2000) or how melioidosis is socially constructed through the economic forces at play (Das 2015; Dumit 2012), for instance, in relation to the political economy of rice cultivation which is discussed in the next chapter. Through discussions with Lom, Jum, and Jum's wife Su, this chapter provides a narrative of the journey patients take, revealing how they navigate through melioidosis from the time they develop illness symptoms, to their diagnoses and treatments. It demonstrates the complexities patients go through in living with, and in making sense of melioidosis, thus contributing to its enigmatic characteristic.

In what follows, I begin by outlining the concerns patients have about the explanations their doctors give. This leads to confusion in comprehending the cause of their illness. I then discuss the journey patients and their families go through as the disease progresses. Patients experience the severe impact of melioidosis in different ways. They try to rationalise their doctors' advice in relation to their experiences, which are entangled with the political economy of rice cultivation and the lifestyle of the people of *Isan*. This region, according to the World Bank, is the poorest in the country, and was most severely impacted economically, during the COVID-19 pandemic (The World Bank October 2022). I then go on to discuss the questions patients have about the absence of an advocacy or awareness campaign on melioidosis, something they associate the severity of a disease with. These characteristics, I argue, contribute to the enigma of melioidosis.

The puzzle around melioidosis infection

Lom and Jum are from different villages. They have never met each other, but what I learnt from meeting them separately, was that they had similar experiences with melioidosis. They both heard of melioidosis for the first time when they were diagnosed with it, and both made multiple visits to different hospitals before they were treated at Sunpasit Hospital. Both Lom and Jum told me that they tried to make sense of what melioidosis is, as they still could not understand how they got infected with the disease. This troubled them a lot because they wanted to know how they exactly got the disease so that they could protect themselves from future infections. They told me that the explanation their doctors gave them puzzled them. Based on scientific literature, melioidosis infection is described as a result of exposure to bacteria-contaminated soil and water, the presence of which is predominantly in rice fields in the *Isan* region (Hinjoy et al. 2018; Limmathurotsakul et al. 2013; Hantrakun 2019). This dominant narrative is emphasised in the recently published National Melioidosis Guideline, the first one for Thailand, in 2021 (Department of Disease Control 2021). Based on this information, doctors advise patients to avoid spending time in the rice fields unnecessarily or to wear Wellington-style high rubber boots for rice cultivation. These explanations cause more confusion for Lom, who occasionally goes into rice fields, or Jum, who has not been in his paddy fields for years because of his busy work schedule.

Lom

Lom is a scrap dealer who makes a living by riding his motorcycle with a side carriage around his village and neighbouring villages. He buys various kinds of materials, big and small, from houses he visits. These included plastic bottles, utensils, electric goods, and furniture. I first met Lom at his house on a hot Friday afternoon in January 2021. I was with Deer and three VHVs who were responsible for the area. We were on our way back from a temple in an adjacent village where a TB screening activity was due to take place on the following Monday. Mobile TB screening on an X-ray van became an annual activity in the area following the confirmation of a patient with drug-resistant TB two years prior to my fieldwork. Deer told me that they had expected at least four hundred villages to turn up for the event, and the people did. It is a common practice for health workers and VHVs to organize activities calendared by MOPH or those considered a priority for the province, many of which involve health awareness and campaigns. Many such activities were cancelled during COVID-19 and only activities considered a priority, like the TB screening, took place.

Like most villagers in *Isan*, Lom is self-employed. He told me that he generally earned a good income from the resale of plastic bottles and metal products. The fifty-two-year-old man said he occasionally joined his friends for day-paid jobs on construction sites or in rice fields. Casual labour of such a kind is common, and the villagers are incentivised by the convenience of the transportation provided to take them from their village to the field site and back. These activities are not merely considered jobs but are also opportunities for meeting friends and for socialising, Lom explains. During the rice ploughing or harvest seasons, farmers generally gather their relatives and friends to help with the work. These days, rice farming is mediated by technologies for both ploughing and harvesting, so the demand for labour has significantly reduced (Cramb 2020). In some villages, in addition to technologies, friends and families are gathered for the event for a day-or-two, to continue the tradition, Lom says, adding that he enjoyed participating in these activities because they gave him the opportunity to meet and socialise with friends while allowing him to earn some extra income. He usually hears about these activities from his friends, one of whom is a local contractor who usually reaches out to the villagers by word of mouth. Lom told me that this contractor friend generally mobilised friends and associates from different neighbouring villages whenever there was an opportunity.

During our first meeting, Lom looked frail. He told me that he did not go out to collect scrap or join his friends for day-paid jobs for many months because he had melioidosis. He showed me a box full of medicines, saying he had to take medicines for diabetes and melioidosis daily, since the time he was discharged from Sunpasit Hospital three months ago:

I'm still taking these medicines [antibiotics]. I take eight tablets for this disease and one for diabetes, daily. I also take injections for diabetes...so many medicines.

I feel weak.

Due to melioidosis, Lom was hospitalised for several months. He said when he was diagnosed, the doctor also told him that he should not go into rice fields. He said he did not understand how he was the only person in the entire village to be infected when he only occasionally went into rice fields, while others who worked as farmers spent days in the fields but did not contract the disease. I asked him if he had a chance to ask his doctor and his response was:

Usually, I don't ask any questions. Whatever the doctor says, I just listen [giggle].

Lom is a jovial person and often giggled during our conversation. His response was, however, not unexpected. Although not universal, it is common for Thai patients, including my mother, to not ask their doctor any question or clarification they may need, for fear of being perceived as doubting their doctor's views or advice. Acceptance of one's illness is associated with maintaining calm (Cassaniti 2016), a virtue believed in Thai Buddhism. It relates to the belief of karma where the state of one's physical or mental health is embraced as fate, something which is caused as a result of one's past deeds (Ratanakul 1999). Buddhist perspectives have a strong influence on the social and political everyday lives in Thai society (Aulino et al. 2022; Aulino 2020, 2019; Seo 2020, 2016; Stonington 2020; Mérieau 2018; Tonsakulrungruang 2022; Cassaniti 2016; Wijngaarden and Willem 2021; Jory 2021; Keyes 1987). These influences also facilitate the embodiment of hierarchy between the state as a provider and the people as subjects (Aulino 2019), and is propagated through bureaucratic practices and popular media¹⁴

¹⁴ By popular media, I refer to the media which widely appeals to the general public and includes soap operas, songs, movies, and discussions on social media.

which shape the meanings of life, health, illness, disease, and death (Aulino 2019; Stonington 2020; Keyes 1987). The influence of Buddhism in the nation's health system (Wasi 2009; Paonil and Sringernyuang 2002) is also observed in the perception of the state, health workers and volunteers as providers of gifts of health care to the people (Aulino 2019; Seo 2020, 2016), which is further elaborated in Chapter Six.

Lom giggled again and told me that his doctor told him not to go into rice fields, particularly during the rainy season. His doctor's advice sounded unrealistic to me as it rains almost all year round in Ubon, from March to November. I asked him what his impression of his doctor's advice was and he responded:

We live and work this way [under such climatic conditions]. We are repeatedly standing on the soil and in water. When we go into rice fields, we are bound to be standing in the water, on the soil, with cow dung and herbicides, and other chemicals which get accumulated there.

My interpretation of Lom's giggle was a polite response to acknowledging the impracticalities of implementing his doctor's advice in asking him to avoid rice fields. *Isan's* wide geographical area is covered with rice fields, making it the region with the largest rice cultivation area in Thailand (Walker 2012; Turton and Akin 1987; Suebpongsang, Ekasingh, and Cramb 2020; Srisompun 2020). Although *Isan* people's occupation has shifted from predominantly depending on rice cultivation to becoming migrant workers and small-scale business entrepreneurs, rice continues to be central to the local identity, which I will further discuss in the next chapter. Lom attempts to account for how he got infected with melioidosis by associating it with the excessive use of chemicals for farming in the area:

I don't understand this disease. The doctor said it comes from the soil and the water in rice fields. But what is the germ like [what does it cause]? Is it like *chee nu* [leptospirosis] because that is also contracted from going into rice fields? Or is it because of the residue from the chemicals used [pesticides and herbicides]?

In my subsequent meeting with him two months later, Lom seemed full of energy. He told me that his doctor told him that he had completely recovered from melioidosis and that he did

not have to take the antibiotics anymore. He said this meant that he could resume work and get back to his “normal life”. This included collecting scrap, occasionally working in rice fields, and socialising with his friends. Lom however, said he continued to be frustrated because every time he returned to the hospital for a follow-up, his doctor reminded him not to go into rice fields. The doctor told him that he should wear rubber boots if he wanted to be in the rice fields. He explained that this was not possible. He said his friends and neighbours were all engaged in rice cultivation, and they did not understand how he got this disease from being in rice fields when they spent more time in the fields than he did. Rice cultivation for many people in *Isan*, including Lom, is not an occupation. It is a way of life:

Yesterday, I sneaked out to plant some rice once again [giggle]. A vehicle picked us up. I didn’t wear any boots, but I wore socks. Their water was quite clean because they had recently pumped it from a nearby stream. It was clear.

Thirteen of us were there, planting rice. It was fun. It felt like going out for an excursion again. We began at eight in the morning and came back in the evening.

It’s better than staying at home and the pay is good. They paid us three hundred Baht¹⁵ per day. And I get to meet friends and have lunch with them. So, it is fun [giggle]. It is better than staying at home.

I went because I wanted to see if I had the energy to resume work. And I didn’t feel too tired.

Lom rationalised his exposure to chemicals used in agriculture as the cause of melioidosis infection. This enabled him to occasionally resume rice cultivation, while at the same time allowing him to avoid the guilt for not strictly following the advice of his doctor to avoid rice fields. Lom’s justification, I argue, was not an outcome of his intention to challenge what he was told by his doctor, but a response to an explanation that did not match his experiences. Therefore, to make sense of melioidosis, Lom associated it with exposure to chemicals used for farming. Additionally, he rationalises being in rice fields with clear water as being safe from

¹⁵ One UK pound is approximately forty-five Baht.

risks of melioidosis infection. This positive re-ordering of the environment conforms to the idea (Douglas 1966) which associates clear water from the stream water with purity.

Jum

I met Jum and his wife, Su, several times as she is a friend of one of the VHV's. Jum was a migrant worker in Bangkok before moving back to work in Ubon some ten years ago. He drove trucks for a construction company. The forty-seven-year-old man said he had not been in rice fields for years but became seriously ill due to melioidosis in 2019. During that period, he was involved with transporting gravel for a national project related to the expansion of a four-lane highway leading to the border of Laos. This project was initiated in preparation for the transnational economic development which would further facilitate the connections of the two countries across the Mekong River and link Thailand's trade with China. The completion of the highway Jum worked on coincided with the inauguration of the Lao-China highspeed train¹⁶ in 2021, to facilitate the movement of goods between Thailand and China, through Laos. Thailand exports rice and tropical fruit to China while importing agricultural products and cheap consumer products from the country.

One day, in the month leading up to the completion of the highway, Jum developed severe pain in his left leg. He also had a high fever which did not subside. A few days later, he went to a private clinic run by a nurse from the health promotion hospital Deer worked in¹⁷. The nurse prescribed some painkillers and paracetamol, which made him feel better for a couple of days when his fever reduced. However, a few days later, he began to have a severe headache and the swelling on his left leg increased. Su told me that she took him to see many doctors, engaged in different practices, from Western to traditional, spiritual healing, and the use of herbs, both in Ubon and in neighbouring Sisaket province. She said wherever she heard there was a *mor dee* (good doctor), she drove her husband to see them. She took leave from the school she was working at while Jum was sick, to take care of him. Although medical

¹⁶ Between Vientiane, the capital of Lao, and Boten, a small-town bordering China's Kunming city.

¹⁷ In villages extending far from city areas, private practices are generally run by nurses, while in districts closer to the city or provincial capital, they are operated by doctors.

pluralism continues to be practiced in many parts of Thailand, the state's recognition is narrowly placed on what is termed "Thai traditional medicine", which encompasses licensed and accredited use of certain herbs and therapies like Thai traditional massage, while outlawing folk healing practices (Cohen, Lyttleton, and Phatcharanuruk 2022). Jum also visited a "blowing" doctor, whose remedy involves sessions of reciting mantras, while blowing off pain from specific areas, like the leg in Jum's case. Practices performed by blowing doctors are popular in Ubon and other parts of *Isan* but have been discouraged by health authorities. I later learnt from a blowing doctor I met that his profession is passed on through kinship within the family, from one generation to another. Although they are not recognised by the state, they are known to local health officials and VHVs and remain popular among patients. They maintain a low profile and are generally contacted by word of mouth. Their remedies are not perceived to be harmful, and they do not disrupt the work of local health workers, says Deer. Like most villagers and local health workers, the blowing doctor said he had not heard of melioidosis before.

After visiting several places with no improvement in Jum's condition, his daughter drove him to Sunpasit Hospital, some sixty kilometres from their village. Here, he was diagnosed with melioidosis through bacteria culture, which is a standardised diagnosis discussed in Chapter Five. I asked Jum and Su to tell me more about what happened when they first heard of melioidosis:

Su: It was very confusing.

Jum: We never heard of it before. And what the doctor told us is very different from the lifestyle I have. I don't know how I got infected. I still don't understand.

Su: The doctor said that people get infected from rice fields, from staying in the rice fields for a long time. This is completely different from what he does daily. He was in the truck from eight in the morning to five in the evening, so we don't understand how he got the disease. He didn't even take any holiday during that period because the construction work was urgent.

Or did he get infected by smelling or breathing air from the rice fields? (to rationalise the doctor's explanation, Su remarked that it may have been possible for Jum to be infected from the rice fields if the exposure came through drifts of air from the rice fields around their house).

Jum: We have rice fields, but we hire people to scatter the seeds and to harvest. I worked as a driver and not a farmer.... I still don't know how I got infected; I still don't understand.

Both Jum and Su told me that they were still confused about how he developed melioidosis. She said apart from hearing about it for the first time, they were also surprised to learn that this disease generally occurs among rice farmers because many people in their village and other villages in the area are rice farmers, but they had never heard of this disease before:

It seems like this is a new disease. Maybe it's like *chee nu* (leptospirosis)¹⁸ which we have heard about.

Su said she had participated in leptospirosis campaigns organised in the village. Jum found it strange that he contracted the disease without going into the rice fields, while other villagers never had the disease despite spending days in rice fields for many months in a year¹⁹:

Some people spend all day working in the fields and they don't get the disease... They (doctors) told me to be careful and not go into rice fields, but how can I be careful when I don't even do what they are telling me not to. I don't go into rice fields. I don't think that's how I got infected. How then should I protect myself?

Jum tried to rationalise the explanation given to him by the doctor, stating that he suspects he may have contracted melioidosis from the stopovers he made during the gravel transportation trips. During that period, he drove for several hours before making brief stops along the side of the roads for food breaks. He sometimes walked across cassava fields to pick

¹⁸ Leptospirosis is another bacterial disease which affects humans and animals. Most patients get infected with the disease through exposure to the urine of infected rodents. The disease is treatable with antibiotics. Illness symptoms include high fever, headache, chills, muscle aches, diarrhoea, rash and yellow skin and eyes. It can lead to severe illness like kidney or liver failure, or meningitis.

¹⁹ The seasonality and cycle of rice farming is explained in Chapter Two.

up bamboo shoots from the forests along the way. He said the mud puddles contaminated with chemicals used in a cassava plantation may have caused his illness. The use of pesticides and herbicides for agriculture is observed across Thailand, including in *Isan*. An agricultural census carried out every ten years showed that there was a ten percent increase in chemical pesticide use in *Isan* between 2003 to 2013 (National Statistical Office 2014).

Understanding knowledge as relational can help move beyond the assumed dichotomy between objective science and subjective experience when healthcare professionals consider patient experience as a form of evidence (Renedo, Komporozos-Athanasiou, and Marston 2018), but in this case, both Jum and Lom are left to rationalise the contradictions between their experience and the scientific evidence of melioidosis infection on their own. They both raised concerns about the association between melioidosis infection and the use of chemicals in agriculture. Both men first heard of melioidosis when they were diagnosed with the disease. Like Lom, Jum was confused with the explanation given by his doctor about how he contracted melioidosis. Although Lom occasionally went into rice fields, Jum had not been in rice fields for years, and this made it difficult for him to understand how he could have been exposed to the bacteria from rice fields. The sociological imagination of this rumour (association of infection with chemical exposure) allows them to process their understanding within the broader context (Farmer 2006) of situating melioidosis with agriculture. The emergence of melioidosis is possibly imagined through the exacerbated use of chemicals to enhance crop production as an economic stimulus propagated by the state and large agricultural businesses, which is beyond the inquiry this thesis makes.

Knowing melioidosis

Medical technologies have facilitated how melioidosis is known through seeing the microbe (see Chapter Five) and studying the patients' bodies (see Chapters Four and Six). They have demonstrated that patients with melioidosis can be coinfecting with diseases like diabetes (Chantratita et al. 2023) or have multiple simultaneous infections with other diseases like tuberculosis (Rubel et al. 2022) or thalassemia (Chit Yee et al. 2022), which can challenge the institutional capacities of the health services and the intellectual and the technical capacities

of hospitals and clinicians (Livingston 2020). They can also challenge the social, emotional, and existential capacities of patients and relatives (ibid.).

The cost of universal healthcare

Lom's symptoms began with a headache which he thought was caused due to migraine. For about a week, he consumed paracetamol daily, thinking it would relieve his pain, but it did not. The pain spread from the left side of his head down to his left neck, shoulder, and arm. In less than two weeks, he had difficulty lifting his hand. His brother drove him to the nearest health centre where he was registered under the Universal Healthcare Scheme (UHC). They referred him to the district hospital, some thirty kilometres away from the village. He was admitted to the hospital for some days before he was referred to another hospital in a neighbouring district that had more sophisticated medical technology and was closer to the provincial centre. In the first hospital, he was given medicines to relieve his pain and his blood was drawn for some tests. In the second hospital, he was treated as a TB suspect and was made to spend a couple of nights in an isolation room. More blood was drawn, and sputum was taken for further tests. Some days later, he was told that he did not have TB and was transferred to Sunpasit Hospital as they could not figure out the cause of his illness. At Sunpasit Hospital, he was hospitalised for about a month:

Here again, they did many tests. They said it was not a lung infection but was another kind of infection. They told me that I had this disease [melioidosis] and I had diabetes. I never knew I was diabetic.

After spending days moving from one hospital to another, Lom ended up at Sunpasit Hospital, which is about seventy kilometres from his village. Under Thailand's UHC scheme, patients are generally registered with the health promotion hospital nearest to their homes. Depending on their health condition, these facilities decide whether they should be transferred to a secondary or tertiary care hospital. A patient who chooses to walk into another facility without being referred would have to absorb the medical cost in a way similar to what they would do if they visited a private practice. Lom went through the regular process within which healthcare is streamlined under UHC. Bo Kyeong Seo (2016) shows in her

ethnography on Thailand's health care system that people go to public hospitals not out of choice, but because they need to. She says waiting is part of the social fabric of public hospitals in the country. For Lom, his wait to be treated for his ailment extended across different hospitals, which did not come without a financial cost. The financial implications he had to absorb included hiring a pick-up truck with a driver to take him to the hospital when his brother was not available to drive him.

Sticky rice and the Isan diet

Sticky rice is a staple *Isan* diet which is often consumed with papaya salad, spicy pork or beef salads, grilled chicken, and spicy soups. The intense flavours of *Isan* food have made it popular street food across the country, and this has also contributed to the popularity of Thai food internationally. However, in certain spheres, like health care, the prejudice against local foods continues. This reflects the hierarchies and discrimination exercised against the people of *Isan*, while it is locally perceived as ethnic pride (Lefferts 2005). The lifestyle of the people of *Isan* is often associated with poor health and risky food habits (Asavarut et al. 2016; Pylypa 2011).

After over a month's stay in Sunpasit Hospital, Lom was discharged. He had to return to the hospital for a monthly follow-up. During one of these visits, he learnt that he was anaemic²⁰. For these follow-ups, his blood was drawn for tests to check whether the bacteria were still present:

This time I fainted when they drew blood from my arm. Instead of being able to return home, I was hospitalised again for some nights. I was given blood, after which I felt better. In two nights, I got four bags of blood. I don't understand how I got this other disease. My blood sugar level was also very high.

One day, in the hospital, when I was eating sticky rice, a nurse saw me. After I finished my food, she came up to me and measured my blood sugar levels. She

²⁰ A condition caused by low levels of red blood cells which causes fatigue.

said it went up by fifty, it came up to a hundred and forty²¹. She said it was because of sticky rice and that I shouldn't eat sticky rice. I don't think it's because of sticky rice, I've been eating it all my life.

Sticky rice is a staple *Isan* diet widely consumed across Thailand. It is believed to be a risk factor for worsening the health of diabetes patients because of its high glycaemic index²² and health workers often advise the people in *Isan* to reduce its consumption (Sranacharoenpong and Hanning 2011). It is, however, also used to discriminate against the people of *Isan* who are often told to consume less sticky rice to control their blood sugar levels (Lefferts 2005; Numsang et al. 2023) but are not advised against consuming refined sugar or other foods or drinks with high sugar content.

The painful melioidosis experiences

Jum stayed in Sunpasit Hospital for several months, multiple times between 2019 and 2021, after his wife took him to different kinds of practitioners. On the first visit, he was hospitalised for five days, where he received a leg scan and was diagnosed with diabetes. After receiving some medication, his fever subsided, but his leg pain lingered. He was discharged and was asked to return to the hospital after ten days for a leg operation. The doctor told him that they needed to remove excess fluids from his knee which caused the swelling. In the second round of hospitalisation ten days later, he learnt that he had melioidosis. He then spent two months in the hospital, said his wife Su:

It [melioidosis] ate into his muscles and bones. The doctor said they couldn't do anything with the leg until his fever came down. They had to deal with melioidosis and high blood sugar first, before operating on the leg. He also had a blood infection.

Melioidosis is enacted in multiple ways with and without other diseases. In the hospital, when the treatment of a patient like Lom is challenged by coinfections and multiple infections, a

²¹ The normal range of blood sugar level is between 100 to 125 mg/dl.

²² A rating system for food containing carbohydrates affects one's blood sugar level.

hierarchy is established through coordination (Mol 2002), which prioritises the treatment for melioidosis, Jum explained:

I almost didn't survive. I didn't know what was happening around me. The pain was so severe that I didn't know what was going on. I didn't even realize when they operated on my leg.

In two years, Jum underwent three knee and leg operations. He said he almost died. He said it was as if melioidosis had 'eaten into' his bones. He emphasised that the pain was extremely severe, and because of that, he was on strong medication which made him drowsy all the time. He said he did not even realize when he had the knee operations and found out about them days later. Su said he often randomly spoke in his sleep, before he regained consciousness, which was after almost a month.

UHC does not come for free in Thailand. Both Lom and Jum went through visits to multiple hospitals where they undertook several diagnoses before they were confirmed and treated for melioidosis. The disease transcends into the bodies of patients and expresses itself in multiple ways (Mol 2002), as experienced differently by Lom and Jum. It caused them severe pain and suffering, and they almost lost their lives.

A scary disease

Like Lom and Jum, other melioidosis patients I met said they had dreadful experiences with melioidosis. All of them spent at least a month in the hospital, with several days in intensive care. In some interviews, including with Jum and Su, I was shown photographs they took on their mobile phones. These photographs brought back memories and reminded them of the unpleasant and fearful experiences they went through. They raised questions about why there was no public information on a disease so severe. They associate the severity of a disease with active public health response, which they say, has significantly been missing for melioidosis. They want to know why there has been no public awareness of melioidosis. Based on their understanding and experience, the MOPH often proactively communicated and

raised awareness of significant health threats people face but this has not been the case for melioidosis.

Experiencing a severe disease in isolation

In one of our meetings, Su showed me some photographs on her mobile phone. She said she wanted me to see how severe this disease was so that it would give me a sense of what they went through. While slowly swiping her mobile phone, she described every image to me. A few images were disturbing. They were of the open wound on Jum's knee which vividly displayed red and white muscles and the tendons of his bones. She told me that his doctor said he had to be treated for melioidosis first before they could operate on his knee, so the wound was left open for some time. When we got to a photograph of two hands holding each other as shown in Figure 3, she shyly giggled and said she had taken these photographs to show him how much she cared and what it was like when he was hospitalised. This was because he was not conscious enough to know what the family was going through. She elaborated that they thought they would lose him. She said Jum lost a lot of weight in the first two months of hospitalisation. She said he was poorly during most of his stay in the hospital:

It was very scary. It must have been very painful for him. They (the nurses) had to sometimes tie his hands to the bed because he wanted to touch his open wound without realising. He was drowsy most of the time.



Figure 3: Su holding her mobile phone.

She was showing me a photograph of her holding her husband Jum's hand when he was critically ill and treated at Sunpasit Hospital. Photo: Author.

Jum added that the fear of melioidosis infection continued to haunt him. It also kept him thinking about how he got infected in the first place. He said he wanted to avoid getting the disease again because he did not want to repeat the painful experience, but did not know how:

I'm still very afraid of it. The pain was very bad. The painkillers I got in the hospital were not effective. The only drug that worked was morphine.

Lom also said he was afraid of getting melioidosis again:

I'm afraid of it. I don't know about this disease at all. When the doctor mentioned it, I thought it was a new disease, but it's not. I later met other people with the disease. But not many know about it. I don't even know its name. It seems like an old disease, but many people don't know about it.

The photographs Su showed me gave me a sense of how severe melioidosis is and what it did to Jum. It also made visible the care and concerns she had, particularly when she discussed the time she spent by his bedside in the hospital. After showing me pictures, she proactively

shared them with me through Line, a social media application widely used in Thailand. She said she wanted other people to see what melioidosis could do to a patient. It made me realised that this was her way of sharing her social experiences of melioidosis with me, with the hope that I would be able to share it with others, including the health workers and VHVs other than those who accompanied me during the interview. She made melioidosis visible to me through the stories she shared and the photographs. I also learnt about melioidosis from Lom's experience. By referring to melioidosis as a disease he did not know, Lom said it reflects how scary it was for him.

Meeting other patients

Jum and other melioidosis patients I interviewed thought they were the only people suffering from what they referred to as a "rare" disease. They said it was rare because they had not heard of it before their diagnosis, and because they had never met another person with the disease. None of the 19 melioidosis patients I met who were from different villages in the same sub-district knew each other. Lom got to meet other melioidosis patients when he returned to Sunpasit Hospital for follow-up:

I didn't know there were so many people with this strange disease. I thought I was the only one.

Lom coincidentally found out that there were other melioidosis patients treated in the same ward in Sunpasit Hospital when he moved from the intensive care unit to a male infectious disease ward during his first round of hospitalisation. He said there were four or five other patients, but they did not get to meet or speak with each other. In subsequent visits to the hospital for follow-up, Lom came across some melioidosis patients. On the other hand, other melioidosis patients I met, including Jum, had not met other melioidosis patients and were still under the impression that they were the only people with this "rare" disease.

Anthropological studies have demonstrated the values associated with community support in drawing attention to both a disease and the group members (Nguyen 2010; Dumes 2020; Bradley 2021; Biehl 2007; Epstein 1996). They have demonstrated how community groups for

different illnesses have experienced different forms of political and public attention. For instance, among people with AIDS (Nguyen 2010; Biehl 2007), or those who experience Lyme disease as a contested illness (Dumes 2020), or mental health disorders like body-focused repetitive behaviours²³ which are poorly understood (Bradley 2021). Vinh-Kim Nguyen (2010) demonstrates the importance of activism as a tool for political engagement for access to AIDS treatment, while Bridget Bradley (2021) refers to community activism as biosolidarity which facilitates the visibility of the illness group and the illness itself. Abigail Dumes (2020) shows how legitimacy was given to Lyme disease through the vocalisation of patients' experiences through their support groups. The absence of a collective experience has significantly contributed to the confusion melioidosis patients face in making sense of the disease. This contributes to the enigma of melioidosis.

Why is there no campaign?

In the interviews I had with melioidosis patients and local health workers, the issue related to the absence of news, public information, health education, advocacy, and campaigns for melioidosis kept emerging in our discussions. These conversations came up not only in relation to the COVID-19 pandemic experienced during that time, but also in relation to other public health activities like the TB screening which I mentioned at the beginning of the chapter, or awareness campaigns for dengue or leptospirosis. Both leptospirosis and dengue are endemic in Ubon and their campaigns have been observed for several years. Melioidosis researchers also argued that despite underreporting, melioidosis causes more deaths than dengue and leptospirosis (Hantrakun et al. 2019; Hinjoy et al. 2018).

A disease with a foreign name

Both dengue and leptospirosis have Thai names, making it easier for patients to relate to them. Lom told me that he did not speak to his neighbours about it, not because he was afraid

²³ BFRB involves repetitive behaviours like hair pulling, skin picking and nail-biting.

of being stigmatised, but because he felt that he did not know or understand the disease which impacted him. He said he would not know what answers to provide if they asked him questions because he did not have much information about it. He said the information provided by his doctor was confusing and if he asked his doctor a question, he may become even more confused, or be perceived as not trusting what the doctor told him. I noticed that Lom was not comfortable referring to the name of the disease. During our conversations, he kept referring to it as *rok ni* (this disease) and emphasised that he was not comfortable with even saying its name. To him, it was a foreign name that was not only difficult to pronounce but also had no reference to the local illness category or aetiology (Nichter and Nichter 1996).

Comprehensible words or names of diseases that are associated with the symptoms, or the causes can bridge patients' understandings, making it easier for them to remember. This recognition can also lead to new inquiries and new domains of knowledge (Hacking 1975). Dengue is endemic in most parts of Thailand and regular campaigns are carried out locally involving the whole community from local politicians, businesses, and students, to health workers and volunteers. Dengue is referred to as *khai luead oak*, which is literally translated as 'bleeding fever'. Leptospirosis is called *chee nu*, which is translated as rat urine. Exposure to the urine of rats contaminated with the bacteria from rice fields is often heard in public health campaigns in rural communities. Bird flu is referred to as *khaiwad nok*, which literally translates as bird flu, the outbreak of which impacted Thailand's poultry trade and resulted in structural changes in poultry farming, affecting small-scale farmers most because of the elevated biosecurity measures required for farming.

This silence surrounding melioidosis elevates patients' confusion about the disease, especially in relation to the COVID-19 pandemic:

Lom: What's scarier, this disease [melioidosis] or COVID?

Luck²⁴: I don't know. What do you think?

²⁴ This is my nickname. In Thailand we use nicknames in everyday conversations while proper names are often used for formal occasions.

Lom: Honestly, I'm not afraid of COVID. I know it's everywhere in the media and everyone is talking about it these days, but I'm more afraid of this disease [melioidosis] because I had it...I still don't know how I got it...

It was so bad, I almost died...

I'm still confused about what disease this is. Is it a new disease like COVID? I had not heard of it before. I can't even say its name...

In a conversation with Jum, he declared that he felt that melioidosis was much scarier than COVID-19 and hoped there was some form of awareness in the local community because he did not think other villagers had heard of the disease:

It's a very scary disease. But the villagers don't know about it. These days we only hear of COVID. We haven't seen anyone in the village infected with COVID, but we hear so much about it, that it is scary. It's in the news every day.

The value of health campaigns

People in *Isan* are familiar with public announcements and community-level health campaigns as the lifestyle in the region is perceived to be associated with poor health which requires government intervention (Asavarut et al. 2016; Pylypa 2011). I learnt from my interlocutors that significant levels of engagement and participation in government-sponsored activities are due to the festive approach and ambiance in which these activities take place. Leptospirosis is endemic in *Isan* and rice farmers are asked to wear rubber boots in rice fields to avoid infection. Public health responses to diseases like this are usually marked with ceremonial media briefings which provide information on the latest situation and protection measures. These briefings are accompanied by the distribution of posters and leaflets through the media, hospitals, and VHVs. Campaigns are also observed through multiple platforms, including on television, radio, social media and in the communities. Community level activities include the broadcast of public announcements through community radios and in the temples and markets. They are celebrated with loud campaign jingles and music which is played for several days, providing a festive ambience to draw the attention of the villagers. Community members

are encouraged to participate in campaigns, and events which include songs, dances and competitions with ceremonious inaugurations made by local politicians and senior health officials. Although these campaigns make people public health subjects or what anthropologists term 'citizens' (Petryna 2002; Rose and Novas 2007; Lock and Nguyen 2018; Nguyen 2010), my interlocutors told me that it was important for them, as it gave them a sense of belonging (Harper 2014). It symbolised the government's acknowledgement of diseases that impact their health. With the absence of a public campaign or community support group, I argue that melioidosis patients are left to reason about the cause of infection and experience the disease in isolation. They are left to rationalise how their severe illness experience can be matched with the lack of information on melioidosis on their own.

Conclusion

Melioidosis is a debilitating disease that afflicts patients and their families in many ways (Das 2015). Patients and their families are left to experience the severe illness and the confusion surrounding its causes, in isolation. The experiences patients have with melioidosis begins with the multiple visits they make to different hospitals before they are diagnosed with the disease. It leads to multiple months of treatment, usually with coinfection or multiple infections with other diseases and long treatment periods before they are discharged from the hospital. They also must consume antibiotics for months before they are completely recovered from the disease. The agony resulting from melioidosis infection fuses into the everyday lives of the patients. The disease is known through remembering the fear and pain caused by the disease. Many patients thought they were the only people with a rare disease. Collective experiences, which can be created through the availability of public information or activism (Treichler 1999) are absent for melioidosis. Patients are made to rationalise their understanding of the disease on their own.

This chapter has shown the confusion patients go through when they are told of their melioidosis infection, which is also the first time they hear of the disease. Patients are left to wonder why they have never heard of melioidosis before and why have the health authorities not been forthcoming in providing information about it. They find it difficult to comprehend

the explanation their doctors give about the cause of infection but do not want to question them for fear of being perceived as disrespectful. Patients like Lom and Jum try to rationalise the cause of the disease with their experiences by distancing it from rice fields and rice cultivation. They associate it with excessive chemical use in agriculture to make sense of melioidosis. Making sense involves knowing the disease through engaging the mind and the body, through understanding and feeling it (Scheper-Hughes and Lock 1987). It also involves embodied exposure through everyday life, which is repeatedly reinforced (Nichter 2008) through hearing, seeing, or engaging with it. This illness is made knowable to patients in ways that are different from the information they receive from their doctors.

Melioidosis remains enigmatic to patients who continue to be confused about how they became infected with it. The absence of a health campaign contributes to this enigma, and because of this absence of widely available information on the disease, patients like Lom are discouraged from talking about it due to fear of further confusion. Since such health campaigns give people a sense of belonging, their absence further exacerbates the isolated feeling among melioidosis patients, many of whom continue to think they are the only people to experience what they refer to as a “rare disease”. Additionally, since melioidosis patients associate disease severity with public health advocacy, its absence raises the question of whether melioidosis is a serious disease or not. These questions and concerns of melioidosis patients have contributed to their isolated experience with melioidosis.

In the next chapter, I will discuss the importance of rice to Thai society, economy, politics, and ideology. Thailand is internationally renowned for being a leading exporter of one of the finest qualities of aromatic rice. In the chapter, I try to make sense of why, despite scientific evidence that BP bacteria thrives in rice fields and most melioidosis patients are rice farmers, there is little public communication or discussion about melioidosis in relation to the broader rice production policies and practices in the country.

Chapter 2: Of rice cultivation and melioidosis infection

What kind of disease is it? I don't know...

I haven't heard anybody talk about it...

- Aunty Som, March 2021

In the previous chapter, I discussed the confusion melioidosis patients go through when they are informed by their doctors of their melioidosis infection following exposure to bacteria in rice fields. Patients try to rationalise their infections by distancing melioidosis from rice fields and rice cultivation as it goes against their experiences. The previous chapter demonstrated that lack of public health activity on melioidosis leads to confusion, leaving patients and their family caregivers to experience melioidosis in isolation. It also leaves local health workers confused as to why there was no public health activity on the disease. Rice and rice cultivation are salient to the nation's culture, politics, and economy, but melioidosis, a disease caused by the bacteria that thrive in rice fields, seems to be neglected by national authorities. Thailand is one of the countries affected by melioidosis which is endemic in *Isan*, and despite causing high fatalities among patients, it is not heard of among rice farmers and most *Isan* residents.

Some association between melioidosis infection and rice cultivation is acknowledged in public health, including in the national disease surveillance records which document rice farmers as the group with the highest melioidosis incidents (Epidemiology, Hinjoy et al., 2018). The association between melioidosis infection and rice cultivation is also made in the advice doctors give melioidosis patients to avoid going into rice fields, which was discussed in the previous chapter. Decades of medical research, complemented with environmental research on melioidosis in Thailand associate its risks with daily lifestyle of rice farmers (Limmathurotsakul et al., 2013), including framing melioidosis risks in relation to occupational exposure (Suputtamongkol et al., 1999, Suputtamongkol et al., 1994). A study shows that melioidosis is also a major cause of community-acquired sepsis in northeast Thailand (Hantrakun et al., 2018) and that the microbe is spread out over large areas in the

environment (Hinjoy et al., 2018, Limmathurotsakul et al., 2013, Hantrakun, 2019). Environmental tests show that the bacteria thrives in wetlands (Chuah et al., 2017), especially in rice paddies with low soil nutrients (Hantrakun et al., 2016).

While the low-nutrient soil in rice fields is ideal for the survival of melioidosis-causing bacteria, these less fertile lands with low nutrients in *Isan* are conducive to producing the aromatic *Hom Mali* or Thai Jasmine rice (Vanavichit et al., 2018). The soil in *Isan* is generally sandy and not considered ideal for agriculture, but rice fields are spread out in large geographical areas, making the region the country's largest rice cultivation area (Walker, 2012, Turton and Akin, 1987, Suebpongsang et al., 2020, Srisompun, 2020). A study by Vanavichit et al. (2018) shows that a variety of Thai Jasmine rice whose plantation was promoted since the late 1950s is ideal for cultivation in the region as it has capacities to tolerate droughts, flash floods, and resistance to plant bacteria and insects.

Despite epidemiological data indicating linkages between exposure of the microbe in rice fields and melioidosis infection, many farmers I met during my fieldwork in Ubon, including Aunty Som whom I quote at the beginning of this chapter, had never heard of the disease. How is it that melioidosis has been significantly absent from key government policies on public health and rice cultivation until recently? This absence contrasts with the social, economic, and political recognition of rice cultivation, consumption, and export in the country. Some years ago, I had an opportunity to ask a senior official why there was no public information on melioidosis in Thailand. He explained that since little could be done to eradicate the risk of melioidosis, they opt to respond to the disease by focusing on raising awareness among patients identified with melioidosis or those with the highest risk of infection. He admitted that raising its visibility could result in unnecessary fear or concerns about the disease which may extend beyond the high-risk groups. He said they wanted to focus on the awareness among rice farming communities living in endemic areas of *Isan*, who had underlying health conditions like diabetes, activities related to which I will elaborate in the next chapter. According to him, although BP microbe does not contaminate rice grains, broadcasting information about melioidosis could lead to misunderstandings which impact Thailand's rice trade and tourism in a similar manner to what bird flu caused to the country's poultry export. During my fieldwork, I tried to further explore the reaction of this senior officer. Whenever I brought the issue up in a question in conversations or interviews, I notice a discomfort in

associating melioidosis with rice cultivation among my interlocutors, be it policymakers, public health officials, melioidosis researchers, patients, or rice farmers. As I explore the importance of rice cultivation to Thai culture, society, economy, and politics, it became clearer as to why discussions and responses on melioidosis have publicly been absent from policies, including in public health.

This chapter discusses the fragile alliance between rice cultivation and melioidosis. It reviews what rice is and what this contested space means in the sense of who should benefit from rice cultivation and how rice cultivation and melioidosis infection should be farmed. The argument I make in this chapter is that the linkages between rice cultivation and melioidosis are fragile and for this reason, discussions about melioidosis infection and rice cultivation have been abstracted from the broader discussion on the importance of rice to the Thai culture and society. The hypothesis I make in this chapter is that *barami*, a form of Thai social capital, may have influenced this absence and that the government may have deployed what Lindsay McGoey (2019) terms “strategic ignorance” as a measure to avoid liability.

What makes rice cultivation so important to Thai society? How can this importance explain the largely absent information on melioidosis outside health facilities? How is it that a serious disease like melioidosis which is endemic in *Isan*, and mainly impacts rice farmers, has practically been absent from Thailand’s policies and programmes related to rice or farming? In what follows, I demonstrate the importance of rice and farming to Thai culture and political economy. I discuss the intrinsic composition of rice in contemporary life by presenting some notable rituals that foster social and power relations between the monarchy, the government, and the people. Here I demonstrate the connections between humans with non-humans, the living with the dead, the spirits and nature through rice rituals. I then discuss the economic significance of rice, demonstrating its contribution to Thailand’s growth as a prominent international supplier of the cereal. After that, I turn to discuss how rice became central to the nation’s politics. Through these discussions, I share my assumptions on what I rationalise as one of the possible reasons for the narrowly focused public health responses to melioidosis which is deliberated in the next chapter.

Rice as a cultural identity

Khao or rice also means food in Thai. It is a staple in the Thai diet and is generally consumed in three main daily meals. The significance of rice, however, extends beyond its properties as a staple diet. Rice sustains Thai society and fosters social relations. It represents life (Suebpongsang et al., 2020, Singanusong and Mingyai, 2019), and has been part of the Thai identity (Siriwan, 2015), symbolising prosperity and wealth (Saiyasak, 2006). Its importance is revealed through grand ceremonies, rites and rituals carried out as a tradition from historical to contemporary times (Sujachaya, 2013, Siriwan, 2015).

Rice and self

There is something special about *Isan's* sticky or glutenous rice. The newly harvested cereal is more aromatic and presents a distinct flavour compared to other rice I have eaten in Thailand or anywhere else. When Auntie Som opened the lid of the bamboo container and peeled the thin white muslin cloth to remove some sticky rice she cooked, placing it on a plate for me, I could sense the aroma of freshly cooked rice drifting in her wide kitchen space. It made me hungry. "It smells so good," I remarked. She responded with a slight smile and said, "eat lots". After taking the first bite, I told her that the sticky rice in Ubon was the best I had eaten. I meant it. She smiled again, saying "Because it's new rice...we only eat new and fresh rice here". A regular meal in a Thai household is not complete without rice. Sticky rice is a staple food in *Isan* and symbolizes the *Isan* identity.

Auntie Som is in her early eighties. She is from an influential family in the area. Her father was the village headman and her younger sister used to head the sub-district health centre²⁵ where her niece currently works. She migrated to Bangkok to work as a cook in a hotel from the 1970s until her retirement about two decades ago. During that period, *Isan* rice farming communities faced difficulties with low prices for their agricultural produce. This placed them in deeper debt, forcing them to migrate to work in Bangkok and overseas (Baker and

²⁵ Health centres were formally upgraded to health promotion hospitals in 2009 with the objective of bringing health services closer to local communities. The idea was to have the HPH staffed with at least one doctor, but several facilities, including in *Isan* are not managed by doctors and continue to be run by public health officials or nurses.

Phongpaichit, 2009, Kaewwongyai, 2021). After retirement, Aunty Som returned to resume rice cultivation. She lives with her sister and niece, who hosted me during my fieldwork in the area. When based there, I followed Deer and some VHV²⁶ around, observing their daily activities at the health centre and during their visits to patients' homes. I also participated in their community outreach activities, like the tuberculosis screening discussed in Chapter One. During the first few days of my stay, Aunty Som seemed reserved and spoke very little. I had to prompt her with questions to initiate conversations. She became more open towards me as the days went by. Similarly, my other interlocutors spoke very little in our first meetings and opened up more with familiarity. This made me realize how fortunate I was to be able to interact with them in person despite the COVID-19 pandemic lockdown.



Figure 4: Aunty Som in her kitchen.

Straight to the centre of the photograph is the family rice barn which stocked newly harvested rice for daily consumption.

Photo: Author.

²⁶ Village health volunteers.

Upon returning home in the evening, the first question Aunty Som and her sister asked me was “*Kin khao rue yung*” (have you eaten (rice)?). This phrase is a form of everyday greeting and the synonymised reference to rice signifies its importance in Thai culture. It is used in the everyday language as a collective cultural identity (Berno et al., 2019). Being Thai is connected in various ways through conversations related to rice (Siriwan, 2015) and the material and knowledge exchanges that take place over temporalities (Biggs, 2015) and spaces. As I have demonstrated from my personal experiences, the sensory incitement of the aroma of cooked glutinous rice initiated conversations between Aunty Som and me, allowing me to gain more knowledge about sticky rice and to strengthen our social interactions and foster relations.

Most of my time spent at home was in the spacious kitchen area (shown in Figure 4), accompanying Aunty Som. I tried to assist her where I could. We discussed food and engaged in its preparation. We frequently went out for evening walks to her fields, which are a short distance from their home. Aunty Som told me that the field and her house were on one piece of land until the government’s expropriation for the construction of a road in their village which led to the main highway. This separated their land into several plots. She always carried two bamboo baskets along during those walks and filled them with vegetables, fruits, and fish on our return.

When I got home one evening, I saw several large trays filled with fruits and vegetables placed on the floor of the kitchen. Aunty Som had already been to the field to collect fruits and vegetables to prepare for *Boon Khao Ji* (merits of grilled sticky rice) celebration. She made an appointment with the chief monk of the temple she frequented, which was a requirement introduced during COVID-19 as they limited the number of visitors at the temple. Rice rituals are celebrated across Thailand as it entangles the past with the present, the living with the non-living, and the hierarchy that exists in Thai society. Thailand’s rice rituals are marked by ceremonies carried out from local to national levels, by varying social groups involving farming communities, government officials and the monarchy. These rituals demonstrate the values of seniority, communality, and religion in Thai society (Siriwan, 2015).

Isan rice rituals

Boon Khao Ji is one of the several commonly observed rice rituals in *Isan* which evolved around the worship of nature and spirits or guardians of rice fields and rice barns. Rituals are performed to express gratitude and respect for rice yields and to pass on the blessings or merits to the deceased ancestors and other family members. Preparations and performances for *Boon Khao Ji*, which is generally celebrated in February, are different in different ethnic communities of *Isan*. For instance, some communities worship rice stalks while others organize a big pile of rice for the ceremony. On the day of the ceremony, men walk from the community to the rice fields, making a loud noise by hitting a zinc bucket to drive evil spirits away from the community. Monks and other community members gather in front of the area where the objects of worship such as rice stalks or a pile of rice grains are placed to perform prayers. After that, monks bless the rice stalks and the rice pile by sprinkling holy water. These rituals also maintain relations between farmers and Buddhist monks in the temples who are important to the Thai ideology (Santhikaro, 2021). After the ceremony, the villagers celebrate by eating grilled glutinous rice with liquor. The dried rice stalks or rice grains from the pile are taken back to the rice barn where they are safely kept and taken to the temple for another ceremony before the planting season in May. In November and December, another rice-related ritual is performed after harvest. However, due to COVID-19, Aunty Som and the other villagers in her community had to limit their celebration to making merits through prayers in the temple where they offered alms to the monks (see Figure 5).

Rice rituals are seasonally performed as an expression of respect for the dead and the living. They socially connect those who are alive with their deceased ancestors, the spirits, and ghosts in the villages and in the rice fields (Phonkaewket, 2022). This ceremony involves prayers and food offerings for the monks in the temples to thank the ancestors, ghosts, and guardians for protecting the rice fields and for blessing them with the yields (Santhikaro, 2021). Embodied worship of ghosts and spirits like the rice guardian is considered valuable for maintaining the local cultural capital for the *Isan* people (Limwongse, 2023).



Figure 5: Temple visit.

Some members of the community sit and wait while monks receive alms or food as offering at a temple in Ubon. Photo: Author.

Worship of Goddess Phosop

Goddess Phosop is one of the most significant figures in the rice-beckoning ceremony celebrated across the country. It is believed that she brings prosperity and yields to rice fields. She is based on a Thai legend that tells the story of an ill-treated goddess who retreated from humankind into the woods because she was mistreated. Her sufferings negatively influence rice harvests, but she is also believed to bring prosperity to the community if she is made happy. Her worship connects rice farmers with nature, to the land, the soil, and the water, thus emphasising the relations between the security of rice farmers, spirituality, and nature (Siriwan, 2015). The ceremony is performed in rice fields where farmers give flowers, coconut, boiled eggs, Thai desserts, a comb, a mirror, and cosmetics like face powder as offerings to a doll made of rice stalks. This ceremony takes place when rice is transferred from the fields into the barns.

Royal rice ritual

The royal rice ploughing ceremony (see Figure 6) is a significant morale-boosting strategy for rice farmers which is performed by the royal court to foster relations between the monarchy, the government, and the people. The ceremony involves forecasting the weather, which is essential for cultivating rice, and the prosperity of crop yields, and the nation. As shown in Figure 6, it takes place in May in front of the Grand Palace in Bangkok to mark the start of the rice cultivation season. The day was declared a National Farmer's Day in 1966 and has since been celebrated as a national holiday (Now, 2023). Influenced by Brahman tradition, the ceremony is performed elaborately with loud traditional Thai music and royal costumes. The procession involves a series of rituals, which last for about half an hour and are participated by senior ranking civil servants and government officials, witnessed by members of the royal family and the public. The ceremony begins with the ploughing lord scattering rice seeds into the soil. Officials dressed in red guide two groomed oxen pulling a wooden plough attached to them to portray that rice is being ploughed into the soil. Then, the oxen are given liquor, water, and some grains like rice, beans, maize, sesame seeds, and hay to choose from. Based on what they eat or drink, a forecast is made on the nation's weather and economic prosperity. After the ceremony, people rush to pick up rice grains which are taken home for worship or use in their rice fields.



Figure 6: Royal rice ceremony.

From top left to bottom right, the images from the 2023 rice ploughing ceremony shows (1) The ploughing lord scatter rice seeds, (2) The oxen picking up grains and drinks, from which the nation's prosperity is forecasted, (3) People picking rice seeds, and (4) rice seeds displayed in a person's palm. Photo: Bangkok Post.

Thailand is a ritualised state where ceremonies are performed to demonstrate and maintain power and prestige between the monarchy, the government, and the subjects (Pinthongvijayakul, 2018). Although the nation's rice culture and significance are declining, rituals continue to be observed in different parts of the country as a construct of the identity that unites farming communities as children and grandchildren of rice fields (Siriwan, 2015). With the significance of rice to the Thai culture and the challenges posed in making rice fields safe for farming, what can the government do when the microbe is dispersed in the environment, particularly in rice fields? Thailand's melioidosis experts Direk Limmathurotsakul et al. (2013) say, there is every reason to look for solutions to prevent melioidosis among people living in and visiting melioidosis endemic areas. Their study shows that although melioidosis infection is potentially preventable, prevention strategies are

hampered by a lack of evidence on which can be used as a basis to advocate for melioidosis prevention. They identified several activities associated with an increased risk of developing melioidosis. These include working in rice fields, and other activities like exposure to soil or water with an open wound, eating food contaminated with soil or dust, drinking untreated water, outdoor exposure to rain, water, inhalation, and smoking or steroid intake. Joon Chuah et al. (2017) argue for health safety education for vulnerable farmers, adding that the high prevalence of water in rice fields in rural agricultural areas of Thailand is indicative of the inherent vulnerability of farmers. Their study shows a high prevalence of BP in wetlands of the *Isan* rice cultivation area, which is discussed in the last section.

Thailand's rice economy

Rice made Thailand significant globally as a top exporter of the finest qualities of the cereal. Thai Jasmine rice is renowned for its soft texture and aromatic fragrance exhibited during the cooking process (Vanavichit et al., 2018). Thailand annually exports over seven million tonnes of rice, mainly to China, South Africa, the United States and countries in the Middle East (Thaicharoen, 2023). Although export earnings from the rice trade are low compared to other agricultural products like rubber or earnings from the industrial sector (Imahashi and Phoonphongphiphat, 2022, Suebpongsang et al., 2020), nearly forty percent of the population works in the agricultural sector, of which seventy percent are in rice production (Napasintuwong, 2019). Thai farmers have been encouraged to plant rice since the early twentieth century. During that period, the rulers distributed seeds and organised contests to promote rice production.

Thailand began exporting rice in 1851, mainly to China and the British Malay Peninsula. In the early years of Thailand's rice export, it was independently managed by Chinese millers settled in the country. The government took over exclusive rights to exporting Thai rice after establishing the Thai Rice Company in 1946-1954 (Siamwalla, 1975, Baker and Phongpaichit, 2009). The explanation the government gave for taking over was that rice is considered the backbone of the people (Baker and Phongpaichit, 2009). The country's export market significantly expanded after signing the Bowring Treaty with Britain in 1856 (Siamwalla, 1975)

and the empire facilitated the establishment of the first rice research centre²⁷ in the country in 1961 (Napasintuwong, 2018).

Commercialisation of Thai rice

Commercialisation of rice was observed from the 1970s onwards with significant shifts from cultivation for household consumption to cultivation for domestic and international markets (Suebpongsang *et al.*, 2020). Since then, Thailand has become a rice-surplus country (Cramb, 2020). Thailand's rice trade was facilitated by urbanisation of rural areas through construction of roads, expansion of agricultural land, and extension of electricity to the provincial areas (Walker, 2012, Turton and Akin, 1987). This development significantly benefited *Isan* because of the region's vast rice cultivation area (Walker, 2012, Turton and Akin, 1987, Suebpongsang *et al.*, 2020, Srisompun, 2020). During that period, rice cultivation was the main source of livelihood for *Isan* farmers. The government promoted rice production and sales, including through the establishment of marketing cooperatives, and interventions on rice export tax (Kramol and Ekasingh, 2020). The first price support policy was established in 1976, which was converted into a rice buffer stock scheme in 1981 and a paddy mortgage programme in 1983, to raise farm-gate paddy prices (*ibid.*). Aggressive government interventions, including the use of public warehouses to store paddy stock introduced between 2011 and 2014, also referred to as the "rice pledging scheme", led to the accumulation of record stock which resulted in the collapse of the programme and the overthrow of the government, which I further elaborate in the next section.

Isan's development came with an increase in debt for rice farmers who had to continuously invest in quality rice seeds, fertilizers, pesticides, and other farming equipment (Napasintuwong, 2019). A census on agriculture carried out every ten years showed over a ten percent increase in household consumption of pesticides in *Isan* between 2003-2013, and debts among farming households rose by fifty percent during the period (Office, 2014).

²⁷ The Rangsit Canal Experiment Station was established in 1961. It was renamed the National Center for Genetic Engineering and Biotechnology in 2003. In 1960, Thailand began partnering with the International Rice Research Institute (IRRI) established by the Rockefeller Foundation, to improve the quality of rice in Asia.

Excessive use of pesticides and herbicides in agriculture may have also facilitated the growth of melioidosis-causing microbes. A study shows that repeated use of herbicides can lead to an abundance of gram-negative bacteria, including those from the *Burkholderia* family in the soil (Lancaster et al., 2010). A systematic review of intensified food production and correlated health risks in the Mekong subregion confirms that there is evidence of the correlation between agricultural intensification and biodiversity loss which can influence the emergence of diseases like melioidosis in the Mekong region (Richter et al., 2015).

Rice tourism

Thailand takes pride in its rice identity, which has also been used by the government to promote tourism nationally and internationally. In recent decades, the Tourism Authority of Thailand (TAT) took advantage of the Thai rice culture to launch campaigns associating the Thai heritage through food and lifestyle. They promoted exotic flavours and varieties of Thai cuisines with slogans portraying Thailand as the “kitchen of the world” as part of the “Amazing Thailand” campaign. These campaigns link tourism with domestic and international trade of rice, fruit, and other food products. In 2015, tourism in Thailand was elevated to enhance “the food experience” with the launch of the “Discover Thainess” campaign. This initiative encouraged the business sector to include the “cultural significance” of food preparations in the form of cooking classes as part of tourism (Thailand, 2017a). In 2018, the “Thainess experience” campaign highlighted “the unique Thai local experience” (Thailand, 2017b) which includes “home stays” or living with local families in the countryside. These campaigns included cycling and walking along rice fields, and visiting temples and markets, as part of agrotourism (TAT, 2018). These campaigns can contribute to fulfilling the desire for authentic experiences of agriculture, tourism, and food for tourists, says Tracy Berno et al (2019), associating it with economic sufficiency, which emphasises the deep foundation of Thailand’s agricultural roots, which I discuss in the last section. These stories of Thai lives and rice connect the country with the outside world through tourism, involving rural landscapes of rice fields and rice-oriented cuisines (ibid.). Such initiatives, according to Savaporn Supaphol (2010) provide opportunities for farmers to explore chemical-free rice and vegetable production for domestic and international markets by addressing the challenges of food

contamination and educational needs to attract the younger generation back into farming, as many *Isan* families have contemporarily shifted away from rice cultivation to small-scale businesses.

Commercialisation of rice led *Isan* into urbanisation. It also led Thai rice farmers to greater debts. Intensification of rice farming led to an increase in the use of herbicides, which contributed to the increase in gram-negative microbes, including BP which contribute to melioidosis. This was also around the same period which marked the beginning of more frequent identification of melioidosis in Sunpasit Hospital. This was when the hospital microbiologist became puzzled by a bug, she began to observe in specimens tested in the hospital laboratory in the 1980s. As discussed in Chapter Four, this identification of the microbe which caused severe illness and deaths among patients in the 1980s led to decades of melioidosis research in Thailand. Although most of the patients identified with melioidosis are farmers, the government paid little attention towards melioidosis, which they detached from the rice economy. Meanwhile, they used rice and rice fields to boost Thailand's exports and to generate income from domestic and international travel.

Rice politics

Commercialisation of rice in Thailand is closely entangled with the politics of nation-building. In 1973 and 1976, *Isan* rice farmers joined a student-led political uprising in Bangkok against royalist military rulers who had seized power in the country since 1947, fifteen years after the abolition of the absolute monarchy. The crackdown led many students to flee into the jungles in *Isan*. The students were accused of being communists and considered a threat to the nation and the monarchy (see Anderson, 1993 and Baker and Phongpaichit, 2009). The anti-communism movement led to the expansion of roads, agricultural land, electricity, hospitals, schools, and temples into rural areas. This was to facilitate the state's control and foster relations with rural communities (Walker, 2012, Suebpongsang et al., 2020, Cramb, 2020). During this development process, the government's focus was on *Isan* because of concerns over the establishment of communism in the region (Anderson, 1993, Baker and Phongpaichit, 2009). While *Isan* rice farmers benefited from the government's development, they were also

subjected to power negotiations between politicians tainted with corruption and the middle-class royalists in national politics (Keyes, 2012, Ricks, 2018, Ricks and Laiprakobsup, 2021, McCargo and Hongladarom, 2004, Thabchumpon and Duncan, 2011).

An economic and social shift among rice farming communities observed over two decades led many farmers to emerge as middle-class citizens or urban villagers who also took up jobs in the bureaucracy or owned independent businesses (Walker, 2012, Thabchumpon and Duncan, 2011, Sopranzetti, 2012). This shift was facilitated by the introduction of three key schemes; the thirty-baht health care scheme which significantly reduced household debts (Tangcharoensathien et al., 2020), the rice-pledging scheme which allowed farmers to sell their crops to the government at a price above the market price (Ricks, 2018), and the village funds which allowed villages to establish local businesses (Kaboski and Townsend, 2012). These schemes were introduced by populist leader Thaksin Shinawatra²⁸ who was overthrown by a military coup in 2006 and returned to the country after seventeen years amidst rumours of his negotiations with military leaders.

Challenges with surplus rice storage

Aunty Som usually stores about five percent of the annual harvest in her rice barn (shown in Figures 4 and 7) and sells the rest to rice millers. Like most farmers, before storing the rice, she dries them along the side of the road in the village as shown in Figure 8. She periodically took the rice stored in the barn to the local mill for deshelling and polishing. Although she preferred to hold on to larger quantities of rice and gradually release them into the market for a better price along with other farmers in her area, she was forced to sell them to the millers soon after harvest. Rice is a fragile commodity which needs to be maintained from humidity. This is a major challenge for farmers, considering the humidity in Thailand. The limited storage capacity forces farmers to sell their crops at a low price. The shortage of rice storage space for farmers has been a subject of political tension with the government for decades. Storage capacity symbolises class hierarchies manifested through unequal access to the agricultural

²⁸ Thaksin returned to Thailand after 17 years of exile in August 2023 in what is reported as a 'negotiated deal' between his founded political party and politicians aligned with former Prime Minister and military leader Prayuth Chan-ocha who overthrew his sister's government in a coup in 2014.

infrastructure (Matthan, 2022) which creates conditions that allow certain groups to capitalize on rice and other crops, including onion storage studied in India (ibid.).



Figure 7: Aunty Som's rice barn.

This is where Aunt Som stores plain Jasmine rice on one side and sticky rice on the other for daily consumption. Empty rice sacks are seen at the centre. Photo: Author



Figure 8: Freshly harvested rice.

This is a common site in the villages in Ubon observed during rice harvest season. Villagers dry unshelled rice on the roadside. Photo: Author

Isan farmers generally cultivate rice once a year, while farmers in other parts of the country cultivate twice annually. This is because the region's farming almost exclusively depends on rainfall and other natural water reservoirs (Suebpongsang et al., 2020). *Isan* is prone to droughts and the flat geographical terrain places the region at risk of flooding during the monsoons (Srisompun, 2020). Despite these challenges, the government's support has been infirm, and this is evident from the weakly conceived development projects like the Pak Mun Dam in Ubon (Manorom, 2021) which was constructed despite protests by local communities over its impact on the environment. The dam's construction began in 1990. It was opened in 1994 and shut down in 2002 due to its impact on local aquatic life, the environment and farming communities (Baird et al., 2020).

Isan farmers protesting the Pak Mun Dam formed an alliance of small-scale farmers under the "Assembly of the Poor". They became politically significant (Pongsudhirak, 2020, Heis, 2015) with the new political order which made national politicians depend on voters to win majority seats in the parliament (McCargo and Pathmanand, 2001). Thaksin's government introduced several schemes that benefited *Isan* residents. His popularity with provincial residents was seen as a threat among royalists, which led to protests and his overthrow in a coup in 2006 (Baker, 2005, Harris, 2015, Hewison, 2004). He continues to influence contemporary Thai politics during his years of exile (Gadavani, 2020) and following his return to the country.

Rice pledging scheme

Thaksin's sister Yingluck Shinawatra introduced the rice pledging scheme after she was elected prime minister in 2011. Under the scheme, the government pledged the purchase of rice paddies from farmers at a price almost fifty percent higher than the market price. The rice was stored in a government-rented warehouse with the intention to gradually release the cereal into the international market. The scheme was however criticised for benefiting over a million moderate-income farmers and the government accused of corruption which led to another military coup against Yingluck's government (Congress, 7 August 2013). Aunty Som told me that the rice-pledging scheme benefited her and allowed many *Isan* farmers to significantly emerge out of poverty. Political scientists view it as a symbol of a new order in the relationship

between elected politicians and the people (Hewison, 2004). It also changed the political relationship between the people and the government (Baker and Phongpaichit, 2009), allowing rice farmers to emerge from rural patrons to influential players in national politics and as middle-class citizens (Thabchumpon and Duncan, 2011, Walker, 2012).

The period through which rice cultivation and trade were promoted also observed an increase in reporting of melioidosis infections. Although melioidosis experts and officials insist that melioidosis is underdiagnosed and underreported (Hinjoy et al., 2018, Hantrakun et al., 2019), high numbers of melioidosis infections and deaths have been reported to MOPH since at least 1989. Figure 9 shows a graph based on data compiled by the ministry's Bureau of Epidemiology on the number of melioidosis patients per 100,000 population reported between 1989 and 2005. Melioidosis became a notifiable disease under the national law on disease control in 2002 (see Chapters Three and Seven) and has since been reported to the national disease surveillance system. A modelling study estimates that annually, 7572 persons become infected with melioidosis in Thailand, of whom 2838 die (Limmathurotsakul et al., 2016).

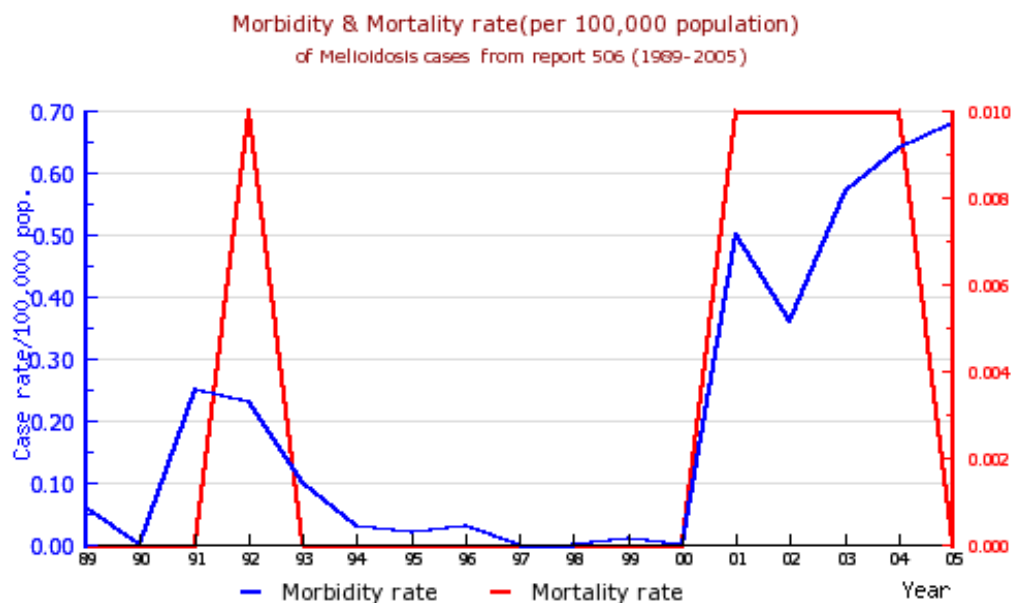


Figure 9: Data on melioidosis incidences in Thailand.

The graph obtained from Bureau of Epidemiology shows incidences of melioidosis in Thailand per 100,000 population from 1989-2005. Source: Bureau of Epidemiology. [Accessed: 9 April 2024].

Promotion of rice cultivation and sufficiency economy

Setthakit pho phiang or sufficiency economy is based on the conception of Thai society to maintain economic stability through a moderate lifestyle, reasonable life choices and resilience against domestic and international changes that cause economic risks. It was conceived by King Bhumibol, the ninth Rama king who reigned Thailand the longest until he died in 2016. He continues to be personified with divinity and is referred to as the father of the nation who moved Thailand into development. The government continues to promote his legacy contemporarily under the rule of his son. Sufficiency economy emerged in 1997-1998 as a strategy for Thai citizens to cope with the economic crisis. It emphasises encouraging farming communities to hold on to their occupation as farmers with moderation and self-reliance (Song, 2020). Like some farmers I met during fieldwork, Aunty Som proudly proclaimed that she adopted sufficiency economy to “follow the path of his majesty the King”. Although she did not have one big piece of land to follow the “masterplan” released by the Ministry of Agriculture (shown in Figure 10), she adopted techniques of crop rotation and water conservation. Several pieces of her land are separated by a local road²⁹ which was constructed following appropriation of parts of her family property. She transformed a plot nearest to her home into a fishpond, with some space for raising egg-laying chickens and used another plot for planting crops like bamboo, mangoes, papaya, bananas, lemon, chilies, and other vegetables. The biggest plot was for rice cultivation. The pond not only served as a fishpond but was also used as a water reservoir for the dry season.

During my fieldwork, the government rebranded sufficiency economy as “New theory of agriculture”, emphasising food security, and aligning it with the United Nations’ Sustainable Development Goals. This was when international travel and trade were disrupted globally due to the pandemic lockdown. Additionally, Thailand’s Thirteenth National Economic and Social Development Plan, based on which the government’s plans and budget for 2023-2027 is focused, is oriented towards sufficiency economy philosophy as a mechanism for Thailand to securely prosper with sustainability (Council, 2023). Critiques of Thai politics argue that this political philosophy is promoted by government as a popular royalist ideology (Walker, 2010)

²⁹ Parts of her land was expropriated for construction of local roads leading to the highway which stretches to the banks of Mekong River with Laos on the other side of the river.

and a nationalist strategy (McCargo, 2001). Duncan McCargo says this populist strategy maintains nationalism while adopting globalisation through the embracement of capitalism, while Andrew Walker notes that it was actively promoted after the military coup of 2006 to campaign for the endorsement of the supreme leader of the nation. Kevin Hewison (2001) views it as an encouragement for provincial residents to return to their farmland during crisis situations, while Lotte Isager and Soren Ivarsson (2010) see it as a form of discipline over the moral conduct of local citizens, in what Nikolas Rose (Rose, 1999) terms “ethno politics” which strives to reform the economic behaviour of the people rather than directly address the economic system which is related to democratic and capitalist conditions. Sufficiency economy encourages individual households to lead a moderate life by incorporating rice farming and fishing with Buddhist practices to maintain distance from the influence of globalization.



Figure 10: A government poster on sufficiency economy.

The poster shows an image of the late king and the new theory of agriculture. The blueprint for sufficiency economy states that each farming household should divide their land into four portions, 30% for water storage and raising of aquatic animals, 30% for rice cultivation, 30% for vegetables and fruits, and 10% for household and other purposes, including for raising animals.

Since its introduction, the government has deployed sufficiency economy and other agriculture-related initiatives in the name of the late king's *barami* to gain endorsement from farming communities and the people at large. For farmers like Auntie Som, the late king's *barami* or moral virtues have drawn attention towards the resource constraints of local communities in the form of royal projects like sufficiency economy and *fon luang* or the "royal rain". *Barami* is a distinct characteristic of the monarchy based on virtues and moral influence and authority. Although *barami* of a monarch is different from the *barami* of a Thai leader's characteristic and how this social capital relates to everyday life which is discussed in Chapters Four and Six, the concept of this social capital originated through the links of monarchs with gods. Based on Theravada Buddhist beliefs, Thai kings are considered to have high levels of *barami* or divine moral and spiritual power attained through good deeds performed in their previous and present lives (Jory, 2002). Although this ideology was formulated in the early 1900s under absolute monarchy, it remains unchanged (Winichakul, 2019) and is propagated by the royalist government. Even after his death, Rama IX is conventionally held with enormous *barami* which is in keeping with concepts of Buddhist kingships. His kingship was elevated to the level of being *saksit* or sacred, which gave him aura and divinity, says Michael Connors (2011). He says the god-making process was partially driven from below.

Barami is also materially indicative of having the ability to make things happen and is represented through visual images, ritualised practices, education, wealth and social status (Veal 2013). It can be symbolically expressed through the ability to resolve situations through social connections instead of depending on lawful avenues (ibid.). The late king was renowned for the royal rain initiative which provided rainfall, particularly to the rural areas severely impacted by droughts. The Royal Rainmaking Operation Group was established in the Ministry of Agriculture in 1969 to support the villagers with artificial rain during the dry season. Contemporarily known as the Royal Rainmaking and Agricultural Aviation Department, it deploys technologies to manipulate the clouds to produce rainfall in rice cultivation areas often hit by droughts. He was intimately involved in water resource governance at multiple geographical scales, says David Blake (2015), adding that he was influential in the construction of the dominant problem and solution framework on which the narrative of Thailand's water resource policy is based. His influence continues in contemporary Thailand as observed in the latest five-year national plan. The government regularly advocate for the construction of

manmade wetlands as water reserves for farming rice and other agricultural products during the drought under sufficiency economy.

While water is salient for rice cultivation which is promoted by the Thai government, studies show that the BP bacteria thrive in wetlands and fresh water. An environmental study by Chuah et al (2017) tested over a hundred water samples collected from rice paddies, natural wetland sites and manmade water bodies in rural areas of Thailand's *Isan* region showed that BP is most prevalent in rice paddies, particularly in areas within the vicinity of wetlands. The study is indicative of the inherent vulnerability of farmers in rural agricultural areas in Thailand (ibid.), but the government has not publicly addressed this connection in relation to its promotion of rice cultivation. I hypothesise that this may be due to what Lindsay McGoeys (2019) terms "strategic ignorance". By avoiding the liability for promoting rice cultivation, which can also increase risks of melioidosis infection, I argue that strategic ignorance can be used to explain the absence of larger discussions on melioidosis in relation to rice cultivation. Strategic ignorance, McGoeys says, is often deployed by leaders, governments, and the private sector to avoid repercussions or liability for earlier actions or past mistakes. Returning to the senior government official's remarks I discussed at the beginning of the chapter who expressed concerns that the publicity of information on melioidosis may lead to misunderstandings that can impact rice cultivation in Thailand, I suggest that considering the importance of rice to the Thai culture and political economy, the government may have deployed strategic ignorance to avoid liability for making rice cultivation safe for farmers.

Conclusion

This chapter has discussed the tensions between making melioidosis visible in relation to rice cultivation in Thailand, arguing that their linkages are contested because of the significance of rice to the Thai culture and political economy. I have discussed how rice reflects the bonds and tensions between the elites, the government, and the people through imaginaries and ideologies where rice is valued, and rice cultivation is idealised to unite sovereign subjects of the nation. I have shown that rice is sacred and intrinsic to the Thai heritage, and is situated in communal, spiritual, and royal rituals, symbolising relations between humans - the people,

the government, the monarch, and with non-humans – the spirits, the ghosts, the goddess, the ancestors, and nature.

The chapter discussed the significance of rice in the nation's economy and in nation-building. It has led Thailand to become a leading exporter of the cereal and the government promotes rice-related tourism activities through the incorporation of food flavours with the village lifestyle as the "Thai experience" to stimulate the national economy. Rice cultivation is also central to the nation's politics and continues to be ideologically deployed to maintain power relations. While it was used as a strategy for nation-building in the twentieth century (Baker and Phongpaichit, 2009), contemporarily it is used to evoke patriotism and loyalty to the nation, the monarchy, and the government (Ricks, 2018, Ricks and Laiprakobsup, 2021).

While the essentiality of rice and rice cultivation is visible through rituals, social norms and conversations, national statistics and policies related to rice cultivation, melioidosis infection has been obscured. This chapter also argued that although melioidosis is associated with the political economy of rice cultivation, *barami* may have contributed to its enigma by detaching discussions about melioidosis from public policies and practices of rice cultivation. With the promotion of rice cultivation in Thailand, tensions may arise if the association with the abundance of BP bacteria in rice fields is publicly made in relation to the broader discussions on the production of rice for local consumption and exports.

Although this association can lead to tensions when difficult questions are posed to government officials who are of the opinion that little can be done to address the risks of melioidosis infection, based on the evidence and reasoning I have discussed, the real issue with the tension is to reveal that rice cultivation can be pathogenic, or that the association between rice cultivation and melioidosis infection cannot be ignored. The government is liable to do what it can to protect people and the least it can do is to inform individuals and communities of the risks of melioidosis infection. To reiterate the words of melioidosis experts Limmathurotsakul et al. I refer to earlier on in this chapter, there is every reason for the government to look for solutions to prevent melioidosis among people living in and visiting melioidosis endemic areas.

The next chapter is about how melioidosis emerged in Thailand's national health policy and was made visible during the COVID-19 pandemic through the issuance of the first national guideline on the disease. The chapter also discusses the activities which were prioritised and implemented with the support and influence of melioidosis researchers from MORU. The chapter reveals that public health interventions are narrowly focused on individual-based behaviour change activities.

Chapter 3: Thailand's melioidosis policy and priorities

We can influence development when we engage and create participatory processes for public policy development.

We need the people, politics, and knowledge to come together, to work on something that is very big and difficult. We need this triangle to move the mountain. This is what we work with to bring health development in Thailand.

- Professor Prawes Wasi, President Emeritus, Thailand National Health Foundation (Interview with author, 2021).

This chapter is about Thailand's recent public health policy recognition of melioidosis, which was formalised through the first national guideline on the disease during my fieldwork in 2021. It follows on from the previous chapter where I demonstrated that the alliance between melioidosis, rice and rice cultivation remain fragile because of the intrinsic importance of rice and farming to Thai culture, society, and ideology. This importance has made the linkages between rice cultivation and melioidosis a contested space, whereby discussions on the disease remain abstracted from public policies and practices related to the promotion of rice cultivation. This chapter is based on years of negotiations and assertions melioidosis researchers made in demonstrating the burden³⁰ of the disease to the national health system (Limmathurotsakul and Dance 2019), to convince national health officials to pay attention to melioidosis. I met Dr Tam at MOPH while she was working on formalising melioidosis into the national health policy and priorities to which a national budget would be dedicated for the first time. In our meeting, she announced with excitement that melioidosis is now placed in

³⁰ Calculated on the basis of the extent of health loss caused by the disease.

the One Health Programme³¹, a global health framework being redefined in Thailand since its introduction in 2014 (Tangwangvivat et al. 2019). She explained that this meant that from now on, there would be a dedicated annual budget with planned activities for melioidosis. Before this, the only public health activity related to melioidosis was the compilation of epidemiological data on the disease. Since 2002, melioidosis data has been reported to national health authorities, but following the 2015 amendment of the Communicable Diseases Control Act B.E. 2558 (2015)³², the disease was included in the list of diseases requiring immediate notification. This puts melioidosis into the same category as other infectious diseases categorised as “dangerous” and are of international health security concerns like novel influenza strains, Ebola, anthrax, and cholera.

To understand how melioidosis came to be recognised in Thailand’s national health policy after decades of neglect, I review the processes, actors and factors involved in rendering melioidosis visible in the national health policy and practices. What is the public health policy on melioidosis, and how did it emerge? What does it prioritise, and how is it taking shape? What does it reveal about the broader public health priorities and practices in Thailand? This chapter demonstrates how melioidosis is being stabilised through the emerging public health policy and practices, where I argue that the focus on behaviour change of rice farmers is a form of “quick fix” which “responsibilise” individuals to take actions to protect themselves rather than address the structural issues like the promotion of rice cultivation which I have discussed in the previous chapter. I draw on Laurie Denyer Willis and Clare Chandler (2019) to discuss behaviour change as a quick fix for melioidosis and responsabilisation in relation to the works of Nicholas Rose and Peter Miller (2013), and although these concepts are discussed in the context of neoliberal economies, their influence extends beyond neoliberal

³¹ One Health is a global health framework promoted to increase collaboration between animal, human and environmental health to prevent and control the spread of infectious diseases. It gained prominence through the years, with increasing concerns over cross-border spread of infectious diseases which impact travel and trade like avian influenza and Ebola. In global health, One Health was formally recognised in 2008 when relevant UN agencies got together with the World Bank to jointly develop a strategic framework to respond to evolving risks of emerging and re-emerging infectious diseases, amidst pandemic concerns about the spread of H5N1 avian influenza. Thailand’s One Health work has been influenced and is supported, technically and financially, by United States agencies, Centers of Disease Control and Prevention (CDC) and the Defense Threat Reduction Agency (DTRA), and more recently USAID.

³² The law has been enforced since 1934, focusing on immediate notification of diseases categorised as ‘dangerous’ to national public health authorities. It was revised in 2015 to include more diseases of international public health concerns to the list.

governments. Willis and Chandler discuss the use of antibiotics as a quick fix in response to the lack of access to the infrastructure of clean water and sanitary toilets, adding that the focus on changing behaviours of individuals often fails because of the lack of resources, unstable infrastructure, and competing priorities. Meanwhile, Rose and Miller discuss responsabilisation as a governance strategy that controls the economic and social life of the people from a distance under the guise of freedom of choice, decision, or action, while placing moral responsibility and obligation to act.

In what follows, I begin by discussing the efforts MORU researchers took over the years to convince public health officials to pay attention to melioidosis. These include having closed-door meetings in the presence of foreign institutions influential to national health authorities and collaborating on research to generate evidence on the burden of melioidosis on the national health system. I then discuss the activities health officials prioritise with the launch of the melioidosis programme. These include orientating health administrators responsible for reporting back on indicators about melioidosis, and training preparations for convincing rice farmers to change their behaviours.

When scientists, technocrats and policymakers collaborate

Scientists, technocrats, and policymakers have different perceptions and objectives. They operate with different values and mentalities. They have different attitudes towards information, time, use of language and communication (Choi et al. 2005). These differences include views of what qualifies as evidence and how they can be applied based on their different public images and political rationalities (ibid.). For instance, decades of melioidosis research investment have led to the production of extensive evidence on melioidosis which has led to a better understanding of the disease, which I will discuss in the next chapter. But how much of this evidence was accessible to health officials, technocrats, and policymakers? What makes one kind of evidence superior to another, and how can scientific evidence be translated into policies? To bridge the tensions between science and bureaucracy and to render evidence for public health policy, new incentives and actors are needed to translate scientific knowledge and actors are needed to broker or mediators between scientists and

polymakers (ibid.). This section discusses how melioidosis researchers became knowledge brokers in the lobby for melioidosis to be recognised in Thailand's public health policy.

Advocating for melioidosis in national health

As discussed in the introduction, MORU is a key melioidosis research institution established through a collaboration between prestigious universities – Mahidol in Thailand and Oxford in the United Kingdom, with continuous funding from the Wellcome Trust since 1979. Their research focus was then on malaria control along the Thai-Cambodia and Thai-Myanmar borders. Initially named 'Wellcome Unit' they gradually transitioned into an established entity within Mahidol University's Faculty of Tropical Medicine³³ and has since facilitated Thailand's networking with the international tropical medicine research community. In 1983 - 1984, MORU began research on melioidosis in collaboration with Sunpasit Hospital in Ubon, the details of which I will discuss in the next chapter. This marked the beginning of decades of melioidosis research which led MORU to establish itself with national and international expertise on the disease. The knowledge produced through the collaboration between MORU and Sunpasit Hospital significantly saved the lives of melioidosis patients, leading to patients' diagnosis and timely treatment in the hospital, thus significantly reducing melioidosis-related deaths (White et al. 1989). MORU researchers have undoubtedly been instrumental in advocating for the visibility of melioidosis nationally and in global health. Although they have had little success in convincing the global health community to recognize melioidosis as an NTD, they have successfully influenced Thai health authorities to pay more attention to melioidosis.

A key person in MORU who has been influential in making melioidosis visible in Thailand's health policy and practices is Dr Ek. In his capacity as a senior researcher, he organised several "closed-door" meetings with public health officials to discuss challenges related to melioidosis in 2012 (Melioidosis Info 17 September 2012, 22 March 2012). These meetings were organised as "international" meetings to facilitate the participation of non-Thais both from

³³ With support from Liverpool School of Tropical Medicine, Thailand's first tropical medicine hospital was established at Mahidol University in 1960, based on which Mahidol University's Faculty of Tropical Medicine was established. See (Mahidol University Tropical Medicine Hospital 2022)

MORU and from the Thai MOPH-US CDC Collaboration Unit³⁴, a collaboration between the United States Centers for Disease Control and Prevention (CDC) and the Thai MOPH, which was established in the early days of the AIDS epidemic in Thailand in the 1990s. I asked Dr Ek what initiated his meetings with MOPH officials and his response was:

Earlier, I thought as a researcher, my role was to publish so that my work could be read by technocrats and policymakers in MOPH. But it's not [doesn't work] like that...

I didn't think I had to go and talk to them...

Initially, when we reached out to the ministry officials, we told them that their data (epidemiological) was wrong, but that didn't work. So, then we changed our strategy and decided to collaborate with them. We invited them for a meeting to hear from them what their problem was. We wanted to understand their limitations and support them.

Dr Ek was based with the MORU team in Sunpasit Hospital for some years before he moved to join the head office team in Bangkok. He said he felt that attention given to melioidosis did not correspond with what he observed in Sunpasit Hospital, where many patients developed severe symptoms and died within a few days after hospitalisation. After the meetings, they began to work together with the health officials to generate evidence on the melioidosis situation in Thailand. The closed-door meetings were later formalised into the Thai Melioidosis Network led by MOPH. From 2012 to 2015, they collected data from hospitals and published research as evidence, which they used to advocate for health policy attention. From the collaboration of these studies which I will discuss in Chapter Four, they demonstrated that melioidosis placed a higher burden on the national health system than other diseases prioritised by the government like dengue and leptospirosis, but since melioidosis is underreported, the true numbers of patients' deaths are not reflected in the national disease surveillance data (Hinjoy et al. 2018). I discuss about this in Chapter Seven. Their studies showed that melioidosis is endemic across Thailand with patients testing

³⁴ The Thai MOPH and US CDC which emerged from the AIDS response has extended its mandate to cover all health security and cross-border health concerns between Thailand and the US government.

positive for melioidosis in different parts of Thailand (ibid.). Through modelling, they estimate that annually, 7,572 patients develop melioidosis in the country, of whom 2,838 die (Limmathurotsakul et al. 2016).

With research findings indicating that melioidosis is underreported, which relates to it being underdiagnosed due to lack of awareness, including among health workers, the MOPH-led network decided to prioritise their policies in four areas. These include enhancing data production for the disease surveillance system, increasing public awareness, improving diagnosis, and improving disease prevention.

Melioidosis in disease surveillance

In 2015, Thailand amended the National Communicable Diseases Control Act to include melioidosis among a list of sixty-four notifiable infectious diseases³⁵ under active surveillance, which requires diseases of international concern to be immediately reported to national health authorities (Bureau of Epidemiology 2017). This amendment was made to align the country's laws governing infectious pathogens to comply with GHSA, an initiative pushed by the United States government in relation to the control of the deliberate use or international spread of pathogens deemed threatful to national security. Global health security concerns emerged following the Anthrax threat in the United States in 2001, which emerged around the same time as the attacks on the Twin Towers in New York in September 2001. After the anthrax incident, all weaponisable biological agents were categorised under the watch list of the governments of the United States, and that included melioidosis, which was classified under Category B out of three categories (A, B, C) of diseases based on ease of its spread and severity of illness and death. While Category A relates to the highest risk, Category C is considered an emerging threat that requires close monitoring. The United States' influence on Thailand's public health and medicine is not new and has been evident from the establishment of the first Western Hospital, Siriraj Hospital in Bangkok in 1888 and the medical training of Thai doctors, which received support from the Rockefeller Foundation (Montesano

³⁵ As of 2021, eighty-seven diseases require to be reported under the Communicable Disease Control Act B.E. 2558 (2015).

2015). In recent decades, despite their overall declining influence because of their criticism of military coups (in 2006 and 2014), and China's increasing influence in Southeast Asia (Busbarat 2017), the United States continues to maintain public health relations with the Thai government, particularly in the area of global health security (Innes et al. 2022; MOPH-TUC Co-Unit 2023). The CDC has been influential in supporting Thailand's disease surveillance system, which is evident from the country being the first outside the US where they established a Field Epidemiology Training Programme³⁶ in 1980. The main purpose of this initiative was to develop a system to rapidly detect, share information and respond to new and emerging pathogens of international concern (Centers for Disease Control and Prevention 12 March 2021).

With the amended law, hospitals across the country are required to report all melioidosis-confirmed infections to the national disease surveillance system every week, through a standardised reporting mechanism. However, many hospitals do not systematically compile and report data to the national surveillance system for several reasons. Some health officials are not aware of this reporting requirement (Hinjoy et al. 2018), and MORU is working with MOPH to streamline melioidosis reporting for the disease surveillance system which I will discuss in Chapter Seven. Both MORU and MOPH are hopeful that they will be able to alleviate the discrepancies between the laboratory and the clinical data on melioidosis (Hantrakun et al. 2019). Dr Ek insists that it is important to have accurate numbers for melioidosis reflected in the national disease surveillance system so that the true burden of melioidosis can be reflected and presented to national policymakers.

Melioidosis in One Health

Evidence of zoonotic infections from exotic animals, livestock and migratory birds from disease-endemic areas may lead to the spread of melioidosis in non-endemic areas according to Emma Birnie et al. (2022) who also raises concerns about the impact of climate change and global warming on the prevalence of BP in the environment. In Thailand, animal infections

³⁶ By 2020, CDC had established FETP programmes in eighty countries across the world.

with melioidosis have been reported, although not systematically, in exotic and zoo animals (Kasantikul et al. 2016; Damrongsukij et al. 2021; Saechan et al. 2022), and in farmed animals (Limmathurotsakul et al. 2012; Tonpitak et al. 2014). Since disease surveillance is identified as a priority area and requires collaboration between animal and human health, both MOPH and MORU supported the establishment of melioidosis under One Health in Thailand.

Thailand's One Health began as an initiative to strengthen the collaboration between human and animal health, following the bird flu outbreak in 2004. The H5N1 outbreak stalled the country's poultry exports and impacted trade and tourism (Sommanustweechai et al. 2017; Innes et al. 2022). Following years of experimentation with the One Health initiative (Porter 2019), a One Health Unit was established in the Department of Disease Control in 2019. Support for this unit partially comes from the CDC and the United States' Defense Threat Reduction Agency (Sommanustweechai et al. 2017; Innes et al. 2022; Hinjoy et al. 2016).

With the relaunch of the One Health Programme and melioidosis newly recognised by MOPH, the officers decided to showcase their melioidosis work as a priority for the activities implemented in 2020. This meant that melioidosis was for the first time mentioned in national health policy documents with a dedicated budget for local-level activities. The 2020 National Operational Plan for Communicable Disease Control allocated a budget of almost four million Baht for One Health, of which 160,000 Baht was dedicated to melioidosis. Despite a modest amount, Dr Tam from the One Health Unit said it demonstrates the government's commitment towards melioidosis and signifies the extension of public health response which exclusively focuses on global health security, to local concern. Dr Tam told me that this was a result of years of efforts put together between public health officials and MORU to generate evidence to prove the burden of melioidosis. Through the years, the senior public health officials engaged in producing evidence with MORU have assumed senior positions in the ministry. They have elevated the attention towards melioidosis and have supported the One Health team in defining activities to be carried out at the provincial and local levels, she adds. Dr Tam proudly announced that she and her team also managed to draw the attention of the health minister who had never heard of melioidosis, despite his political stronghold in Isan, a region endemic with the disease.

The national guideline on melioidosis

The first national guideline on melioidosis, developed through a collaboration between MOPH officials, and researchers from MORU and Khonkaen³⁷ University, was published in July 2021. It highlights that *Isan* rice farmers with diabetes are the group with the highest risk of melioidosis infection, based on evidence that most patients confirmed with melioidosis in Sunpasit Hospital are rice farmers with diabetes (Suputtamongkol et al. 1999). It thus establishes the syndemics (Singer 2009) or the co-presence of melioidosis and diabetes, in relation to rice fields and rice cultivation. Since the evidence demonstrates that *Isan* rice farmers with diabetes are at the highest risk of melioidosis infection, Dr Tam said priorities activities will be placed on educating local health workers and rice farmers in the *Isan* provinces. These activities, she hopes, would lead to better reporting of melioidosis from hospitals in *Isan*, and a better understanding of disease prevention measures. Studies carried out over the years highlight underreporting of melioidosis, partly because of the difficulty in identifying the bacteria (Hinjoy et al. 2018; Kaewrakmuk et al. 2023; Hantrakun et al. 2019) and because of a lack of awareness about the disease, including among health workers (Chansrichavala et al. 2015).

Following the launch of the national guideline, Dr Tam and her team organised training to orientate health workers at provincial and local levels on its content. I had the opportunity to participate in this first online workshop from Edinburgh along with almost five hundred other participants, most of whom were administrators from the provincial or the district health offices. The health administrators were responsible for reporting their organisation's activities against the key performance indicators (KPI) outlined by national authorities. Dr Tam said the reason they prioritised the training for public health administrators was so that they know that the central authorities gave much importance to melioidosis-related work. The course was carried out for a couple of hours, twice a week, for a month in May 2022. Each session began with an introduction by a member of the One Health team, followed by a pre-recorded video presentation from various experts. The content of the course mirrored that of the guideline, which included sessions on diagnosis, treatment, reporting and prevention of melioidosis. At the end of each session, we were given about fifteen minutes to complete a

³⁷ Khonkaen is another province in *Isan* where melioidosis research has been carried out (see Chapter Four).

set of multiple-choice questions and were awarded a certificate for participation at the end of the course.

The sessions comprised dense technical information ranging from the benefits and challenges of different kinds of diagnostics to different combinations and varying amounts of antibiotics required for treating patients in different stages of the illness. It was difficult to capture all the knowledge provided in each session. As the sessions were convened by a staff member from the One Health team who manipulated the pre-recorded training, there was no opportunity for questions or interactions between the facilitators and the participants or among the participants. Many participants requested a replay of the videos through the “chat” function on Zoom, which was granted for all the sessions before we were asked to complete the multiple-choice answers to the questions at the end of each session. Although I was familiar with the content of the guideline which I had access to before this training, I could not remember all the technical details from the document or the course. As a participant, I felt that the sessions were not tailored for the health administrators, whose functions require a different kind of information. Since their role is to report on KPIs related to melioidosis activities, some of the dense information provided in the online training may not have been relevant to their work. Although the One Health team wanted to demonstrate the importance and values given to data required for reporting indicators used for calculating the larger health metrics, it did not consider the needs of the participants in the training.

No local name

What’s in a name, and why is it important for an infectious disease to have a local name? As discussed in Chapter One, the name “melioidosis” is considered foreign, and as patients like Lom stated, is difficult to pronounce. He expressed discomfort in saying the disease’s name because, for him, it had no local reference to an illness category or aetiology (Nichter and Nichter 1996). These characteristics alienate melioidosis from patients, thus contributing to the enigmatic characteristic of the disease. Unlike other diseases such as dengue, leptospirosis, or bird flu, all of which have Thai names that correspond with disease infection or symptoms, melioidosis does not allow patients to relate to it in the way they do to other

emerging infectious disease threats observed in Thailand. Discussions on whether to use a Thai name for melioidosis were made while developing the national health policy on the disease³⁸. Since the early periods when the disease was first reported in Thailand in the 1960s, some infectious disease experts referred to it as *khai din* which translates as “soil fever”, in their reports. In one of the meetings on developing the national guideline, the proposal to use *khai din* to refer to melioidosis in Thailand was discussed. This proposition was, however, brushed off by MORU experts who felt that it did not truly represent the modes of disease infection and may lead to misunderstandings that the disease is transmitted through soil and not water. Dr Ek explained in an interview that they did not want to use a Thai name for the disease and if it was too difficult to pronounce, it could be referred to as “melioi”, which is what is already used by Thai doctors.

The above discussion demonstrates that MORU has been instrumental in influencing and shaping Thailand’s public health policy on melioidosis. Since their first meetings in 2012, they have collaborated with MOPH officials in carrying out joint research to produce evidence, to convince policymakers on the disease burden to the national health system. They supported MOPH in establishing a network for melioidosis in Thailand and have influenced the development of the country’s first national guideline on the disease, the content of which is largely based on findings from their research carried out over the last several decades. They have also influenced the decision to maintain the Latin name of the disease, instead of having a Thai name for it like other infectious diseases commonly observed in the country. Their influence extends to priority activities for melioidosis prevention, where the focus is placed on changing the behaviour of rice farmers.

Changing behaviours of diabetic rice farmers

Since research data shows that *Isan* rice farmers with diabetes are the group with the highest incidents of melioidosis infection, a priority disease prevention activity identified by MOPH is to change the behaviour of rice farmers. This behaviour change initiative is influenced by

³⁸ Through a written request to the One Health Programme, I was able to obtain the minutes for the series of joint meetings which took place on the development of the national guideline in 2019-2020.

MORU's multi-year randomised controlled trial (RCT) which was conducted from 2014 to 2018. RCT is a popular biomedical research method believed to reduce biases and is often used in studies that measure the effectiveness of new interventions or treatments. Their focus, however, is on statistical rather than contextual understanding. This trial enrolled 9,056 diabetes patients, of whom 6,544 received what they called "behavioural support group sessions" (Suntornsut et al. 2021), an example of which I further illustrate below. The trial's focus was on measuring patients' outcomes related with hospital admissions for any infectious disease, and for confirmed melioidosis infection. These considerations were made without considering the complexity and dynamic nature of patients' daily lifestyles and engagement with farming practices. Although MORU promoted this research as a success in meetings with MOPH, and emphasised during my interviews, the published literature on the study indicates that there was no difference in the health outcome of patients with diabetes, where melioidosis or other disease infection was concerned.

MOPH decided to mirror the behaviour change training based on MORU's research and commissioned them to train local health workers to deliver the behaviour change training to rice farmers with diabetes in Ubon and some other *Isan* provinces who have been identified with a high risk of melioidosis infection. I had the opportunity to observe and interview members of the MORU team involved in this initiative who expressed pride in being part of this project. For them, it means a lot for MORU's work to be recognised and applied to a national project which is prioritised by MOPH.

Preventing melioidosis with rubber boots and drinking boiled water

As I walked into a three-storied house in an alley off the road from Sunpasit Hospital one hot morning in 2021, I was greeted by Tik and Kuk, two MORU research assistants. They were sitting in front of their laptops, rehearsing for the "training of trainers" project. MORU has two office spaces in Ubon, one of which is where the research laboratory is located inside Sunpasit Hospital, and the other is this annex office. This space was rented during the years when MORU expanded their research in Ubon which made the original space in the hospital too small to accommodate all the team members. Each floor of the building had shelves neatly

stacked along the walls of the room. On the shelves were folders and boxes containing documents from decades of research on melioidosis, blood infection and other studies. Some boxes had personal protective equipment (PPE) and other materials like tubes for collecting blood for tests and other medical devices. The centre space in the building was where the staff sat and did their work. Tik and Kuk invited me to sit with them, offering me some fruit and a bottle of water which was on the table. They told me that they felt relieved to have more time to rehearse, as the training had been postponed for several months due to COVID-19. They have been spending time refining their presentations, following several online rehearsals with their supervisors who were based in the MORU head office in Bangkok. They told me that they wanted to do the best they could on this project because it is considered a flagship initiative for MORU's work which is recognised at the national level.

Both MORU and MOPH officials believe that changing the behaviour of rice farmers is the key method to prevent melioidosis infection. In an interview with Dr Ek in Bangkok earlier in the year, he insisted that rice farmers must adapt their farming practices to protect themselves from melioidosis. He said farmers should wear rubber boots in rice fields. This would prevent them from having direct contact with the bacteria in the soil and the water, especially if they have cuts and wounds on their toes or legs. He insisted that rice farmers must be convinced to adopt the recommended behaviour to reduce melioidosis infections:

The options to prevent the disease are limited... Social distancing can reduce flu. But for melioidosis, farmers will continue to go to the rice fields. Melioidosis won't be reduced unless they wear rubber boots...

We don't want to cause panic, but we must advocate for them to change their behaviour.

How is it that farmers in Japan, South Korea and Taiwan wear boots and waterproof jumpsuits when they go into rice fields, while Thai farmers don't? The excuse we often hear is that it is too hot and humid, but in some parts of those countries, it is also hot in the summer. They [Thai farmers] don't want to wear boots because it slows down their work, and they have a myth that

wearing boots can cause blisters on their feet... because the boots are usually too big for them.

The research (Suntornsut et al. 2021; Suntornsut et al. 2018; Limmathurotsakul 2018), which is a blueprint for this project, involved providing participants with information on melioidosis and engaging them in activities like trying on different kinds of rubber boots, using different kinds of kettles to boil water for drinking, taking photographs of participants with the boots and kettle, and asking them to write a pledge to take actions to prevent melioidosis infection. Dr Ek said since most participants are elderly farmers, they liked the idea of having a wall-hanging calendar with their photograph to take back home:

During home visits, our team found that the calendars were still on the wall in some homes, although the year had passed.... We hope the calendar stood as a reminder, as we had intended.

Nat, another MORU researcher said she was hopeful that this project would not only reduce melioidosis infections, but it would also bring down other waterborne diseases or skin infections because it advocated for farmers to wear rubber boots in rice fields and to drink boiled water. She pulled out the brochure they developed (see Figure 11), saying it contains comprehensive information farmers need to know, to protect themselves.



Figure 11: Melioidosis educational brochures.

Two melioidosis educational brochures distributed to participants in the behaviour change study. The one on the left is about wearing rubber boots, while the one on the right is about drinking boiled water to prevent melioidosis infection. Source: (Limmathurotsakul 2018).

Nat said the plan was for MOPH to reproduce the two brochures shown in Figure 11 for the MOPH project. The one on the left is titled “Wear boots every day to prevent melioidosis” (shown in red). It provides images of different kinds and colours of rubber boots, with some descriptions like “without thick heels”. It also provides instructions like “wear socks” and “use talcum powder”. The brochure also shows images with messages like “prevent cuts from cherry shells”, “prevent chemicals”, “prevent leptospirosis”, and “prevent melioidosis”. The second brochure on the right is titled “Boil water for drinking to prevent these diseases”, with messages like “because diabetes patients are prone to risks of opportunistic infections which affect the eyes, the kidney, the heart and the feet”, alongside an illustration of the eye, kidneys, heart and foot. The brochure also shows different kinds of water flasks and kettles, from electronic ones to the ones placed on a stove, while stating the message “since melioidosis bacteria is present in various kinds of water sources including tap water, rainwater, well water, and underground water, drinking it without boiling can cause this disease”.

Unlike residents of big cities like Bangkok where we consume filtered tap water, most of the people I met in Ubon bought water for drinking. This includes the private homes of farmers, melioidosis patients, health workers, and workplaces, including the health centre and the hospital. When I raised this as a question to Nat, she agreed and said some messages may have to be adjusted to correspond with the changing lifestyle.

Asking farmers to wear rubber boots for farming and to boil their water for drinking is prioritised by MOPH and MORU researchers as a risk-minimising strategy. Dr Ek emphasised the value of the evidence obtained through sound scientific RCT methods which identify the behaviour of rice farmers as being problematic and require to be intervened with. Although MORU has invested in this multi-year study, changing behaviour of individuals while overlooking the cultural perceptions and representations (Nichter and Nichter 1996) can be challenging, as evidence from other anthropological studies suggests. Health education messages that are insensitive to local practices and concerns can be ineffective and a waste of time and resources (Nichter and Nichter 1996; Nichter 2008). Additionally, by focusing on farmers' behaviours, attention is diverted from the broader importance of addressing melioidosis in relation to rice cultivation, which is important to Thai culture and political economy, as I have discussed in the previous chapter. The limited ability to address these wider institutional and structural factors (Willis and Chandler 2019) can limit the success of melioidosis prevention.

Fear as a technique for disease awareness

Nat further explained the study design, stating that participants were divided into three groups, each of which were given varying kinds of information and were engaged through different activities. One group received the “full intervention” which involved measuring blood-sugar levels, followed by the provision of basic information about the research without mentioning that it was for melioidosis prevention. The research team later reached out to the participants individually by telephone and arranged for information through small groups in a local health facility on the same day the patients arrived for diabetes-related follow-up appointments.

These sessions began with an introduction by a moderator. The participants were then made to watch six short videos, which included interviews with melioidosis patients who shared their severe illness experiences. They also heard stories from relatives of some patients who died of melioidosis through recorded videos. The video session was followed by a short group discussion. Nat said the deployment of fear-based tactics turned out to be effective in raising the participants' concerns about melioidosis, and they were hopeful that it would encourage them to adopt the recommended behaviours to prevent its infection:

We showed videos of diabetes patients who had melioidosis with the hope that the message connected with them personally. All the patients projected [on video] had severe [melioidosis] symptoms. All of them were farmers with diabetes. Our strategy was to raise awareness by provoking fear. We wanted them to be concerned because they had not heard of melioidosis before.

Another technique we used was to discuss melioidosis-related deaths as an example...They heard [from the video] of what happened...and the activities carried out by melioidosis patients who died are similar to what they practice. We think it makes them scared.

The group discussion was followed by activities related to wearing rubber boots. The participants were given several knee-high rubber boots with varying thickness and flexibility to try on and walk around with. They were asked to rate the level of comfortability of each type of boot. Another activity involved discussions about drinking boiled water. The moderator led a discussion about the different ways in which the participants could boil their water for drinking. These include the use of traditional tin kettles over coal fire and modern electric water kettles. Nat said they also discussed the conveniences and inconveniences related to boiling water and the importance of creating an enabling environment at home for storing boiled water for drinking. This activity was followed by another activity which focused on making participants repeat sentences related to melioidosis prevention to memorise the information which I will elaborate on below.

Towards the end of the session, the participants were photographed with rubber boots, while holding a kettle in their hand. They were also asked to write a pledge to adopt the

recommended behaviours, which were placed on a calendar along with their photograph and were given to them to take home at the end of the session. Each participant also received a pair of knee-high rubber boots, and a two-litre plastic ice bucket which they could carry to the rice fields.

Teaching farmers to memorise messages

I wanted to find out more about the prescribed ways in which rice farmers were told how to behave in rice fields and was directed to MORU's online resources where video clips and photographs from the sessions carried out during the study period are available (Limmathurotsakul 2018; Suntornsut et al. 2018). I extracted an excerpt from one of the sessions to provide a glimpse into how it was conducted.

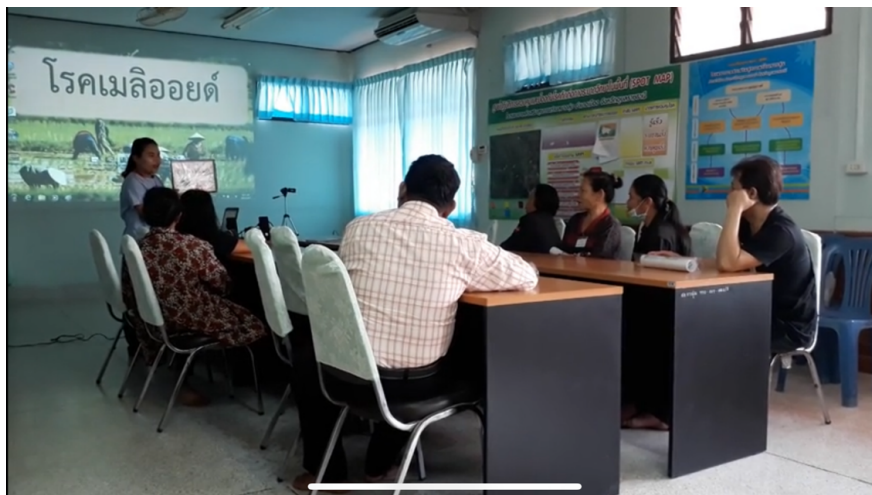


Figure 12: Melioidosis training session.

A face-to-face training session held with diabetes patients as part of the behaviour change research. This photo is a screenshot of a recorded video session from (Limmathurotsakul 2018).

During one of the sessions, as shown in Figure 12, a MORU research assistant stood at the head of the table in a hospital meeting room with seven participants around the table. She shouted out parts of the key messages, following which she asked the participants to repeat each message thrice:

Research assistant:	To drink
Participants:	Boil water
Research assistant:	To drink
Participants:	Boil water
Research assistant:	To drink
Participants:	Boil water
Research assistant:	To farm
Participants:	Wear boots
Research assistant:	To farm
Participants:	Wear boots
Research assistant:	To farm
Participants:	Wear boots
Research assistant:	To prevent
Participants:	Melioidosis
Research assistant:	To prevent
Participants:	Melioidosis
Research assistant:	To prevent
Participants:	Melioidosis

Nat said the rationale for making participants repeat the information thrice was because melioidosis is a disease with a “strange” or unfamiliar name. She said the activity was organised to support participants to memorise the name of the disease. She insisted that it was important for them to repeat the sentences several times so that they could recall the information, particularly the name of the disease. Nat said that being able to recall “melioidosis” is an important part of the awareness activity. In our discussion at this point, I was prompted to ask her why there was very little publicly available information on melioidosis in Thailand. Her response was blunt. She said she did not want to discuss this matter as it was beyond the scope of the research she was involved in.

The two key behaviours and messages the RCT focused on were for rice farmers to wear rubber boots and drink boiled water. Dr Ek said this was a successfully tried and tested approach and is based on the ‘behaviour change wheel’ which was identified as an option for delivering multifaceted prevention programmes aimed at changing behaviours as a health intervention (Michie, Atkins, and West 2014). The objective of this approach was to use education, persuasion, incentivisation, coercion, (role) modeling, and environmental restructuring to enable farmers to change their behaviours (Suntornsut et al. 2018). Melioidosis researchers and MOPH officials were hopeful that rice farmers would willingly adopt the wearing of rubber boots, insisting that advocating it as a measure to prevent melioidosis was necessary. Dr Ek said:

There is evidence that wearing rubber boots in rice fields works. We need to advocate better.

Although a published paper on the study stated that clear benefits of this multifaceted prevention programme for melioidosis were not observed (Suntornsut et al. 2021), MOPH decided to use it as a model for training rice farmers on the grounds that it was “acceptable” to participants in the trial. The study measured participants’ behaviour against two outcomes: hospital admissions for general infectious diseases, and confirmation of melioidosis infection. It showed that hospitalisation was not significantly lower among patients confirmed with melioidosis (ibid.).

Some rice farmers I had the opportunity to discuss wearing rubber boots with told me that they sometimes wore them, but mainly to protect themselves from getting cuts caused by stamping on small cherry shells which are commonly found in rice fields. They said wearing rubber boots, even light ones, felt uncomfortable, especially because of the heat and humidity. The average temperature in Ubon ranges between thirty-two and thirty-six degrees Celsius. Some farmers said wearing rubber boots makes them take several breaks for fresh air, as it makes them feel uncomfortable. They also explained that it was quicker and more comfortable to work bare feet or with rubber slippers. Walking in rice fields with boots makes their boots sink into the soil more, some farmers stated.

Anthropological studies have increasingly demonstrated the limits and challenges in conventional ideas in controlling infectious diseases which focus on localising places, people or animals, associating them with pathogens, vectors, and hosts, without considering the broader issues that influence and shape them (Harper 2006, 2014; Porter 2019; Nading 2014; Brown 2019; Kelly and Beisel 2011). Evidence from bird flu (Porter 2019), dengue (Nading 2014), tuberculosis (Harper 2006, 2014), malaria (Kelly and Beisel 2011), HIV (Farmer 2006; Marsland 2012) and Ebola (Brown 2019) show that responses to infectious diseases conceptualised with to contain pathogens by focusing on confining locations, or on controlling people, animals or insects, are futile to reducing disease risks. This is mainly because, like melioidosis, the pathogens are widely present in the environment and human interactions with the environment. Additionally, the approaches used during the melioidosis training where participants are made to repeat key messages reflect on particular rationales melioidosis policymakers and researchers actualise through this project. It subjects rice farmers with diabetes to particular ways of learning about the disease. In addition to associating behaviours of individual farmers as risk behaviours, it is focused on fear-based approaches. Such practices demonstrate the simplistic ways in which health authorities and researchers have chosen to deal with melioidosis, which is a biosocially complex disease, as I have discussed in the Introduction Chapter.

This melioidosis prevention initiative subjects rice farmers to wearing rubber boots for farming, while avoiding addressing the relationship between rice cultivation and melioidosis infection. It also overlooks the significance of microbial life and the broader ecosystem, a challenge raised by melioidosis scientists like Dr Currie, with whose quote I began my thesis.

By subjecting farmers to wearing rubber boots for rice cultivation, they place the blame on farmers for putting themselves at risk of melioidosis infection by not wearing rubber boots. This responsibility to manage the risks of melioidosis is placed unduly on individual farmers, thereby responsabilising (Rose and Miller 2013) them with melioidosis prevention. Such choices, like choices of care, can deceive patients into making decisions against their freedom or desire, says Mol (2008). They can also be deployed by institutions to draw funding while responsabilising people impacted by the disease, as Ayaz Qureshi (2022) discusses about AIDS in Pakistan, where he demonstrates how AIDS NGOs responsabilise commercial sex workers, transgender people, homosexual men and injecting drug users to gain international funding for their organisations.

Conclusion

This chapter demonstrates how melioidosis is made visible through the national health policy and prioritised activities. I begin the chapter by providing a background on how Thailand's melioidosis policy came to be formulated and launched in 2020 – 2021 through MORU's influence. In the early days of their engagement with national health officials, MORU involved foreign institutions influential to Thailand's public health policymakers like the CDC in melioidosis-related discussions. They worked with MOPH officials to produce evidence through research collaboration and used it to demonstrate the burden of the disease on the national health system. They also supported the health officials in developing the first national guideline on melioidosis and in establishing a national programme on the disease under One Health.

The chapter discussed how melioidosis is used to showcase the work of this newly established One Health Programme, despite a modest budget. For this reason, health administrators who are responsible for reporting performance indicators to MOPH were prioritised for the melioidosis training, the content of which seemed to have been designed for health workers responsible for taking care of melioidosis patients. The chapter highlighted the melioidosis prevention project which involved training local health workers to educate *Isan* rice farmers with diabetes to protect themselves from melioidosis by wearing rubber boots in rice fields

and drinking boiled water. These activities were modelled from a multi-year RCT which focused on recruiting large numbers of participants to generate sound quantitative results while ignoring the social, political, and economic factors which influence behaviours and practices. The behavioural interventions, I have argued, are deployed as a quick fix to the complex melioidosis challenges. Structural factors that shape social actions which contribute to melioidosis infection, like rice cultivation which is entangled with the Thai culture, identity, economy, and politics, as discussed in Chapter Two, would not be resolved through changing the behaviours of rice farmers.

Despite this shift in the Thai government's attention towards melioidosis, it is done through poorly conceived interventions that focus on narrow approaches aimed at changing the behaviour of rice farmers. Narrowly conceived scientific responses may lead to unintended consequences and repeated harmful public practices (Ganguli-Mitra et al. 2020). Additionally, this health awareness initiative is based on outdated ideas that are not compatible with people's farming practices and ways of living. The project is modelled from a study that focuses on provoking fear to convince farmers to wear rubber boots for farming and to boil water for drinking while failing to consider lived realities. It aggravates the stereotypes of *Isan* people with poor health, behaviours and lifestyle (Asavarut et al. 2016; Lefferts 2005).

Disease control policies and practices that tend to simplify the complexities of the management of infectious diseases through simple activities that focus on production guidelines, standardised procedures (Brown 2019) and ineffective health education (Nichter and Nichter 1996) tend to place the responsibility on the people to navigate through the complexities on their own (Rose and Miller 2013). In this chapter, I have demonstrated that the activities prioritised focus on responsabilising rice farmers by placing the responsibility for preventing melioidosis on them by advising them to wear rubber boots. This means the blame would also be placed on them if they get infected with melioidosis because they have not followed the health advice. Projects of such kind subject individual farmers to the responsibility of and blame for melioidosis infection, while needing them to continue with rice cultivation to sustain their livelihoods, the nation's economy and the national identity as discussed in Chapter Two. This is what makes the relationship between rice, farming and melioidosis infection fragile, thus contributing to the enigma of melioidosis.

The government's melioidosis advice is framed within the logic of behavioural choice, which oversimplifies the response to melioidosis and glosses over the wider and evolving knowledge derived from biomedical research carried out in Thailand and other countries, which I will go on to discuss in the next chapter. The chapter takes stock of how melioidosis came to be researched in Thailand with the support of British institutions and philanthropists interested in tropical medicine. It discusses the contribution decades of melioidosis research carried out in Thailand made to the global biomedical knowledge on the disease. It discusses the recognition of MORU and Sunpasit Hospital as experts in melioidosis, and the role and contribution of both research and *barami*, which is a form of Thai social capital that has contributed to this recognition.

Chapter 4: *Barami* and melioidosis research in Thailand

The opportunities of a pathologist at a large Eastern Hospital are many; but his time for research work is short, and his conveniences are few. I, therefore, feel that we, at the laboratory of the Rangoon General Hospital, are more than unusually fortunate to be able to give, within the first two years of the official existence of the Laboratory, an account of a strange disease. Doubtless it is to chance that we owe the first discrimination of the disease; but I hope that it has been by accurate observation and precise experiment that have sought to fulfill our knowledge.

- Alfred Whitmore, British pathologist on his documentation of the identification of BP (Whitmore 1913).

The previous chapter demonstrated the assertive role and influence melioidosis researchers have in shaping Thailand's national policy on the disease. This chapter considers melioidosis as an object of scientific research through various spaces and relationships that have contributed to the production of scientific knowledge and its significance in Thailand. This chapter attempts to understand how research on a disease of low public health interest came to be constructed as an object of evidence to demonstrate its public health impact, thus making the disease visible in Thailand and internationally. Drawing on Crystal Biruk's (2018) argument that data is not simply objective and neutral but is often shaped by biases and interests of researchers, institutions and funders, the chapter examines how MORU emerged as a key melioidosis research institution in Thailand and globally. *In Cooking Data: Culture and Politics in an African Research World*, Biruk argues that medical research is not conducted in a vacuum, and whether intentionally or unintentionally, data can be "cooked" or manipulated to fit the narratives or agendas. She demonstrates that research is influenced by the socio-

cultural and political contexts in which it takes place, including the power dynamics, funding resources, institutional pressures, and historical legacies. I am interested in finding out what led to the establishment of melioidosis research in Thailand, and how was the scientific knowledge produced. How did MORU position itself and what kind of relationship emerged out of their work in Sunpasit Hospital? The argument I make in this chapter is that melioidosis is stabilised in Sunpasit Hospital through Mol's (2002) multiple enactments, which have made the hospital what Gieryn (2018) terms "truth spots" for melioidosis. In considering the socio-cultural and political contexts in which melioidosis research takes place in Thailand, I draw on the historical and political analyses of *barami*, a form of Thai social capital, which, I argue, has contributed to making melioidosis visible in Thailand's health policy.

In what follows, I provide an account of the everyday practices of melioidosis research and their findings which have led to the visibility of the disease, particularly in biomedical research spaces. I begin with a background on the institutionalisation of tropical medicine and the establishment of MORU in Thailand. I then discuss how MORU established their expertise through decades of research collaboration on a little-known infectious disease, in a tertiary care health facility in provincial Thailand, with foreign funding and support. I demonstrate their contributions to the global biomedical community and in Thailand through the production of knowledge and understanding about melioidosis. I also discuss how MORU and Sunpasit Hospital came to be known as experts on melioidosis nationally and internationally.

Institutionalising tropical medicine in Thailand

The expansion of Britain's interests to advance politically and commercially through the expansion of research in tropical medicine (Harrison 2010; Hirsch 2021; Saha 2012; Packard 2016, 2011; Arce and Fisher 1999) arrived in Thailand only in the 1960s, with the establishment of the first Tropical Medicine Hospital through collaboration with Liverpool School of Tropical Medicine (Mahidol University Tropical Medicine Hospital 2022). This hospital is affiliated with Mahidol University, an educational institution born out of the country's first Western Hospital, Siriraj in the late 1880s (Charuluxananan and Chentanez 2007). The institute's research priority was drug-resistant malaria, which was then an

emerging public health threat first detected in the gem mining areas along the Thai-Cambodian border in the 1950s (Packard 2011). Before that, tropical medicine was mainstream in public health and medicine in tropical Thailand.

In the late 1970s, after spending several years travelling as physicians and researchers in Asia, Africa, Latin America, and Papua New Guinea, Dr David Warrell and his wife Mary from Oxford University set up a “Wellcome Unit” in Bangkok. This unit’s name was later changed to MORU, to establish formal recognition of the collaboration between Mahidol University and Britain’s Oxford University. This collaboration places Oxford University among research institutions supporting knowledge production on malaria and other tropical diseases in developing countries, according to the Oxford University website (University of Oxford History of tropical medicine at oxford):

The genesis of Oxford’s involvement [in tropical medicine] goes back to a conversation over a bottle of whiskey, between David Weatherall and Peter Williams, the then Director of the Wellcome Trust, in New York in 1977. This led to David Warrell establishing the Mahidol-Oxford Tropical Medicine Research Unit in Bangkok and Weatherall, in the words of Peter Williams, became the “Fairy Godmother” of the Oxford researchers who went to work in the tropics.

After establishing themselves in Bangkok, they continued to collaborate with hospitals on clinical trials to identify treatments for drug-resistant malaria, including in Phrapokklao Hospital in Chanthaburi, the Thai province bordering a mountainous region in Cambodia. The province was popular for its gemstone market. Many patients treated in the hospital during that period were gem mine workers (Foreign Broadcast Information Service 30 July 1990). Since then, through the years, MORU’s research in Thailand expanded beyond malaria, to other health concerns, including melioidosis, antimicrobial resistance (AMR), and more recently, COVID-19.

Locating melioidosis in Thailand

Following its first documentation in Myanmar in 1911, melioidosis was reported in Malaysia in 1924, in Vietnam in 1925 and in Indonesia in 1929 (Dance and Limmathurotsakul 2019). In Thailand, it was first documented in a military hospital over two decades after neighbouring countries, in 1955 (Leelarasamee 2000). This was around the period when Thailand's hospital services were slowly extended to the provincial areas³⁹ (Muksong and Chuengsatiansup 2012; Reynolds 2005). In 1975, melioidosis was brought to the attention of the National Infectious Disease Group⁴⁰, a network of Thai infectious disease physicians (Leelarasamee 2000) established with the support of the Rockefeller Foundation in 1972 (Punyagupta 2022). After that, melioidosis was occasionally discussed in the group's annual meetings, said Dr Wan, a prominent melioidosis researcher who headed decades of melioidosis research at Sunpasit Hospital. In her eighties, Dr Wan continues to work as a senior advisor in one of the largest private hospitals in Ubon.

The emerging bug

Dr Wan graduated from Siriraj Hospital in the 1970s and went to work at Sunpasit Hospital in Ubon soon after. In 1983-84, as part of her routine patient care, her attention was drawn to an emerging bug identified in the hospital's laboratory. Jai, the hospital microbiologist who routinely cultured bacteria in the laboratory, noticed something unfamiliar developing on the bacteria culture plates. She notified Dr Wan about it, and they discussed it extensively, trying to figure out what this bug was as it was suspected to cause severe illness in patients. Dr Wan consulted with her professor based in Siriraj Hospital who advised them to dye patients' sputum with a fluorescent liquid to find out if it was a gram-negative bacterium⁴¹. The safety-pin-shaped bacteria which became visible through the dying technique, was later confirmed to be BP which causes melioidosis:

³⁹ The MOPH was established in 1942, prior to which health care was centred in Bangkok.

⁴⁰ The group formally registered as the Infectious Disease Association of Thailand in 1982.

⁴¹ A group of bacteria which can cause serious health problems.

After that, our lab[oratory] technicians learnt the techniques of dying to identify gram-negative strains, and we were able to confirm that our patients had melioidosis.

It must have been there a long time ago, but we weren't able to detect it earlier. We thought it was *pseudomonas*⁴², but it turned out to be *pseudomonas pseudomallei* (another name for BP). We must admit that this (to be able to detect something unusual on the bacteria culture plates) requires enthusiasm and cautiousness on the part of lab[oratory] technicians.

These days, a technician wouldn't know about it if a doctor didn't ask them to look for it because they don't get to learn about these things⁴³ (identifying melioidosis).

While the dying technique helps with identifying the presence of gram-negative bacteria under the microscope, BP can be made visible to the naked eye through bacteria culture techniques (which I elaborate on in Chapter Five). However, these techniques must be accompanied by the experience and expertise of laboratory technicians, said Dr Wan. She said as more patients were being identified in the hospital, she realised that they were coming to the hospital only when they were in critical condition and that many melioidosis patients died a few days following hospitalisation.

By chance or by choice

Like the establishment of the Wellcome Unit in Thailand which emerged from a casual conversation, melioidosis researchers share anecdotes of what they refer to as a chance encounter between Dr Wan and Dr Tom from MORU which led to decades of melioidosis research in Thailand. In September 1985, during one of her regular weekend visits to see her

⁴² *Pseudomonas* is a family of gram-negative bacteria which does not cause illness among generally healthy persons. It can, however, make an immune compromised person sick.

⁴³ Melioidosis was introduced to medical schools in recent decades, as an endemic disease in *Isan*.

husband, who was the director of Phrapokklao Hospital in Chanthaburi province, Dr Wan met Dr Tom. The British tropical medicine doctor was at that time coordinating a malaria project for MORU. They collaborated with Phrapokklao Hospital on clinical trials to identify treatments for drug-resistant malaria.

In recalling their first meeting, Dr Tom told me how they met in an interview via Microsoft Teams:

I met her and her husband at their place, over a drink. She told me that she was preparing for her talk on melioidosis, and I said, well fantastic, how interesting, and we got talking about it. To cut the long story short, she said why don't you come up and take a look and see if there is any opportunity for research...

So, I suppose, right, fascinating. Now at that stage, I didn't know very much about melioidosis. Like most people, we didn't consider this disease important, but Thailand started to diagnose it because there was substantial improvement in the hospital infrastructure.

After returning to his office in Bangkok, Dr Tom decided to take up Dr Wan's invitation to visit Sunpasit Hospital in Ubon. Dr Wan's major concern at that time was that most patients admitted to the hospital developed septic shock and died within a few days of hospitalisation. She also presented her concerns to the national infectious disease group meeting, where she later learnt that over six hundred melioidosis infections were reported in the country between 1955 and 1985 (Melioidosis Info September 2013). The meeting concluded that sepsis was the main cause of death among melioidosis patients, and the experts agreed that more research was needed to understand the disease and that data should be systematically collected (ibid.).

In deciding to visit Sunpasit Hospital, Dr Tom wanted to explore opportunities and new avenues for research collaboration. He was preparing to resume directorship of MORU and wanted to see if the organisation's research could extend beyond malaria. He admitted that although he was curious to find out more about melioidosis, he did not think much of it at that time. However, after visiting the hospital and seeing the capacity of its laboratory and the

wards, he paid more attention to the disease. Jai showed him several culture plates with BP, and Dr Wan took him around the wards to see her patients:

I was amazed... It was a very good hospital, very well organised, with some good physicians. And *Khun*⁴⁴ Jai, who oversaw the lab[oratory] said, look, I've got all these isolates. She started to culture the bacteria and identify the organism which had not been identified in the hospital before.

So, we continued to discuss, and I thought, well, one of the things we could do is some research on it to try to improve treatment because, in those days, it was a terrible disease. Four out of every five patients who got it died. You don't want to have a disease like that.

Dr Wan was keen to study the use of alternative antibiotics as many patients experienced strong side effects from the conventional treatment which involved co-trimoxazole, chloramphenicol and doxycycline. In those days, health care was not free in Thailand and antibiotics were expensive and had to be imported. Dr Wan was interested in comparing it with the use of ceftazidime, a new antibiotic that was marketed in 1984 and was successfully used for treating pneumonia patients in Hong Kong. She managed to convince Dr Tom, who developed a proposal for the study after returning to his office in Bangkok. After obtaining approval for the study, Dr Wan was approached by some senior Thai infectious disease experts, asking her to join their research which would compare multiple antibiotic use, including ceftazidime, in Ubon and Khonkaen, another *Isan* province. She said since the proposal with Dr Tom had advanced, and he was already negotiating for drugs from the Britain-based pharmaceutical company, she had to decline their offer. That upset the senior experts and led to decades of tensions between the Ubon group and the other group that also began research on melioidosis in Khonkaen.

Although the narrative shared among the melioidosis research community on the origins of melioidosis research in Thailand gives credit to "chance" which led to melioidosis research in Thailand, evidence from their interviews discussed above demonstrates that it was the decisions and deliberate choices made by Dr Tom and Dr Wan to collaborate on melioidosis

⁴⁴ A formal title or polite way of referring to a person.

research. Dr Tom decided to study melioidosis after visiting Sunpasit Hospital and witnessing their capacities for identifying the microbe. Rather than considering the collaboration based on fragile infrastructures or the scientific vulnerability of a place (Street 2014, 2016), or the public health system (Geissler 2011a), Dr Tom was drawn to the established infrastructure and capacities he observed in Sunpasit Hospital which gave him the confidence to partner in melioidosis research. Additionally, Dr Wan made a conscious decision to collaborate with MORU instead of joining with the Thai infectious disease experts. With extensive research carried out over the decades, and their findings published in renowned international medical journals, in English, MORU was able to establish partnerships with multiple countries in Asia and Africa on melioidosis research. MORU used its base in Bangkok and in Sunpasit Hospital to expand its knowledge network on melioidosis internationally.

Establishing expertise

In 1986, Dr Tom made several visits to Sunpasit Hospital to learn about melioidosis. By that time, he had become the director of MORU and was able to support his Bangkok-based microbiologist with additional laboratory training in the United Kingdom. He also recruited another British physician to lead the project in Ubon. Both Kan and Dr James received training on bleeding horses so that they could develop their own blood culture plates, which were not commercially available in Thailand during that time. They also learnt different techniques required for mixing chemical broths and for developing solutions they would need to culture the BP bacteria. When they returned to Thailand in 1986, they began their first clinical trial in Sunpasit Hospital.

Dr Tom and Dr James drove over six hundred kilometres from Bangkok to Ubon with all the equipment they needed to set up the MORU laboratory in Sunpasit Hospital. They took with them fridge-size incubators, bacteria culture plates, gas wire loops, Bunsen burners, and Analytical Profile Index (API) kits used for identifying gram-positive and gram-negative bacteria. Dr James elaborated on how they set up the research laboratory in the hospital:

It was a pretty basic microbiology lab[oratory] and we had incubators, fridges and freezers. I remember Tom was keen on getting an ice cream freezer to use in the lab[oratory].

We had quite a nice big room actually, in a block which was empty...That one room was sort of doubling as an office where we did the paperwork on one side and the lab[oratory] work on the other side. So, in the next three years, we basically did the same thing every year.

This laboratory was where Dr James and Kan were based during what they called the “Ubon season”, or during the period when they recruited patients for the clinical trial and followed up on the progress of the study. The MORU team carried out their research without much interaction with the hospital’s administration, the relationship was managed by Dr Wan who soon assumed a senior position in the tertiary care hospital who was responsible for the research work carried out in the hospital. Some interlocutors told me that in those days, the hospital’s administration did not pay much attention to melioidosis research because the disease was not of interest to national health authorities. The ethics approvals for clinical trials in state-run hospitals were managed by affiliated academic institutions, in this case, Mahidol University, and the use of drugs by the Food and Drug Administration. Ethics for clinical research in Thailand was streamlined with the enforcement of the Ethical Guidelines for Research in Human Subjects in Thailand in 2002, revised in 2007, with the clearance procedures for research on human subjects considered by the Central Research Ethics Committee.

Researchers’ routines

A regular workday for Kan and Dr James involved visiting patients in the wards to collect their bodily fluids which were then brought into the laboratory for bacteria culture. During the ward visits, they also studied patients’ records and had discussions with nurses. Kan said as researchers, although they were not allowed to intervene in patient care, they were often consulted by the nurses, doctors and the medical interns on duty. Family members of patients, who were often at their bedsides throughout their hospitalisation also discussed the patients’

conditions with them. She explained that this meant that they did not engage in bedside diagnosis or treatment of patients and maintained their status as researchers. However, since their focus was on studying melioidosis, they were often asked to provide their “expert opinion” by the junior doctors, nurses, and patients’ families.

Perceived as melioidosis experts, Kan and Dr James were frequently called upon, including during odd hours, to observe patients who were suspected of melioidosis. Kan said they did not mind this because they were keen to recruit new patients. She had a dual role of being a researcher and an interpreter for Dr James who did not speak Thai. Dr James drew attention every time he walked around in the hospital and was referred to as *mor farang* (Caucasian doctor). Impressions towards Westerners, based on the value given to their knowledge and practices, have a particular place in Thai society and are specifically observed in medicine and public health (Muksong and Chuengsatiansup 2012). Since the colonial era, Thai rulers have adopted Western colonial practices, particularly in relation to the bureaucracy, to demonstrate the embracement of development (Muksong and Chuengsatiansup 2012; Harrison, Jackson, and Chakrabarty 2010). Dr James’ presence became a social capital which strengthened the credibility of MORU among the hospital staff, the patients, and their families. According to Nuan, the patient’s daughter I referred to at the beginning of this thesis, the *mor farang* in Sunpasit Hospital with melioidosis expertise helped save her mother’s life. I met her about two decades after her mother was treated for melioidosis at Sunpasit Hospital. She said after being in and out of the district hospital multiple times and receiving months of treatment for diseases like TB, her mother did not recover. She was later transferred to Sunpasit Hospital:

They gave her lots of medicine but her condition didn’t improve...it worsened...doctors didn’t say what it was. There was a *mor farang* who came and took blood tests... And then *mor farang* came every day. The Thai doctor who came with him said they were testing different diseases... After some time, they told us that she had melioi[dosis], and they gave her medicine for the disease. She took a lot of medicine. She stayed there (in the hospital) for many months.

Now she is doing well.

Nuan's perception of *mor farang* being superior to Thai doctors is not surprising as the general perception of Caucasians in Thai society is associated with power and prestige. In a historical review of the construction of Thai manners, Patrick Jory (2021) says, although Thailand was never formally colonised like its neighbours, Thai aristocrats adopted Westernisation as a form of bourgeoisie mode of living. Their quest for modernity (Aphornsuvan 2009) led to the construction of *Thainess* through adopting Western values, while maintaining control over the wider local public (Harrison, Jackson, and Chakrabarty 2010). Rachel Harrison et al. explains this colonial governance mentality with Thai cultural control as a hybrid character of the Thai-Western cultural interrelationships practice which involves the adoption of Western values, while emphasising control over local subjects (Harrison, Jackson, and Chakrabarty 2010; Reynolds 2005). Such forms of governance are rooted in the context of racism and subjectivity inherent in the legacy of colonialism in biomedicine (Briggs 2005; Scott 2005; Hirsch 2021).

The making of truth spots

The research team spent the first couple of years closely observing the patients with melioidosis and the microbe to try to understand the disease. Kan said they took every opportunity they were given to see patients because they wanted to document every detail related to the disease:

On some days we were woken up at one or two o'clock in the morning. Sometimes, when the phone rang, I felt like throwing it away [laugh], but I got up and went (to the hospital). I have been in situations where I struggled to keep my eyes open. It has definitely been challenging, but when I saw the patients, it reminded me of how severe the disease is. We had to do something to help the patients. I was fortunate to work with world experts.

To learn about melioidosis, Kan and Dr James observed and documented every detail they could. They took detailed notes from the time the patients entered the hospital, documenting their conditions, the treatment they received, and their health outcomes. They paid close

attention to the number of days the patients spent in intensive care before they were transferred to other wards for recovery, or to the morgue, following their deaths. Kan said they focused on studying the biological prognosis of the disease through its manifestation in different parts of patients' bodies. Many patients did not survive, she said, adding that these details allowed them to construct a clearer picture of the disease. It led them to understand the pattern of patients' hospitalisation, which came a couple of weeks after the start of the monsoon season. They also noticed that most patients with the disease were rice farmers. In the 1980s, most *Isan* residents were rice farmers (Baker and Phongpaichit 2009). As discussed in Chapter Two, rice sustains Thai society and fosters social relations. For this reason, discussions on the association between melioidosis and rice cultivation have not been broadly discussed in the context of Thailand's policies and practices that promote rice cultivation. Observations on high incidents of melioidosis infection among rice farmers led Kan and Dr James to initiate several other studies to better understand the disease in the decades that followed.

Since 1986, the work of the MORU team led by a British doctor and a Thai microbiologist has led to the establishment of the MORU laboratory and Sunpasit Hospital as truth spots for melioidosis. This is the place where the "truth" is skilfully made, where it becomes inseparable from the geographical location (Gieryn 2018). It is where the meaning and value of scientific work led to the belief in this place as truth spots (ibid.). This truth was established through the development of expertise on the disease, which Kan and Dr James did through building social relations with the nurses in the wards, the junior doctors, the medical interns, and the patients' families, during their ward visits. A key instrument that facilitated the establishment of this truth is the hospital infrastructure which facilitates the identification of melioidosis, which I will elaborate on in the next chapter. The close observations researchers made in the early years of their work and the documentation of the details which generated their discussions and ideas allowed them to maintain ownership of the knowledge (Biruk 2018) derived from what they learnt from the patients and the microbe they studied in the laboratory and the hospital. This enabled them to generate new evidence and new ideas for future research, thus making papers as important as blood in medical research (Whyte 2011). It led them to become experts in melioidosis.

Demonstrating expertise

While MORU's work in Sunpasit Hospital progressed and enabled them to collect more data on melioidosis, the work of the other group of infectious disease experts working in Khonkaen developed at a slower pace. This caused further tensions between Dr Wan and her colleagues, who perceived her as a competitor. Dr Wan said the fact that the MORU - Sunpasit Hospital study was able to publish their study in a prestigious international medical journal before the other group, led to more tension. The findings of their first study which demonstrated that the use of co-trimoxazole can reduce patients' deaths by half was published in *The Lancet* in 1989 (White et al. 1989). This study became an international benchmark and is used as a criterion for standardised treatment of melioidosis patients in Thailand. The Khonkaen study which recommended the use of both antibiotics, co-trimoxazole and ceftazidime to reduce overall mortality from severe melioidosis infection was published three years later in *Antimicrob Agents Chemother* (Sookpranee et al. 1992).

The apprehension between melioidosis researchers in Ubon and Khonkaen eased with a government policy that brought medical and academic institutions in *Isan* to work together towards recruiting local *Isan* residents to be trained and to practice medicine in *Isan*. The initiative to recruit and train doctors to work in rural areas of *Isan* began in 1995 to address the problem of the shortage of doctors in rural areas. With this initiative, Sunpasit Hospital became the training ground for students from medical schools in *Isan*, one of which is Khonkaen University. Dr Wan was responsible for Sunpasit Hospital's research and training and through her leadership, the relationship between the two melioidosis research teams improved over the years.

Published research

The first melioidosis trial in Ubon paved the way for decades of research collaboration between MORU and Dr Wan in Sunpasit Hospital. Several studies were carried out to compare varying combinations of antibiotics for treating melioidosis patients at different stages of illness (Dance et al. 1989; Wuthiekanun et al. 2011; Vanaporn Wuthiekanun et al. 2005; Chierakul, Anunnatsiri, et al. 2005; Suputtamongkol, Rajchanuwong, et al. 1994;

Suputtamongkol et al. 2000). These include projects like alternative antibiotic use to eradicate BP from patients' bodies (Anunnatsiri et al. 2021; Dance 2014), and studies to monitor antibiotic resistance (Wuthiekanun et al. 2011; Dance et al. 1989). The study on alternative use of antibiotics was standardised as a treatment for patients in their second treatment phase, which is the bacteria eradication phase (Dance 2014).

As more patients recovered from melioidosis, studies were conducted to better understand the progression of the disease in different organs of the human body (Wuthiekanun and Peacock 2006; Limmathurotsakul and Peacock 2011; Chierakul, Anunnatsiri, et al. 2005). Studies showed that the bacteria infected multiple organs, including the lungs, the blood, and the bones, and that the disease can relapse in patients who have recovered from the disease (Limmathurotsakul et al. 2006). Another study showed that most melioidosis recurrence was caused by reinfection rather than relapse of the disease (Maharjan et al. 2005). Studies also showed that most patients died of septic shock (Chaowagul et al. 1993) and that diabetes was the main underlying factor that worsened disease outcomes in patients (Limmathurotsakul et al. 2013; Suputtamongkol et al. 1999; Limmathurotsakul et al. 2021). A study confirmed that HIV infection did not lead to any difference in the patient's outcomes (Chierakul, Wuthiekanun, et al. 2005).

Several studies were also carried out to identify the most appropriate medium to culture the bacteria from patients' bodily fluids. Kan and Dr James conducted several trials before concluding that Ashdown agar was the best medium to isolate BP as it made the bacteria visible within two to three days, compared to other mediums used, which can take up to five days for the bacteria to grow (Wuthiekanun et al. 1990). They also collected environmental samples from some locations to test for BP and began to monitor the growth of BP in controlled laboratory settings. Their studies led to the confirmation that BP can survive without nutrients in distilled (Wuthiekanun, Smith, and White 1995) for at least sixteen years (Pumpuang et al. 2011). A study also showed that BP can survive in carbonated drinks, including beer and energy drinks for fourteen and twenty-eight days (Wuthiekanun et al. 2020). MORU's research also showed that BP was present in marketed bottled water (Limmathurotsakul et al. 2014) and in household water (Chewapreecha et al. 2019) in Ubon.

MORU's research also showed that the bacteria can survive in multiple natural environments (Chewapreecha et al. 2022), mainly in rice fields (Hantrakun 2019; Hantrakun et al. 2016; Ong et al. 2017). Soil-based studies show that BP thrives in moist and humid soil, living in an area between surface level to ten centimetres deep (Hantrakun et al. 2016). This study shows that BP can be swept up to the surface level and infect humans more during extreme weather conditions, particularly during monsoons. A study also confirmed the correlation between hospitalisation of melioidosis patients and rainfall (Suputtamongkol, Hall, et al. 1994). A review of over 6,100 soil samples collected from sixty-one rice fields in Thailand suggests that BP thrives in nutrient-depleted soil (Hantrakun 2019). This study shows that getting rid of crop residue through burning, which is a preferred way for preparing the soil for the new farming season because it is cheap and quick, can sustain the presence of the BP bacteria in the environment⁴⁵. The burning process reduces soil nutrients which paves the way for more presence of BP because they can survive better in harsh environments when compared to other environmental pathogens, the study states. Other studies show that high temperatures and soil salination facilitate the survival and scale of the presence of BP in the environment (Hantrakun et al. 2016; Ong et al. 2017).

The significance of studies carried out by MORU in Thailand contributed to the expansion of their research base in neighbouring Laos, Cambodia, and Myanmar. The findings from their research, be it on the treatment of patients, on diagnosis with Ashdown, on the bacteria in controlled laboratory settings, and in nature (soil, water, rice fields), led to a better understanding of the microbe and melioidosis among the scientific community beyond Thailand. MORU's research also confirmed that patients can become infected with melioidosis from inhalation, ingestion, or inoculation (Hinjoy et al. 2018), where skin inoculation following exposure to soil and water was the most common mode of infection (Limmathurotsakul et al. 2013). Studies showed that not all environmental exposure to the bacteria can lead to the disease (Chewapreecha et al. 2019) and that children living in endemic areas develop antibodies against melioidosis (Wuthiekanun et al. 2006). MORU's significance is demonstrated in its leadership in convening an international network on melioidosis research

⁴⁵ This is because with burning, surface level microbes can be destroyed, while BP which is present under the soil can emerge to the surface soil level.

and in compiling studies to demonstrate the global burden of the disease on the health system, which is elaborated below.

As more studies were conducted at Sunpasit Hospital, the hospital began to identify more patients with the disease (Limmathurotsakul, Wongratanacheewin, et al. 2010). This led Ubon to report the highest numbers of melioidosis infections to the national authorities, which I will discuss in Chapter Seven. Other hospitals, including in *Isan*, which reported fewer numbers of melioidosis infections, were not engaged with routinely identifying melioidosis patients and were not involved in melioidosis research. After some years, MORU launched studies to better understand the melioidosis situation in other provinces. They conducted a multi-hospital study to compare the epidemiological data with the laboratory data from the same hospitals to highlight discrepancies in the melioidosis data reported to the national disease surveillance system, and the data from laboratory confirmation (Hantrakun et al. 2019). Their study, which is based on patient confirmation, some environmental studies, and animal outbreaks also shows that melioidosis is endemic in all regions of the country (Hinjoy et al. 2018). Reporting on melioidosis to national health authorities is a requirement under the national communicable disease law, as discussed in Chapter Three. However, in Chapter Seven, I will show that it is challenging, even for a hospital like Sunpasit where melioidosis patients are routinely identified, to accurately compile data to report to the national health authorities.

Embodied research skills

Over the years, Kan developed an interest and expertise in melioidosis. She is renowned for identifying a strain of the *Burkholderia* bacteria which is less virulent than BP. This came about while she was characterising over two hundred isolates from patients in Sunpasit Hospital and another hundred and forty soil isolates she collected over the years from the central provinces and from *Isan*. Kan identified *B. Thailandensis* strain in 1996 (Wuthiekanun et al. 1996). She often spoke of the BP bacteria as a “shy bacteria” which generally “hides” under other common bacteria like *E.coli*. She explained that laboratory technicians need to carefully study the bacteria on culture plates in order to notice BP. She said regular hands-on training among

laboratory technicians is important for confirming melioidosis infections through bacteria culture.

Kan said she deployed tactics of “not knowing” to independently learn and embody the art of recognition (Marchand 2022) of bacteria. Seeing the bacteria and using her hands to hold the culture plates gave her the job satisfaction that came with problem-solving and fact-finding:

I didn't know this bacterium. I didn't know what it looked like... I slowly learnt about it every day. It gave me the enthusiasm to go to work. I would wake up and anticipate what I would find that day. It was never boring.

It gave me a good feeling. It allowed me to learn more than science. So, for me, I consider myself very lucky to be working in this field, and it gives me pride. I never wanted to be a famous person, and all I wanted was to be able to do something I loved.

Kan acknowledged that she benefited from working with international experts, and it paved the way to international exposure:

We are fortunate that the papers we published were acknowledged as big news in medicine, and WHO also used them for recommendations [melioidosis].

The benefit of working with *farang* is that they gave me independence. I could develop my ideas, I could propose my ideas and once they (supervisors) saw that we had a reason for doing something, they allowed us to do it. They gave me the liberty to think, read, and propose what I wanted to do.

Kan's above quote on her independence to think and act reflects the Thai social hierarchy (Herzfeld 2012) where respect for seniority, which is frequently associated with age, is generally observed, including in the workplace. It also reflects on the construction of personhood in Thai society, which is influenced by social networks or people and institutions one identifies with (Vorng 2011). Being part of the international scientific community offers opportunities for the production of knowledge, which is valued highly, and is endorsed as a form of social capital. Kan's work with the international team at MORU allowed her to embody the expertise of a researcher affiliated with a Western institution. It also provides

opportunities to influence future research and adds value to her as a researcher (Wimooktanon 2018). The positions of both Dr Wan and Kan as experts on melioidosis with *farang* doctors and institutions not only paved the way for their exposure to the international scientific community through publications in scientific journals but also gave them status among the Thai medical elites. This social capital enabled MORU researchers in Thailand to network with melioidosis experts nationally and internationally.

Networking expertise

After establishing decades of research presence, MORU signed a Memorandum of Understanding with Sunpasit Hospital to formalise their support to routinely identify BP and to monitor its resistance to antibiotics (see Chapter Five). It can be said that the era during which melioidosis research expanded in Thailand and gained international recognition began in the 1990s. This was the period during which studies were published in internal medical journals. As several long-term studies on melioidosis concluded, MORU began to transition their focus to other areas of research, including on AMR, and sepsis. They also extended the scope of their work beyond research to develop networks with researchers and influence melioidosis policies nationally and internationally.

MORU established an international network of melioidosis researchers in 2015 to share knowledge, tools, and expertise to generate more evidence on the disease globally. Through an open-source web-based platform “Melioidosis Info” (Meioidosis.Info), data on the human, animal, and environmental presence of melioidosis is compiled along with maps of the global presence of the disease which is shown in the Introduction Chapter of this thesis. Tools for data collection and templates for reporting melioidosis to national authorities are also shared on the platform. The platform also provides guidance on the diagnosis and treatment of melioidosis patients. For instance, step-by-step videos on how to prepare Ashdown agar, a medium that is said to be most effective in culturing BP (Ashdown 1979; Wuthiekanun et al. 1990; Peacock et al. 2005) are made available on the site.

The International Melioidosis Society also annually convenes an international conference to discuss the latest scientific findings on the disease. Since the launch of this network,

meliodosis researchers from multiple countries have jointly published scientific papers to demonstrate the global disease burden (Limmathurtsakul and Dance 2019). Studies highlighting the challenges multiple countries face in diagnosing and in reporting meliodosis were put together in a special publication of the *Tropical Medicine and Infectious Disease Journal*, to call the attention of the global health community (ibid.). The group has also advocated for WHO to recognise meliodosis as NTD (Savelkoel et al. 2022; Dance and Limmathurtsakul 2019), a brand that comprises underfunded tropical diseases that impact marginalised communities in lower-income countries. MORU and the international meliodosis network are keen to construct meliodosis as NTD which is a visible framework in global health because they are hopeful that the social influence of the brand can bring about associated attention towards meliodosis.

MORU also significantly positioned meliodosis through policy advocacy in Thailand. As discussed in Chapter Three, after assuming a senior position in MORU, Dr Ek reached out to public health officials to draw their attention towards meliodosis. Since then, he has worked with them to generate evidence to convince policymakers about the burden of the disease to the national health system. The influential position MORU researchers in Thailand have been partly influenced by the scientific expertise they developed through the years, and partly influenced by the social capital they cultivated through being part of an international research institution. In his study of Thai leadership characteristics, Larry Persons (2016) discusses its association with Westerner or Western values. He shows how his request to interview a local politician, which led him to accompany the politician into his constituency, was perceived as a *farang* giving “face” to the politician.

To be influential in Thailand, Dr Wan acknowledged that it was important to understand the Thai bureaucracy. While the presence of British experts and international funding facilitated the international recognition and opportunities for subsequent studies, Dr Wan said it was important to position the work as being led by Thais who understand the Thai culture and can establish relationships with Thai health officials. She further elaborated that she was able to influence the management at Sunpasit Hospital and pave the way for decades of meliodosis research. Similarly, Dr Ek was able to influence health officials to pay attention to meliodosis. *Barami* (prestige), she says, is what led to their successful years of meliodosis research in the

country. Dr Wan said *barami* is needed to gain acceptance from Thai government officials and institutions:

In the beginning, we didn't have the authority to say that this was a problem. We didn't have enough power. Then Wellcome stepped in, and now we have Dr Ek who is making efforts with the public health officials to recognise this as a dangerous infectious disease...

To work with the government, we need *barami*...

Respect is important. It helps with the coordination with government officials and with the hospital staff. I had *barami* to get the work done in the hospital.

Barami is translated as prestige according to the Thai-English Cambridge Dictionary, while the online dictionary of the Office of the Royal Thai Society⁴⁶ describes the term in relation to regularly doing good deeds or the qualities that make a person big or famous. With reference to Thai historian Nidhi Aeusriwongse and political scientist Likhit Dhiravegin, Patrick Jory (2002) describes *barami* as a key leadership characteristic promoted by Thai elites to legitimise authority under the influence of *rabob upatham* or the Thai patronage system. In more recent works related to Thai mannerisms, Jory (2021) says although *barami* understood in the Thai social context is fading away from Buddhist beliefs, it continues to be associated with good conduct, high social status and male power. Michael Connors (2003), Larry Persons (2016) and Claudio Sopranzetti (2021) elaborate on the characteristics and composition of *barami* in relation to *amnat*⁴⁷ (power), *ithiphol*⁴⁸ (influence) and *saksi*⁴⁹ (dignity). While Connors and Sopranzetti continue to link *barami* as influence politicians and military rulers harness from the royal institution to accumulate their own virtues, Persons discuss it as an important characteristic of Thai political leadership. Sopranzetti (2021) says although *amnat* is a characteristic of *barami*, what transpired in Thai politics in the last two decades demonstrates that there is no distinguishment between *barami* as 'hierarchical' and *barami*

⁴⁶ The Office of the Royal Society is responsible for publishing the Royal Institute Dictionary, and manages the government's academic works under the work administered by the Prime Minister.

⁴⁷ *Amnat* in Thai leadership refers to top-down directive display of power.

⁴⁸ *Ithiphol* in Thai leadership refers to the influence and power propagated by those within close circles or entourage of the leader.

⁴⁹ *Saksi* in Thai leadership is related with honour or reputation.

as 'egalitarian *amnat*'. "To govern Thailand, one needs to have both *amnat* and *barami*, to claim moral charisma and exert institutional power, juggling both," he writes (p. 66). Persons says it is a social exchange function that creates unique expressions of community and hierarchy. He disentangles *barami* from other leadership characteristics linked to the cosmologies of the Thai patronage system, like *amnat*, *ithiphol* and *saksi*. Persons argue that, unlike other forms of leadership characteristics, *barami* is extended through the perceived act of doing good for others, and that Thai leaders are often mesmerised by *barami* because their social power is legitimised through the people's trust. The *barami* of a leader also inherently empowers their followers, he adds, saying that it offers security and longevity which extends beyond their formal leadership positions.

Barami is hierarchically positioned within a quasi-feudal structure and can be accomplished through the art of persuasion by those who get things done (Teh 2017). According to Dr Wan, her *barami* developed over the years at Sunpasit Hospital facilitated decades of melioidosis research, while Dr Ek's *barami* was cultivated through his position in MORU and his leadership in the international melioidosis research network gave him the recognition and respect to work with national health officials. This recognition, she says, influenced the health officials to pay attention to melioidosis. In other words, it gave him the *nata* or the face, which, according to Persons (2008) is associated with dignity and respect in the Thai bureaucracy.

Conclusion

This chapter showed how scientists involved in melioidosis research have deployed dual socio-political dynamics to draw attention to the disease in Thailand and internationally. It demonstrated that while the international scientific knowledge developed through research collaboration between MORU and Sunpasit Hospital allowed them to extend their network and collaboration on melioidosis research internationally, it was the *barami* of Thai researchers involved in the endeavor that facilitated more attention towards the disease nationally. This *barami* was cultivated through decades of involvement in the scientific knowledge produced on melioidosis, which led to the formation of the MORU research laboratory and Sunpasit Hospital as truth spots for melioidosis.

I began the chapter with a brief discussion on the institutionalisation of tropical medicine in Thailand to provide a background on how MORU came to be established as a research collaboration between Thailand's Mahidol University and Oxford University with research funding from Wellcome Trust. I then discussed the role and prominence of Sunpasit Hospital and MORU in elevating attention towards melioidosis through decades of research which led to the production of knowledge on the disease. Although melioidosis was first documented in Thailand in 1955, attention towards the disease shifted after the collaboration between MORU and Sunpasit Hospital in the mid-1908s. The decisions made by Dr Tom and Dr Wan to collaborate on a study that demonstrated that timely prescription of ceftazidime, a new antibiotic at that time, could reduce melioidosis patients' deaths by half, had paved the way for decades of melioidosis research in the hospital. This collaboration between a tertiary care government hospital and a British-funded institution led to the generation of new scientific knowledge on the microbe and the disease. The knowledge led to a better understanding of BP and its behaviour in controlled laboratory settings and the natural environment, revealing its capacity to survive in nutrient-depleted environments and ability to emerge after burning crop residues. Research has also led to a better understanding of the diagnosis, which makes BP most visible. They also led to a better understanding of the prognoses of the disease in patients.

These studies have allowed MORU and Sunpasit Hospital to establish their expertise on melioidosis nationally and internationally. Internationally, MORU deployed strategies of networking and advocacy to make melioidosis visible to international researchers through the sharing of data on the web-based platform, and through support in the development of tools like Ashdown to culture the bacteria. With this expertise, MORU and its international network of melioidosis researchers are advocating for more recognition of melioidosis in global health. They have jointly called for international organisations like WHO to consider melioidosis as NTD.

In Thailand, the *barami* Thai researchers developed among hospital staff and patients were deployed with the bureaucracy and the medical elites to obtain attention for melioidosis. Dr James' presence as a *mor farang* increased the *barami* of melioidosis researchers among the hospital staff and patients' families. Their expertise in melioidosis was symbolised through the association of the Caucasian researcher who was perceived as having superior value of

knowledge, especially in the Thai bureaucracy, which historically associates the West as *siwilai* (civilized) (Winichakul 2000). Dr Wan brokered her *barami* in Sunpasit Hospital, while Dr Ek through his affiliation with a Western educational institution and international collaboration with the research network, allowed them to enhance and maintain their social status and hierarchy within the intellectual community (Wimooktanon 2018) and bureaucracy (Jory 2002).

To recap what this thesis has discussed so far, I began the first chapter by revealing the confusion melioidosis patients have in comprehending the disease, mainly because of the lack of publicly available information on it. All the patients I met during my fieldwork first heard of melioidosis when they were diagnosed with it. I then discussed how I interpreted the association of the absence of public information on melioidosis in relation to Thailand's policies and practices that promote rice cultivation. Although rice is important to the Thai culture and ideology, in Chapter Two, I argued that it is equally important to acknowledge the risks that come with it. Chapter Three demonstrated the influence of melioidosis researchers on successfully advocating for a national public health policy on the disease. Despite making melioidosis visible, I argued that the strategies implemented responsabilise *Isan* rice farmers with diabetes by asking them to wear rubber boots for farming and drink boiled water, rather than addressing pertinent issues that structurally put rice farmers at risk of melioidosis infection. This chapter demonstrates the capacities and leadership of Thai melioidosis researchers to move between the socio-scientific and socio-political registers to draw attention to melioidosis internationally and nationally.

In the next chapter, I discuss the Melioidosis Clinic which operated in Sunpasit Hospital during a particular period when melioidosis was high on the agenda of MORU researchers and the Sunpasit Hospital clinician responsible. The chapter continues to discuss *barami*, extending it from a leadership characteristic to the context of everyday social life in Thai society.

Chapter 5: Making melioidosis visible in the research laboratory

...it could be said that we are concerned with the social construction of scientific knowledge in so far as this draws attention to the process by which scientists make sense of their observations.

- (Latour et al., 2013; p.32)

The BP bacteria that cause melioidosis can be challenging to diagnose because they grow slower than other microbes that cause common illnesses in humans like E.coli and Klebsiella. With the absence of bedside rapid diagnostics, bacteria culture in laboratories is the recommended method for diagnosing patients in Thailand. This method can take between two and seven days to confirm infection, provided the microbe is visible to the laboratory technicians. BP can grow in culture plates with mediums like blood or MacConkey, which are commonly used in hospitals across Thailand. However, their presence is enhanced with the use of Ashdown, a medium that contains specific compounds like crystal violet and gentamicin (Wuthiekanun et al. 1990; Ashdown 1979; Peacock et al. 2005). BP is not easily visible on other commonly used culture plates in hospitals because other bacteria which generally grow faster tend to cover the culture plates, keeping BP out of sight of laboratory technicians.

The previous chapter discussed how melioidosis researchers deployed dual socio-political dynamics to make melioidosis visible in Thailand and internationally to demonstrate that the construction of scientific knowledge is multifaceted and involves the making of a place as truth spots, while cultivating *barami* to advance scientific expertise on the disease. This chapter considers the infrastructure of Sunpasit Hospital which facilitates the multiple ways in which melioidosis is made visible. Specific attention is paid to the two laboratories as a space where scientific work on melioidosis is accounted for through the embodied manipulation of laboratory specimens and chemicals (Lynch 1985) which make BP visible. I discuss the two laboratories located in Sunpasit Hospital, where the construction of scientific facts (Latour, Salk, and Woolgar 2013) on melioidosis is produced and where patients have been diagnosed

with the disease for almost four decades. The first is the hospital's main laboratory, which I refer to as the clinical laboratory. This laboratory is located on the top floor of the hospital's main building. It has multiple sections and is responsible for the day-to-day diagnosis of patients seen in this tertiary care hospital. To diagnose patients, the laboratory receives specimens from different wards of the 1,200-bed hospital and different outpatient departments several times, daily. The second laboratory is the MORU research laboratory, which was established in 1986 for melioidosis research (see Chapters Four and Six). I am interested in finding out how the two laboratories construct scientific facts on melioidosis. What infrastructure and technologies are involved and how are they deployed in making these spaces as "truth spots", where melioidosis is made visible? How do the two laboratories work together? What is the relationship between the two laboratories, and how is it maintained?

In what follows, I begin with a brief description of the works of the two laboratories, before moving on to discuss the hospital infrastructure which facilitates the sharing of biological specimens from patients' bedsides in the wards to the clinical laboratory. I demonstrate how they work together and discuss the various enactments performed in these two spaces to make melioidosis visible. I also demonstrate how the materials and the data derived from different laboratory tests are documented, archived, and shared to form the scientific basis that makes Sunpasit Hospital and the MORU research laboratory truth spots for melioidosis. After that, I analyse the relationship between the two laboratories which is maintained through the routine use of kinship language which facilitates the production of scientific knowledge on melioidosis in these spaces.

Stable infrastructures

As discussed in the previous chapter, the MORU research laboratory was established at Sunpasit Hospital in the mid-1980s to focus on melioidosis research. The MORU team works closely with the hospital's main laboratory, which I call the clinical laboratory, in supporting them with the identification of melioidosis and other activities based on their institutional agreement to collaborate on research. This also includes the monitoring of antibiotic

susceptibility and AMR, among other projects⁵⁰ which are under negotiation in 2023. Although the MORU laboratory is an external entity located within the hospital space, it is decontextualised from its immediate geographical surroundings (Gieryn 2008) in the sense that it is strictly considered a research space outside the remit of the hospital's main activities. As discussed in the previous chapter, the MORU laboratory transitioned from a make-shift laboratory in the early years of its establishment into having a designated space in one of the back buildings of the hospital where decades of melioidosis research have been carried out. This research laboratory works closely with the clinical laboratory, which is the hospital's main laboratory and is responsible for diagnosing patients on a day-to-day basis. The clinical laboratory comprises several sections and depending on the diagnosis requested by doctors, the specimens are dispatched to the responsible sections. The microbiology section of the laboratory is responsible for diagnosing infectious diseases, one of which is melioidosis. Since melioidosis is a notifiable disease under the national communicable disease control law, the laboratory is also a referral point for private hospitals, clinics, and other state hospitals in the region to send specimens to confirm melioidosis, with an estimated cost of three hundred and fifty Baht⁵¹ per test. This microbiology section of the clinical laboratory works closely with the research laboratory in identifying melioidosis.

Both these laboratories are of Biosafety level⁵² Two, a standard level observed in most public hospitals in Thailand designated for handling moderate levels of infectious agents or toxins. But what makes these laboratories different from other hospital laboratories, is their involvement in the construction of scientific facts through their day-to-day activities of doing science (Latour, Salk, and Woolgar 2013) to make melioidosis visible. Laboratory specimens are cautiously handled to maintain their biological properties, which affects patients' diagnosis and impacts their treatment. The processional infrastructure of Sunpasit Hospital facilitates the movement of biological materials like blood, saliva, sputum, pus, and urine from patients' bedside in the wards or the outpatient departments to the clinical laboratory for

⁵⁰ My email request to obtain a copy of their agreement from MORU was declined with a response stating, "there is no plan to share it".

⁵¹ Less than 10 British Pounds.

⁵² Laboratories are internationally recognised based on their biosafety level, which indicates their safety levels for handling different kinds of biological materials, depending on the classification of their hazardous level. There are four BSL levels, with BSL-1 being the most basic and BSL-4 the most sophisticated. Laboratories in most general and regional hospitals in Thailand are BSL-2.

diagnosis through a computerised mechanical system known to the hospital staff as *krasuay* (shuttle) system.

Shuttling biological materials through hospital spaces

Although the time taken for the specimens to move from the wards to the laboratory would be similar to the time it would take for hospital staff to do the job, the *krasuay* system reduces the stress and pressure of getting the specimens to the laboratory promptly, said Nuch, an infectious disease ward nurse. It gave them the flexibility to send the specimens to the laboratory individually, at any time, instead of having to wait for a health worker to carry the specimens in batches, she elaborated. The *krasuay* or the pneumatic tube system uses air pressure to move plastic cylinders through small tunnels made of PVC tubes which are placed across different spaces of the hospital. With the air pressure, the plastic cylinders carrying sealed bags with specimens are transferred from different wards to the clinical laboratory. This system has been used in the hospital for many years, she added. Figure 13 shows a *krasuay* station in front of an internal medicine ward from where she usually sends patients' specimens to the clinical laboratory. The labelled plastic sealed tubes with specimens, along with papers indicating the identity of the patient and the laboratory tests required are placed in a red-cap plastic cylinder, which is then placed in the *krasuay* station. Nuch then presses the code for the destination which is the control room of the clinical laboratory. With the air pressure, the cylinder moves upwards with compressed air and downwards with suction. This pressure moves the materials in the grey PVC tubes across buildings to the laboratory, as shown in Figure 14.

Once the specimens arrive at the main station in the clinical laboratory as shown in Figure 15, they are removed from the plastic cylinders and placed in coloured plastic baskets. They are then collected by the staff from different sections of the laboratory for different types of tests as indicated in the documents dispatched along with the specimens.



Figure 13: A Krasuay station.

One of the krasuay stations located in front of a male internal medicine ward. This system is used for transporting specimens from wards to the clinical laboratory for tests. Photo: Author.



Figure 14: The infrastructure of the krasuay system.

The grey pipe shown above the walkway between different buildings in Sunpasit Hospital which forms part of the krasuay system. Photo: Author.



Figure 15: The krasuay control room.

This control room is located in the hospital's clinical laboratory. When the specimens from the wards arrive through the grey pipes, they are removed from the plastic cylinder and placed on the table, in different coloured plastic baskets. They are later collected by laboratory technicians for different laboratory tests. Photo: Author

Sharing specimens between laboratories

The microbiology section of the clinical laboratory is responsible for testing microorganisms like viruses, fungi, yeast, algae, protozoa, and bacteria, including BP. The procedures for handling tests for BP, which lead to confirmation of melioidosis infection in patients are, however, handled differently. This is because the agreement made between MORU and Sunpasit Hospital allows for the sharing of specimens for certain tests like the identification of gram-negative bacteria through immunofluorescence (IF), and for monitoring antibiotic susceptibility and AMR, all of which facilitate the identification of melioidosis, which I detail in the next section below. This means after receiving specimens for diagnosing melioidosis, the clinical laboratory retains some amount of the specimen and shares the remaining with the research laboratory. The research laboratory technicians, Nan and Min, take turns to routinely visit the clinical laboratory twice daily, to collect these specimens.

The collection of specimens to test for melioidosis continued throughout the COVID-19 lockdown, a period during which access to certain spaces in the hospital like the wards and the laboratory was restricted to non-staff. The research laboratory technicians also have access to the clinical laboratory database, where they were provided with a password-protected computer account like other clinical laboratory staff, which facilitated their work. I followed Nan for a few days during her visits to the clinical laboratory. Upon entering the clinical laboratory, she first checked the database from a desktop computer. Here she looked for requests for melioidosis-related laboratory tests sent from different hospital wards. She then printed out the labels, or small stickers with bar codes indicating the patient number, and the request forms. These stickers were later placed on the laboratory results reporting forms which were returned to the clinical laboratory with the test results. Nan then moved to the tray where the specimens were usually kept for her to collect. She checked the labels on the specimens, comparing the numbers with the accompanying documents and the request form she newly printed to make sure the data matched. She then documented the data in the logbook she always carried along with a plastic box she uses to transport the specimens from the clinical laboratory back to the research laboratory.

In the research laboratory, Nan would place the logbook and the white plastic box with a blue lid on a table in the centre of the room which was often packed with materials from stationary to chemical solutions and measuring devices. The space of the research laboratory is smaller with less equipment and is not as new as that of the clinical laboratory. In Figure 16, Nan is seen working at the biosafety cabinet on the left, while her colleague Min is on the right, sitting at the desktop computer which is connected to MORU headquarters in Bangkok. Shelves with folders and reports from various projects carried out over the years are stacked along the walls, below which stood an automated blood culture machine, a centrifuge machine, several incubators used for storing plates during the bacteria culture process, and a fluorescence microscope. Some of these materials were more crucial to the melioidosis research than others, but they all strengthened the apparatus and design for particular tasks (Latour, Salk, and Woolgar 2013) which contributed to the visibility of melioidosis.



Figure 16: The MORU research laboratory.

*Inside the research laboratory, Nan (left) is seen working at the biosafety cabinet, while Min (right) on the desktop computer.
Photo: Author.*

In the research laboratory, my attention was drawn to the big freezer maintained at minus eighty degrees Celsius, as shown in Figure 17. This freezer is securely sealed with a lock and key, along with another slightly smaller freezer. These freezers store BP bacteria cultured from biological materials of humans (blood, urine, pus, sputum, and saliva) and the environment (soil, water) which were collected by MORU researchers over the last four decades. They form the scientific archive for melioidosis research.



Figure 17: The microbe storage freezer.

Nan opening a securely sealed freezer which forms the melioidosis research archive. Photo: Author

The infrastructure in Sunpasit Hospital and the research laboratory contribute to the making of these spaces as truth spots for melioidosis. In these spaces, the mechanically manipulated *krasuy* system facilitates the movements of biological materials required for diagnosing melioidosis. This makes it an important part of the processional infrastructure which is involved in stabilising the biomedical knowledge of melioidosis. The freezers that constitute the archive for melioidosis research are what lends credibility to the laboratory as a space that is good at what it does, thus making it a space of epistemic significance (Gieryn 2018) for the construction of biomedical knowledge on melioidosis.

The melioidosis multiple

On average, the research laboratory processes between ten and fifteen new specimens for identifying BP, per day, but on some days, particularly during the monsoons, they process as many as thirty new specimens. In this laboratory, different tests are performed, the results of which are documented in different templates and different databases, which are collected for different purposes. While all the data processed in this research laboratory is immediately made available to researchers based in the MORU headquarters in Bangkok through their online database system, some of the data is shared with the clinical laboratory based on the agreement between the hospital and MORU. Despite different tests for different purposes, all of them lead to the visibility of melioidosis.

Fluorescence microscopy

The first test carried out in the research laboratory which makes melioidosis visible is fluorescence microscopy, also known as immunofluorescence (IF). This technology allows for the visualisation of gram-negative bacteria by staining the specimen with a fluorescent solution, followed by an observation carried out under the fluorescent microscope. The IF test is not a definitive test to confirm the presence of BP and is not recommended or regarded as a standardised way to confirm melioidosis in Thailand (Department of Disease Control

2021), but is regularly deployed in the research laboratory as a proxy for indicating the possible presence of BP (V. Wuthiekanun et al. 2005).

This technology has gone through a long period of development since it was first described following observations of fluorescence in the woods, which led scientists to follow tree species in the 1560s (Baldari, Boni, and Cassinotti 2023). This early discovery also led to the discovery of the x-ray technology in 1895, and its introduction in clinical neurosurgery in 1947 (ibid.). The early development of IF for microscopy is described by an American immunologist, Albert Coons (1961), as a simple concept which was difficult to carry out. Coons was involved in the development of the device crucial for making microorganisms visible through IF technology under a microscope in the 1930s and 1940s. The key lesson learnt through this process was the importance of making conscious choices while carrying out difficult tasks, he says, emphasizing the discipline of adhering to scientific principles and practices.

To begin the test in the research laboratory, Nan picked a tiny specimen from a tube with the help of a plastic stick and placed it on a small glass slide. She then added some drops of fluid (assays) and rubbed them onto the specimen, staining it with fluorescent colour. She then placed the glass slide on a heated metal plate for ten to fifteen minutes to kill the bacteria, before studying it under the microscope. As shown in Figure 18, the chemical fluid that dyed the specimen also dyed the bacteria, making it glow under the fluorescence microscope.

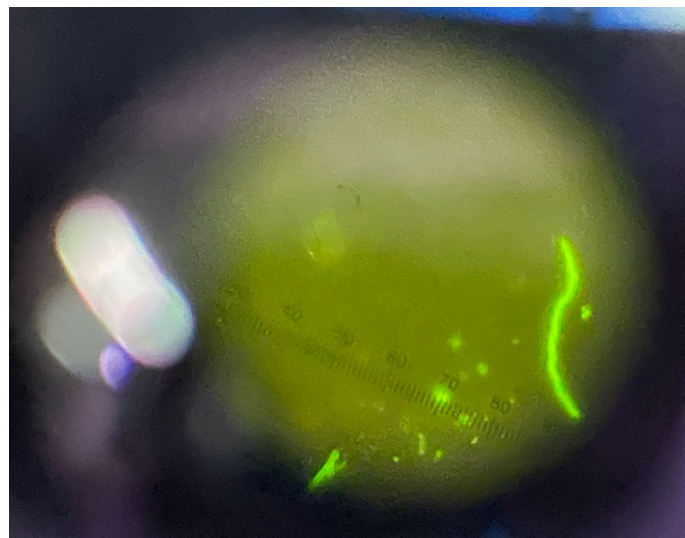


Figure 18: An image of gram-negative bacteria.

Through IF tests, gram negative bacteria are observed in fluorescent colour under the fluorescent microscope. Photo: Author.

Nan learnt to see through the microscope, by doing and not just by looking (Hacking 1983). Through her years of work in the laboratory, she was able to instantly identify a gram-negative bacterium under a fluorescent microscope. The test was completed in about fifteen minutes. After reading the results, Nan documented them in the MORU journal and in the hospital's "clinical microbiology laboratory" form which she had printed from the clinical laboratory. Tests that showed the presence of gram-negative bacteria were rubber-stamped "IF for melioid positive", while those without were rubber-stamped as "IF for melioid negative". These results are labeled in different templates and reports which include the clinical laboratory's form, the MORU journal, and the data stored in the computer, all of which are documented in English although Thai is the language used on a day-to-day basis. These reports allowed MORU researchers in Bangkok to have real-time direct access to the research data compiled at Sunpasit Hospital in Ubon.

Nan is disciplined in her work and is focused on the science of the research as much as on conveying the results back to the hospital so that the patients can receive timely antibiotic treatment. For her, it is important to immediately share the results of the tests with her counterpart in the clinical laboratory and her bosses in Bangkok. She shares the results of the IF test with Kai, her counterpart in the clinical laboratory, through several channels. She first sent a short text message via Line⁵³, and followed with a brief telephone call. The laboratory then conveys the results to the nurses in the wards, so that the message is shared with the doctors responsible for the patients, who can then prescribe the antibiotics to the patients.

Then, on her subsequent visit to the clinical laboratory, she would take along new sets of Ashdown agar culture plates to facilitate the clinical laboratory with their culture of BP. This is because the clinical laboratory mainly uses MacConkey and blood agars to culture bacteria. Although these two bacteria culture mediums are popular for growing bacteria that cause common illnesses in humans, they are not ideal for culturing BP. Ashdown, which I will further elaborate on below, is the best medium for growing BP. The clinical laboratory then conveys the results of the diagnosis back to the ward through another database, or the hospital information system.

⁵³ A popular social media platform used in Thailand.

These repetitive processes emphasize the importance given to the results of tests that confirm the presence of gram-negative bacteria, which is different from confirming the presence of BP. It does not confirm the presence of BP which causes melioidosis, but without a diagnosis to confirm bacterial infection, doctors would not prescribe antibiotics to patients. This is based on the protocol to reduce unnecessary prescriptions of antibiotics in hospitals to reduce risks of AMR. While it is known that delays in antibiotic prescription can lead to poor outcomes in melioidosis patients, thus increasing risks of fatality (Wiersinga et al. 2018), reduced antibiotic use in ambulatory care settings is a key criterion based on which hospitals in Thailand receive accreditation (Sumpradit et al. 2021). This underscores that the diagnostic categories within which individual patients are placed in or out of, influence their treatment, thus impacting their health (Harper and Khatri 2019).

Bacteria culture

After conducting IF tests on the specimens, Nan prepared for bacteria culture. She did this in the biosafety cabinet which is designed to prevent biological hazards while laboratory technicians manipulate the biological materials. Here, Nan took the specimen from the tube with the help of a tool and placed it on the culture plate. The research laboratory uses three kinds of mediums to culture BP - blood, MacConkey, and Ashdown. Figure 19 shows the red jellylike substance or agar which forms the culture plate. While BP grows on blood and MacConkey agars, Ashdown is where the bacteria's appearance is most prominent. Developed by an Australian microbiologist specifically to isolate BP in 1979 (Ashdown 1979), Ashdown is most suitable for stimulating the growth of gram-negative bacteria, particularly BP (Wuthiekanun et al. 1990; Peacock et al. 2005).

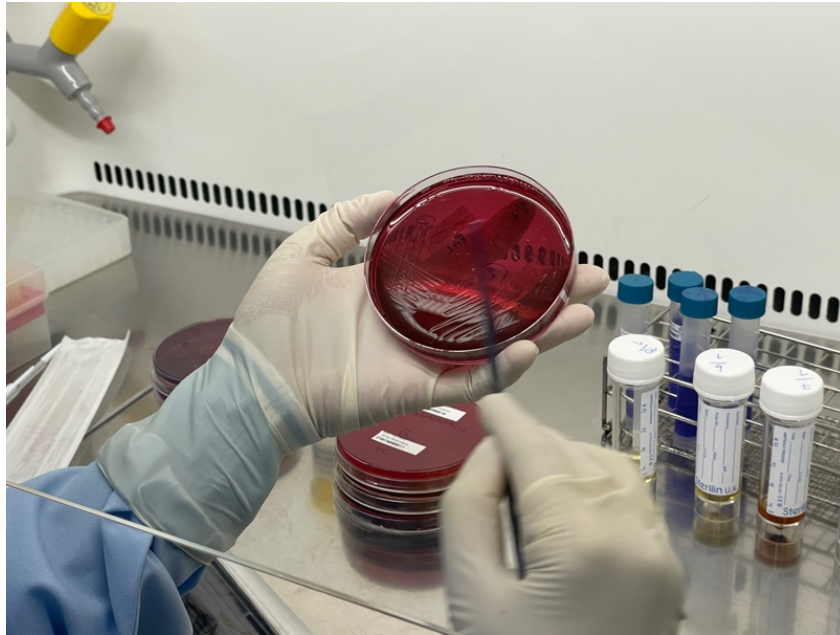


Figure 19: Bacteria culture.

Nan holding an agar culture plate, while stroking a tiny amount of specimen in a zigzag way on it. Photo: Author

Bacteria cultures from urine samples are placed on two agars, MacConkey and Ashdown agars, while other fluids such as sputum and blood are placed on all three agars. To begin the process, she individually mixed each urine sample in the test tube with some chemicals and placed it in the centrifuge machine. This machine spins the fluid at high speed, separating the solid compounds from the liquid. She then placed a tiny part of the compound from the tube on the agar plate. Then, with the help of a plastic loop, she gently strokes the compound back and forth, brushing it in a zigzag way on the agar plate, as shown in Figure 19. Once Nan finishes working on each sample on the different agar plates, she stores them in an incubator, the temperature of which is maintained at around thirty-seven degrees Celsius to mimic that of the human body. The plates are stored here for the next four days. During those four days, Nan takes them out to study and document the development she observes on the plates, daily. She also communicates the results of the emergence of BP on new culture plates to Kai, her counterpart in the clinical laboratory, informally via social media, which is then followed by a brief telephone conversation.

Antibiotic susceptibility and resistance tests

Since the early days of melioidosis research in Ubon, the MORU laboratory has been regularly testing antibiotic susceptibility and resistance (Dance et al. 1989; Vanaporn Wuthiekanun et al. 2005; Sawasdidoln et al. 2010; Wuthiekanun et al. 2011). These tests have shown that BP bacteria have gone through several mutations (Chewapreecha et al. 2019). Certain BP strains identified in patients in Ubon are resistant to certain first-category and second-category antibiotics like gentamicin and colistin (Wiersinga et al. 2018; Simpson, White, and Wuthiekanun 1999). Additionally, a study conducted over a two-decade period showed that some patients in Ubon had BP strains resistant to two commonly used antibiotics for treating melioidosis patients – ceftazidime and amoxicillin, although scientists maintain that this occurrence is rare (Wuthiekanun et al. 2011).

The antibiotics tested for resistance and susceptibility in the research laboratory include amoxicillin/clavulanic acid, ceftazidime, doxycycline, meropenem and trimethoprim-sulfamethoxazole. According to the national guideline on melioidosis, ceftazidime, imipenem or meropenem is intravenously given to patients for at least two weeks, followed by oral prescription of co-trimoxazole during what is called the eradication phase, which is carried out over five months. Strong antibiotics generally prescribed for gram-negative bacterial infections like gentamicin, amikacin, ceftriaxone, cefotaxime and ciprofloxacin, and not-so-strong antibiotics like norfloxacin and ofloxacin cannot be used for treating melioidosis, according to the guideline (Department of Disease Control 2021). Like treatment for TB, melioidosis patients are expected to be disciplined about consuming antibiotics, although this is carried out without an intensive degree of close observation and supervision. To perform tests on antibiotics, Nan first places the antibiotics, which come in small round white patches, on egg-white coloured agar plates. These plates, shown in Figure 20, are slightly bigger than the red agar plates which confirm the presence of melioidosis. Different antibiotics on the white patches are identified by three short alphabets printed on them. Nan generally used one agar plate for two tests, dividing their boundary by drawing with a marker on the outer plastic of the plate. After placing the antibiotic patches, she took a tiny amount of the cultured bacteria from the red agar plate and brushed them onto the egg-white agar plates one by one.

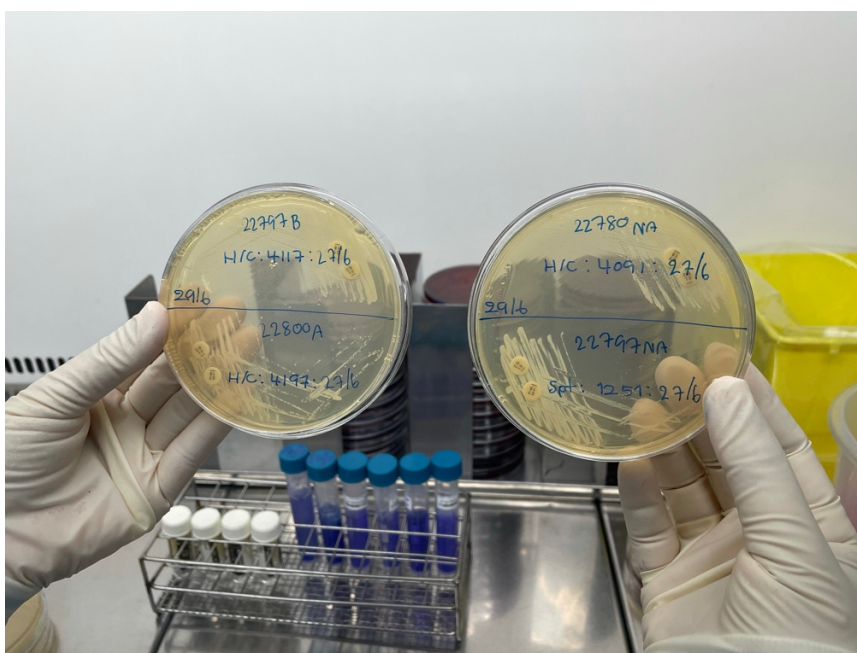


Figure 20: Antibiotic resistance tests.

Nan holds two plates showing some bacteria growth on one area, indicating its resistance to a type of antibiotic. Photo: Author.

The antibiotic test usually showed results within forty-eight hours, Nan said. She told me that although the laboratory's focus was on collecting data for research, it is important for them to share the results of any drug resistance observed immediately with the clinical laboratory so that the patients' treatments can be adjusted accordingly. Similar to her sharing of information on IF positive results, and on the confirmation of BP from bacteria culture, Nan also regularly shared information on any antibiotic resistance she observed from the tests. The clinical laboratory then conveys information to the wards where the patients are treated, so that their treatments can be adjusted accordingly.

Different tests are performed for different purposes in the research laboratory, all contribute to the visibility of melioidosis. The IF tests are carried out to confirm the presence of gram-negative bacteria, and bacteria culture leads to the identification of BP, while the antibiotic tests reveal antibiotic susceptibility or resistance. These tests dictate the treatment of patients with melioidosis and lead to a better understanding of the disease. While melioidosis is made visible in the research laboratory through multiple enactments, the results informally communicated from the research laboratory to the clinical laboratory make melioidosis visible in both the clinical laboratory and the wards where patients are treated. The visibility of

meliodosis in these spaces further triggers different actions. In the clinical ward, it leads to a formal diagnosis of melioidosis, while in the wards, it influences decisions made on the treatment of patients.

Diagnosing melioidosis, developing relations

Ashdown, a medium that is recommended for diagnosing melioidosis, is particularly known for its characteristics both as a selective and a differential media (Wuthiekanun et al. 1990). Selective because it can allow BP to selectively grow while stopping or killing other non-desired organisms. Additionally, its differential properties enable it to take advantage of the biochemical properties of BP, leading to a visible change when the organism is present. According to Wuthiekanun et al., the glycerol and dyes in the medium facilitate the visibility of melioidosis, through the presence of the dry, wrinkled, purple colonies of BP. Since the conclusion of a study which involved tests of over 1,900 clinical specimens obtained from Northeast Thailand between 1986 and 1989, Ashdown has been recommended as the selective medium for diagnosing melioidosis.

In Sunpasit Hospital, Ashdown is not merely an object for culturing BP. It also has the properties of cultivating relations between laboratory technicians and non-human microbes and between the research and the clinical laboratory. This technology, I will demonstrate, performs the role of cultivating relations, while at the same time facilitating the visibility of melioidosis.

Paying close attention to BP

Laboratory work can be slow and tedious with repetitions and predictable routines. Despite doing the same thing repeatedly almost every day for over a decade, Nan enjoyed her work. She told me that she found her work exciting, and I could sense the enthusiasm in her voice as she described her daily activities in the laboratory to me. I also had the opportunity to spend days in the research laboratory and observe her perform the different tests daily. She said her work gave her satisfaction and every time she saw a gram-negative microbe glow

under the fluorescence microscope, or the BP become visible on a culture plate, it brought her some excitement. This is because it meant that she was able to see BP, which is challenging to identify. It also meant that a patient would receive timely treatment for melioidosis, she added. Nan combined her embodied skills practiced for eleven years in the research laboratory with her imagination to engage with the microbe (Tsing et al. 2017; Helmreich 2009).

Nan spoke attentively of BP. Like her predecessor Kan, who used affective language to refer to BP as a “shy” bacterium as discussed in the Introduction and in Chapter Four, Nan often referred to BP as a “stubborn” bacterium. She explained that this is because it often hides under other “bolder” or more visible bacteria. Nan said she always looked carefully into the culture plate so that she could identify BP and paid careful attention to it when it emerged. She said she has been doing this for years, which has given her the practice and the ability to see the spot the microbe, even with its tiny development on the Ashdown culture plate:

I often make a guess when I see even a very tiny spot after one or two days, and I’m often correct [laughs]. It makes me excited to know that I’m right, and I get to see it more clearly after a few days once it has grown more (on the culture plate).

Nan closely studied the culture plates she stored in the incubators for four days. Each day, she brought them out to meticulously observe the microbe and document their growth in a journal. She told me that she looked for the constellation of the bacteria, “the dotted grey wrinkled metallic spots cluttered together”. Each time she picked up a plate, she spent a few seconds carefully looking at the tiny greyish substance on the surface of the agar plates before placing them back on the surface of the biosafety cabinet, one by one. She usually read between twenty and forty plates per day. In the journal, she recorded every detail she observed of the bacteria colony, including its size, colour and density. She said they usually changed from one day to another, in terms of size. She sometimes used a small ruler to measure the dimensions.

Figure 21 shows the constellation of the BP colony on an Ashdown culture plate Nan held. After reading the plates, Nan stored the ones that were cultured from the first to the third day

back in the incubators. She then works on the plates which have reached the fourth day of the culture, taking some bacteria from each plate, and individually storing them in separate tubes. She coded the tubes, placing a small sticker with the information on the specimen type and the patient registration number which she had printed out from the clinical laboratory. She then placed them in a sealed plastic bag and stored them in the secure freezer, adding them to the research archive. The remainder of the bacteria left on the agar plates is then destroyed in an autoclave, a pressure vessel that uses a hundred-and-twenty-degrees Celsius heat and pressure to destroy live bacteria and sterilizes all forms of fluids and liquids within fifteen minutes.



Figure 21: Colonies of BP.

Nan holding Ashdown agar plate where BP colonies are clearly displayed. Photo: Author.

Cultivating relations through bacteria culture

Although the confirmation of the presence of melioidosis in patients in Sunpasit Hospital is first carried out in the research laboratory, the clinical laboratory is designated as the laboratory responsible for diagnosing patients. This means they are responsible for producing laboratory confirmation results which go into the patient's hospital records, and the laboratory database, more of which I will discuss in Chapter Seven. The clinical laboratory has modern material infrastructure to serve a broad array of diagnoses, but they did not use Ashdown, a bacteria culture medium that is most suitable for making BP visible on culture plates. Like most public hospitals in Thailand, they use blood and MacConkey agars, as these mediums are suitable for growing a wide range of microbes that commonly cause illness in patients. I asked Kai why Ashdown agar was not used in the clinical laboratory despite its capacity to provide clear results of melioidosis confirmation, to which her response was:

We cannot just focus only on one bacterium or pathogen. We need to be able to identify the [different] causes of illness in patients.

Kai said that the hospital had to use bacteria culture mediums which can facilitate the diagnosis of different diseases and allow for the identification of various kinds of microbes that cause illness in patients. She further explained that the diagnosis of melioidosis was not a problem because they worked closely with the research laboratory. Although not part of the formal agreement, to facilitate the work of the clinical laboratory in confirming melioidosis infection in patients, the research laboratory regularly provides the clinical laboratory with Ashdown culture plates to test specimens whose IF tests show positive results:

We (the two laboratories) work together. We support each other. *Phueng pha kan muan pen phi pen nong* [we rely on each other, like older and younger siblings]...

Kai's reference to the two laboratories as siblings may sound innocuous, conveying a casual relationship between them, but the use of kinship language here is not merely an expression of care (Carsten 2019). It may be understood as a figure of speech in everyday practice which can influence scientific knowledge production in ways that are abstracted from scientific ethics (Geissler et al. 2008), but in Thai society, kinship plays an important role in everyday life

and kinship language is expressed in conversations, including with strangers or in the bureaucracy (Howard 2007). Although it may be understood as a phenomenon through which the Thai bureaucracy is humanised (Fotaki and Jingjit 2018), it signifies the social hierarchy in society. Governance in the Thai sense is understood as collectivism and respect, which is based on status and authority, seniority and patriotism, reinforcing the social order (Fotaki and Jingjit 2018; Phongphit and Hewison 2001).

As part of the formal agreement between MORU and the hospital, the research laboratory supports the clinical laboratory with IF tests. Paper reports with rubber stamps indicating “IF for melioid positive”, or “IF for melioid negative” are regularly provided to the clinical laboratory during the following visits Nan or her colleague makes to the clinical laboratory to collect new biological specimens for tests. However, the results of other tests like BP positive culture and antibiotic resistance are not formally communicated to the clinical laboratory because they form part of longer-term research. These results take on the form of the research database, which is periodically shared with the hospital, through their research counterparts. Kai continued:

With the help of the research unit, we can identify the bacteria quickly...and we can reduce patients’ deaths.

Kai’s remark led me to understand that she considers the exchanges between the clinical and the research laboratory as a pragmatic exchange, whereby the research laboratory can obtain specimens from the clinical laboratory to carry out research, while the clinical laboratory can obtain Ashdown culture plates to confirm the diagnosis of melioidosis in patients. However, this also signifies that the diagnosis of melioidosis for the patients in the hospital is dependent on an internationally funded research laboratory which is located on the grounds of the hospital. It means making melioidosis visible in the research laboratory allows for the disease to also be visible in other spaces, including the clinical laboratory and the wards. This also means that the visibility of melioidosis in the research laboratory has also made melioidosis visible in the national health policy, as I have discussed in Chapter Three, and in the national disease surveillance system, which I will discuss in Chapter Seven.

While the formal agreement between MORU and Sunpasit Hospital leads to the use of Ashdown agar in the research laboratory that makes melioidosis visible in research and in the clinical laboratory, the informal delivery of Ashdown from the research laboratory to the clinical laboratory formalises the diagnosis of patients with melioidosis in Sunpasit Hospital. This relational technology (Street 2014; Whyte 2011) is deployed through a dual frame, along with the formal agreements in the practices that make melioidosis visible, which has benefited both MORU and Sunpasit Hospital. The provision of Ashdown culture plates to support the clinical laboratory in their diagnosis of patients has enabled the research laboratory to have access to specimens crucial for research, while the clinical laboratory has benefited from their ability to diagnose melioidosis patients.

Conclusion

This chapter has shown that melioidosis is made visible through different tests, and although they are conducted for different purposes, they coherently lead to better knowledge and understanding of melioidosis in medical research and patient care. IF tests conducted to identify gram-negative bacteria are the first sign to indicate the possible presence of BP, while bacteria culture, particularly with Ashdown agar, makes BP visible to laboratory technicians. Tests conducted on antibiotics commonly used to treat melioidosis patients also provide information on any change in the microbe which is shown through their resistance against the antibiotic tested.

These tests carried out in the research laboratory also led to the visibility of melioidosis in other spaces, including the clinical laboratory and the wards where patients are treated. They trigger the confirmation of patients' diagnosis with melioidosis in the clinical laboratory, which is facilitated by using Ashdown agar regularly supplied by the research laboratory to facilitate the bacteria culture. In the wards, once melioidosis infection is confirmed, patients' treatments are adjusted according.

I have demonstrated that the infrastructure of the hospital and the logistics of the *krasuay* system which transports biological materials from patients' bedsides to the clinical laboratory for diagnosing melioidosis facilitates the production of knowledge and information on the

disease, making it known in health policy and the national disease surveillance statistics. I discussed the deployment of Ashdown agar, a specific medium that prominently shows BP on the culture plate, as a relational technology that not only confirms melioidosis but also leads to the stability of MORU's research in Sunpasit Hospital and provides the hospital with the capacity to regularly diagnose patients.

This chapter has argued that the relationship between MORU and Sunpasit Hospital is based on the hospital's recognition of the research laboratory's support in diagnosing melioidosis and MORU's recognition of their need to be located within the grounds of the hospital to produce scientific knowledge on melioidosis. Their presence in the spaces of the hospital facilitates their access to the biological materials essential for identifying the microbe. This is important for maintaining the scientific archive for future research on melioidosis, antibiotic resistance and AMR. It is also what makes the MORU research laboratory in Sunpasit Hospital truth spots for melioidosis.

Chapter 6: The hospital and the clinic

In 1848, Rudolf Virchow's seminal outbreak response to typhus in Upper Silesia was based on collecting and analysing data about disease and the population infected.

Virchow also knew that public health is about more than just data. He said "Medicine is a social science."

Those words capture what I've experienced during every epidemic response - that the control of epidemics depends on understanding not only the disease, but also the social dimensions of how people react to it.

- Dr Mike Ryan, WHO Executive Director,
WHO Health Emergencies Programme. 1
September 2021

Sunpasit Hospital is renowned for its expertise in diagnosing and treating melioidosis patients in Thailand. As discussed in Chapters Three, Four and Five, the research collaboration between MORU and the hospital which began in 1986 has led both MORU and the hospital to be recognised truth spots where scientific knowledge on melioidosis is produced. Their work has been published in renowned international medical journals their researchers are active in the international biomedical network. The hospital is a site where practices involving the day-to-day management of patients and data collection take place. It is the site where melioidosis-related work is tried and tested by national health authorities so that it can be replicated in other hospitals (see Chapter Three). Conventionally, patients who come to the hospital with high fever, and identify themselves as rice farmers, are routinely screened for melioidosis infection. The hospital also routinely reports melioidosis to the national disease surveillance

system as required under the national communicable disease control law, which I will elaborate on in Chapter Seven.

This chapter tells the story of a particular period when the clinic was specifically established to conduct research that involved long-term follow-up on melioidosis patients. Established decades after the launch of the melioidosis research in the hospital in 1986, this clinic operated for over ten years. It was discontinued in 2017, the same year a senior doctor who headed decades of melioidosis research at Sunpasit Hospital decided to discontinue her work in the hospital. The chapter is about the cosmological notions of power (Siani 2019) which entangles Buddhist beliefs of *bun* and *barami* with power, prestige and hierarchy. *Bun* can be understood as luck, fortune, blessing or merits. In continuing to theorise *barami*, this chapter extends its consideration beyond leadership characteristics to demonstrate its practices in the everyday social lives in Thai society where the *barami* of a person is constructed and reconstructed by their actions and the actions of others around them. The argument I make in this chapter is that *barami* contributes to the visibility of melioidosis by facilitating the production of scientific knowledge on the disease through the mediation of relationships cultivated between the clinic staff, the patients, and the hospital staff. The key questions I ask are what is the role of the Melioidosis Clinic and how is knowledge of the disease produced in this space? What relationships are cultivated and what is the role and significance of *barami* in this? How does it facilitate the production of knowledge on melioidosis and what does it reveal of the broader public health practices and the production of biomedical knowledge in Thailand?

The central narrative of this chapter is revealed through two senior nurses Mai and Nuch, and a research assistant Tuk, who worked with Dr Wan, a prominent figure in Thailand's melioidosis research. Although both Mai and Nuch were not directly involved in research on melioidosis, their observations and interactions with the Melioidosis Clinic and the research team contributed to my understanding of the activities that took place when the clinic was operational. In what follows, I begin by providing a description of the hospital and the conventional care practices for melioidosis patients in Sunpasit Hospital. I discuss the challenges the hospital staff have with melioidosis because of the complex biology of the disease, yet it is routinely identified in the hospital. This is largely due to decades of research carried out in the hospital. I then go on to discuss the Melioidosis Clinic and how it continues

to be fondly remembered by hospital staff like Mai and Nuch. In discussing the activities carried out in the clinic, I describe the role of materials like drug prescription receipts and village produces which include rice, vegetables, and fruits, in mediating *bun* and *barami* which has facilitated research in the clinic.

Sunpasit, the hospital of hope

Sunpasit Hospital is among the largest tertiary care hospitals in *Isan* which employs over 4,000 staff. It has a 1,200-bed capacity, with thirty-five general wards and ten special wards. It also has the country's largest intensive care treatment capacity with twenty-six rooms. The hospital is known for its five specialised centres for cardiovascular diseases, cancer, trauma, neonatal care, and organ transplant. These centres are popular among foreign patients from neighbouring Laos and Cambodia who visit in organised groups, accompanied by their interpreters⁵⁴. The hospital is located in a busy old commercial part of Ubon municipality area. It is in the same neighbourhood as the provincial police headquarters, several landmark Buddhist temples, and markets. The buildings of the hospital which are shown on a map in Figure 22, are located on twenty-seven Rai (about four and a quarter hectares) of land which was donated by the family of Prince Sunpasitthiprasong⁵⁵ to construct the hospital in his memory.

⁵⁴ In interviews with some nurses in Sunpasit Hospital, they described how foreign patients from neighbouring Laos and Cambodia frequently visit the hospital and how their appointments were managed by their interpreters who were familiar to the hospital staff. The hospital's website also advertises that they have a centre to facilitate foreign patients and that their staff can speak multiple languages, including English, Khmer and Laos.

⁵⁵ Prince Sunpasitthiprasong was the 37th son of the fourth King of Thailand in the Chakri dynasty (present dynasty). He became the governor of the province of Lao, which was later named *Isan* during the colonial geographical mapping period.



Figure 22: Sunpasit Hospital map

This map is that of a fire escape plan. It shows seventeen buildings in the hospital which are indicated in white blocks. The red mark (top left) is the building where the internal medicine wards are located in. Photo: Author

Built in the Thai calendar year 2478⁵⁶ (1935 AD), the hospital is contemporarily surrounded by small streets with multiple shops, pharmacies, restaurants, food stalls, apartments, guest houses and hostels. The traffic in front of the hospital is usually busy, and the streets are often filled with cars and motorcycles, some of which are parked along the roadside. At the entrance, a small group of street vendors are usually seen sitting on small wooden or plastic stools, selling edibles like lotus seeds and *Irvingia Malayan* seeds locally known as 'Isan's almonds', government lottery tickets and flower garlands for worship. Images and icons of religious and royal significance are displayed at the entrance of the hospital. As shown in Figure 23, the hospital's name is indicated on a stone plaque above which are large images of the current King, Vajiralongkorn, and of his parents, the late King Bhumibol who reigned Thailand for over seventy years (left) and his wife Queen Sirikit (right). King Bhumibol died in 2016 but his influence and respect as a revered monarch continues to be witnessed with his

⁵⁶ The Thai calendar is based on Buddhist Era which is 543 years before the Gregorian calendar.

images displayed in government buildings, business sector offices, shops and in people's homes across the country. Thai governments propagate the monarchy as the institution based on whose *barami* the nation and the people are protected. Popularisation of the monarchy's images dates back to the period during which military leader Sarit Thanarat relied on symbiotic relations with the monarchy to obtain *barami*, to legitimise the military coups in 1957 and 1958 (Veal 2013). The late king's influence is prominent, including in agriculture-related initiatives which I have discussed in Chapter Two.



Figure 23: Sunpasit Hospital.

The front view of Sunpasit Hospital. Photo: Author.

Buddhism influences every sphere of life in Thai society. From personal to political, it intersects with every aspect of interpersonal and material engagements (Jackson 2021; Esterik 2020; Kitiarsa 2005b), and although Buddhism is considered the national religion, the worship of multiple deities, particularly Hindu beliefs, significantly emerged in the country in recent decades. This 'subtle hybridisation' from the 1980s onwards, led to an increase in shrines and spirit medium worship (Kitiarsa 2005a). Figure 23 also shows the shrine of Brahma (on the

right), the Hindu god of the creator, popularly referred to as *Phra Phom*. The statue of Brahma is surrounded by yellow marigolds and white jasmine flower garlands. Around the shrine lays statues of elephants, horses, and chickens of varying sizes, made from cement, wood, and resin. These objects have been placed by worshipers as offerings to the gods.

Several shrines of Buddhist and Hindu gods and of ancestors and spirits are also present along the walkway and in various corners, in and between buildings inside the hospital. In this space, the new cult of wealth, rituality and religious practices intersect (Jackson 2021) with personal and collective aspirations associated with biomedical practices. It is where hope and magic (van der Geest 2005) are entangled with merit-making and worship. In front of the main building which houses the patients' registration desks, the emergency room, and the outpatient department, stands the statue of Prince Sunpasitthiprasong. Along the walkway from the main building to the coffee shop and cafeteria, stands a tall statue of the Chinese goddess *Guan Yin*. A shrine of the Emerald Buddha (a small green colour Buddha statue) is tucked along the walkway from the main building to the intensive care building. *Saan Phra Phum* (spirit house) and *Saan Ta Yay* (shrine for maternal grandfather and maternal grandmother) stand behind the outpatient department building located in an open space near an ongoing renovation. *Saan Phra Phum* and *Saan Ta Yay* are for the worship of the guardians of the land.

The material presentation of religious symbols demonstrates the commodification of religion as part of capitalist consumerism (Kitiarsa 2005a, 2005b). It is associated with the endogenous and exogenous relations of social power and hierarchy in Thai society (Veal 2013). This inside-outside relationship of power and hierarchy is politically constructed to visualise *barami*, an ideology which can be variously described to suggest moral power and authority. *Barami*, as some scholars suggest, can be understood as a form of charisma or prestige accumulated over the years, through the ability to get things done, or do good for others (Persons 2008; Rodli 2021; Connors 2003; Veal 2013). It is one of the key characteristics of Thai leadership which is rooted in Buddhist virtues associated with *bun* and moral goodness (Persons 2016).

Contemporary care in the outpatient department

To begin my observation in the hospital's outpatient department, I arrived at eight o'clock in the morning as suggested by Mai, the head nurse for infectious diseases. When I got there, I realized that I was late. Located on the first floor of the hospital's main building, the space was filled with patients, some accompanied by their relatives, others were on their own. As I walked up the staircase, I saw around five patients lying on elevated stretchers near the elevator, and some others on wheelchairs. The seating area in the wide space was relatively full, with some people standing, as shown in Figure 24. They were waiting to be called by the nurses seated behind different desks in front of the patient's examination rooms. This section of the outpatient department is dedicated to four clinics for respiratory tract infection, digestive tract infection, blood infection and internal medicine⁵⁷. The nurses behind each desk were responsible for making sure that the patients and their records were ready before they were called into the examination rooms to be seen by their doctors.

The space was noisy, with competing sounds of conversations, voices of nurses calling out patients' names and announcements periodically made on the loudspeaker. Mai walked around with a microphone in her hand, repeating the announcements:

Please take a seat and wait in the area designated for your clinic. For those of you who haven't handed your cards to the officers, please bring them to the desk and wait until your name is called. If you have been called and have had your blood pressure taken, you can go and have your food first, and come back and wait to see the doctor.

Mai moved from desk to desk while the nurses were busy organising the information required for the patient-doctor consultation. She attempted to display a sense of order amidst the concerns observed among patients and the nurses in the area. The nurses were busy and seemed rushed with what they were doing. Some of them were handling folders with patients' records, and arranging the information, while others were discussing with patients seated in front of them while taking notes and measuring their blood pressure. During her

⁵⁷ Doctors focusing on prevention, diagnosis and treatment of internal diseases which can affect multiple organs.

stop at each desk, Mai announced what clinic it was designated for. As she walked past the patients and their relatives, she also greeted them, saying “*Sawasdee kha*” and sometimes joining her hands together with a *wai*⁵⁸, while still holding the microphone in her hand. When some elderly patients stopped her to ask a question, she squatted beside them to converse in a customary way to symbolise politeness and respect for those older. Since the patients were seated, she positioned herself at a level lower than them to show respect.



Figure 24: The outpatient department.

A section of the outpatient department showing waiting patients. The patients' examination rooms are seen in the far end, with the room numbers written on the top. Photo: Author.

Mai later told me that she wanted to change the perception patients have towards hospital staff, particularly nurses, who have a reputation for being strict and sometimes rude. She said she wanted to express respect by demonstrating politeness and humility:

We have so much work and when we are in a hurry and tired, sometimes we unintentionally talk impolitely. This makes the patients feel more distressed. We must be very careful...

⁵⁸ Joining two hands to the chest level while bowing the head is a Thai way of greeting.

Appropriate display of manners as social etiquette is an inherent construct of the Thai identity institutionalised by the state as a code of morality and personal conduct (Jory 2015). Through the government's issuance of the Regulation on Deportment in Thai Manners in the 1960s, the moral and political trope of *khon di* (good person) remains forceful in contemporary Thai society. *Khon di* are politically deployed to increase the power of the bureaucratic system to maintain conservativeness (Bundhuwong 2019). In public health, it is deployed to obtain the people's trust in the Thai public health system (Funahashi 2016). Although different, it relates to the cultivation of *barami* in the sense that it is not exclusively based on what is perceived as a good person at face value but also involves the ultimate virtue in the Thai Buddhist sense of care for others (Aulino 2019).

The routines of waiting

Although Mai announced that patients who had already seen the nurses could leave to get some food and return to the waiting area, many patients stayed back and had the food they carried with them in the waiting area. A middle-aged lady sitting beside me took out some sticky rice and grilled barbeque pork from a polythene bag in her bamboo basket and shared it with the man who was with her. It was around ten in the morning at that time. We exchanged smiles and started chatting. She was upset because the nurse had announced just then, that her doctor was delayed. She told me that she had been there since six in the morning, and although she managed to get the first queue card, she had to wait all morning before she could see her doctor. When she got to the hospital, she presented her appointment card to the officials and went through the COVID-19 screening protocol at the hospital entrance. After walking through the temperature screening device and obtaining a negative rapid test for COVID-19, she entered the main building where she presented her identity card and obtained her queue card. She then moved to the outpatient department on the first floor and waited until the nurses settled at their respective desks at eight o'clock. Then, she handed the queue card to them and waited to be called by a nurse. She got her blood drawn for a test and had her blood pressure measured. After that, the nurse asked her several questions about how she was feeling and whether she regularly consumed her diabetes medicines. While

talking to her, the nurse took notes and then told her she could go for her food and return to the waiting area.

On average, about nine hundred patients visited the hospital's outpatient department daily. Patients who went to the hospital during regular clinic hours between eight in the morning to three in the afternoon either had an appointment or were referred from another hospital. The health services provided during regular clinic hours are covered under the universal health coverage (UHC) scheme which was initially introduced nationally as the "30 Baht to treat all diseases" scheme in 2001. Later, in 2006, it was transformed into UHC. Since Sunpasit Hospital is a tertiary care facility for the region, most patients visiting the hospital also come from several neighbouring provinces, including Amnat Charoen, Sisaket, Surin, and Yasothorn. Patients who did not want to wait for long hours usually visited the special clinic which operated in the same space between four in the afternoon to eight in the evening during weekdays and between eight in the morning to noon during weekends.

Hospital visits for melioidosis patients

Sunpasit Hospital is one of the few hospitals in Thailand that routinely screens patients for melioidosis. All patients entering the hospital with high fever and respiratory infections who identify themselves as farmers are routinely tested for melioidosis. Nuch, a senior nurse who has been working in an internal medicine ward for at least ten years said the main challenge in identifying and treating melioidosis patients is because the disease symptoms are non-specific:

Many patients come to the hospital with other diseases like lung infections or other symptoms. They come in critical condition.

It takes several days before they are confirmed with melioidosis.

Patients develop septic shock and have to be on respirators. They also have other conditions like abscesses or swelling in their legs and arms or severe stomach pain.

Many patients spent weeks and months in intensive care. They are then transferred to an internal medicine ward once their condition stabilises, said Nuch, adding that many patients spend months in the wards before they are discharged from the hospital. She said some patients returned to the hospital after a few months of their recovery due to reinfection:

They come in, and they stay in the ward for a long time... I also get to see the same patients; some have infections more than once. I don't understand this disease, but I know that most of them are farmers.

Like many nurses I spoke to in Sunpasit Hospital, Nuch said she did not fully understand melioidosis and that the disease symptoms varied from patient to patient. She noted that she was often asked by the doctors to repeatedly send specimens drawn from patients' bedsides to the laboratory for melioidosis tests because they did not always produce positive results in the first round of testing:

Sometimes it takes several tests before the results come back positive. It is not clear to me...sometimes the doctor asks for an ultrasound or X-rays, but sometimes they don't... Sometimes I collect sputum once and results come out after two to three days, but sometimes I collect their sputum and saliva several times in a week, and it (the bacterium) does not show up. Sometimes it shows up better in pus more than other [bodily] fluids.

Once patients recovered from illness symptoms, they continued to consume antibiotics for at least five months. During this bacteria eradication phase, patients must return to the hospital monthly, for follow-up and to obtain the required antibiotics for their continued treatment. Generally, the treatment of melioidosis patients is carried out by internal medicine doctors but their follow-up is done by general medicine doctors. Mai said although this process provided a clear division of responsibility for different clinics in the outpatient department, it did not facilitate the establishment of relationships between healthcare providers and patients as desired under UHC policies. Patients meet different doctors every time they visit the hospital, she added.

Like most patients visiting big government hospitals in Thailand, melioidosis patients tend to spend long hours in the hospital on the days of their appointment. The protocol established

within these spaces leads to the routine of waiting for patients. Apart from waiting to be seen by their doctors, patients visiting the hospital spend substantial time waiting to receive their medicines from the pharmacy department. To shorten the waiting time, Sunpasit Hospital introduced a system to send medicines to patients' homes by post with a fee, after the COVID-19 pandemic. With experience obtained during the pandemic when access to hospital spaces were limited, state hospitals across the country established a system for sending medicines to patients with chronic illnesses through the home delivery services provided by the village health volunteers⁵⁹. Figure 25 shows an advertisement from the homepage of Sunpasit Hospital's website which states that patients need to register through an online system, at least two weeks in advance of their appointment, should they wish for their medicines to be sent to their homes.



Figure 25: Medicines delivery poster.

A Sunpasit Hospital announcement on the services to deliver medicines to patients by post at a cost of 100 Baht. Source: Sunpasit Hospital website. [Accessed: 20 August 2023]

It is not uncommon for patients to wait for long hours in government hospitals in Thailand. In Sunpasit Hospital, many patients arrive early with the hope of being examined by their doctors

⁵⁹ For more see (National Health Foundation 2022)

early. However, whether they are at the beginning of the queue or not, patients spend long hours waiting. Bo Kyeong Seo (2016) says waiting is part of the experience patients have under Thailand's UHC. Her study shows that rather than being perceived as a basic right, health services provided make people feel obliged for the services they receive. This is because UHC is branded as "free health care" and advertised by the government as a gift for the people. So, despite being frustrated, many patients are subjected to long waits as part of the hospital experience.

For melioidosis patients, the wait is not only in the outpatient department but also when they are admitted as inpatients. As Nuch stated above, it can take days and sometimes several laboratory tests before some patients are confirmed with melioidosis infection. Despite these challenges, Sunpasit Hospital can routinely diagnose and treat melioidosis patients. This work has been made possible in the hospital because of decades of research carried out in this space, particularly in the Melioidosis Clinic.

The golden era of melioidosis research in Thailand

In several discussions with Mai, Nuch, and other nurses in the hospital, they spoke about the Melioidosis Clinic which was operational in the outpatient department for over a decade from around 2006-2007 to 2017-2018. They told me stories of what I understood to be the period during which melioidosis was most visible in the hospital. They said the disease received high attention among the hospital management, the staff, and the patients who visited for follow-up. They credited Dr Wan for her leadership and praised Tuk, her assistant, for maintaining a good relationship with the patients.

With funding from MORU, the Melioidosis Clinic was established to facilitate multiple multi-year studies that involved long-term follow-up of melioidosis patients. These include a multi-year follow-up of patients who recovered but became reinfected with melioidosis (Chaowagul et al. 1993), and studies that led to the establishment of a system to differentiate between patients who developed a relapse, from patients who became reinfected (Limmathurotsakul et al. 2008; Limmathurotsakul et al. 2006; Maharjan et al. 2005). One study that considered more than eight hundred melioidosis patients treated in Sunpasit Hospital between 1986 to

2005 showed that about ten percent of the patients developed a relapse of melioidosis, while twenty-five percent became reinfected with the disease (Limmathurotsakul et al. 2006). Another study carried out in the clinic supported the identification of simultaneous infections with one or more strains of BP, which is an uncommon phenomenon (Limmathurotsakul et al. 2007). Another prominent multi-year study was related to the advancements in treatment for severe melioidosis infection (Chaowagul 2000). The clinic also contributed to a multi-site study involving over six hundred patients from Sunpasit Hospital and other hospitals in Khonkaen, Nakhon Phanom, Udon, Sisaket, Chaiyaphum and Nakhon Ratchasima provinces. The study showed that there was no difference in the outcome of patients treated for twelve or twenty weeks with *Trimethoprim-sulfamethoxazole*, an orally consumed antibiotic to eradicate the bacteria from patients' bodies (Anunnatsiri et al. 2021). Another trial conducted between March 2013 to February 2017 which involved almost five thousand patients showed that community-acquired sepsis was a common risk factor that led to an increase in deaths among patients in *Isan* (Hantrakun et al. 2018). The study stated that early recognition of sepsis can facilitate early recognition of infections and treatment in patients, including for melioidosis which is a common cause of community-acquired bacterial infection that can lead to sepsis (ibid.).

Dr Wan, who established the melioidosis research collaboration between MORU and Sunpasit Hospital in the mid-1980s which I have discussed in Chapters Three and Four, also established the Melioidosis Clinic, which she led after her formal retirement from government service and as a staff at Sunpasit Hospital in 2007. She operated the clinic twice weekly, on Tuesdays and Fridays, where she would see all new patients suspected of melioidosis and those visiting for follow-up. Figure 26 shows Dr Wan with her patients at the Melioidosis Clinic. Like other doctors employed in government hospitals, Dr Wan also ran a private clinic which was located close to Sunpasit Hospital while she was employed at the hospital. Her private clinic was not related to melioidosis and operated in the evenings and during the weekends.

I met Dr Wan for an interview in one of Ubon's largest private hospitals where she assumed a senior managerial position after the Melioidosis Clinic was discontinued. Dr Wan told me that the melioidosis-related research carried out in Sunpasit Hospital was possible because of the *barami* she has. She explained to me that the research was made possible in Sunpasit Hospital during a period when not many stakeholders were interested in melioidosis because of her

commitment to the work, and the recognition she had in the hospital, in MOPH, and among infectious disease specialists.



Figure 26: The Melioidosis Clinic.

This image of the Melioidosis Clinic was published by Al Jazeera news in 2016. Source: (Duggleby 8 August 2016).

The role of the clinic

During the period when the Melioidosis Clinic was operational, all the patients suspected of the disease who came through the outpatient department were seen by Dr Wan. In her capacity as a senior doctor who was part of the hospital's management before her retirement, she had relative autonomy in running the Melioidosis Clinic, where she combined clinical care with research. She saw approximately fifty patients per week. She emphasised that not all the patients who came to the Melioidosis Clinic participated in the research. They included those who came in without appointments, those who were referred to Sunpasit Hospital from other hospitals, and patients who had recovered from melioidosis, some of whom were still on antibiotic treatment, while others had been completely cured of the disease but were involved in research. Dr Wan said she was not responsible for patients who were admitted to the hospital as they were managed by the hospital staff. However, in her capacity as a specialist on melioidosis in the hospital, she frequently visited the patients in the wards.

Dr Wan and her team brought more attention to melioidosis among the hospital staff when they ran the outpatient clinic, said Nuch and Mai. Nuch said she felt that there was more clarity on how melioidosis patients should be managed and treated and that gave her more confidence in doing her work:

They (the research team) could be called upon at any time. They came in whenever a new patient suspected of the disease arrived. They didn't treat patients, but they discussed with the doctors on duty and then the doctors would instruct us on what to do...I'm not giving an excuse by saying this, but it is a fact that we don't have much time to pay special attention to all the patients. There are so many patients, and we have a lot of work. It's good to have clarity, and it's good that they were able to closely observe patients and we were able to get clear instructions on what to do.

Mai told me that she first heard of melioidosis when she joined the hospital as a junior nurse. She has been working in the outpatient department for years, where she had the opportunity to interact and sometimes assist the Melioidosis Clinic staff as they were often busy. She said a key strength of the clinic was its ability to closely engage with most patients:

They were well organized. They had many patients, but they knew all of them personally, and this helped strengthen their relationship. Many patients came for their appointments, and they took good care of the patients.

The Melioidosis Clinic was a site of research that was informed by humanitarian commitments and dependent on translational support and funding (McKay 2017; Redfield 2012). It was a site where medical research came in to facilitate the treatment of patients (Leach and Fairhead 2011), a site where people accessed and experienced what was on offer from the research collaboration (ibid.) between MORU and Sunpasit Hospital. Although melioidosis research was perceived as an external endeavour to the hospital, it was embraced by nurses like Nuch and Mai who felt that it facilitated their work and gave more structure and clarity on what they needed to do to take care of melioidosis patients.

Getting things done

The hospital staff I spoke to told me that a key characteristic of the Melioidosis Clinic was its ability to follow up on many patients who regularly returned for their appointments. A key person who established good relationships with the patients was Tuk, a member of Dr Wan's team who helped her run the Melioidosis Clinic. Although Tuk was not trained as a nurse or in public health, she gained respect from the hospital staff and was recognised for her ability to get things done. After graduating from high school in 1984 she was advised to follow her relative who worked as a nurse in the hospital. She began with a part-time job where she assisted nurses in different departments, before joining Dr Wan's team soon after they began research on melioidosis in 1986:

In those days, the salary for working in a government hospital was low. The pay under the melioidosis project was much better. When I heard that they were looking for an assistant, I immediately approached Dr Wan and told her that I was interested. I am not a nurse and didn't study public health, but I can support their work.

She told me that the bosses are *mor farang* (Caucasian doctors) and they are very active and disciplined and that I had to work hard [laughs]. I am a hard worker and a quick learner.

Tuk's main responsibility in the team was to manage the logistics and the procurement of materials for the clinical trials. She enjoyed meeting and entertaining people and often spent time with MORU visitors from the Bangkok office and abroad, including *mor farang*:

I don't speak English. I only know a few words, but I could take care of all the visitors from Bangkok and abroad. I took them around town. When they came to Sunpasit [Hospital], we hired an interpreter to translate, so it wasn't a problem...I assisted the team with everything. I went around with them to the wards, helped carry syringes in the basket, and accompanied them to the main [hospital] lab[oratory] to collect specimens for testing.

Tuk worked under the influence of Dr Wan:

Dr Wan is a senior and respected doctor. She was strict and straightforward. Many doctors and nurses *kreng jai* (are considerate of) her. In the beginning, we were a small unit and I had to learn to do many things. I was afraid of making mistakes and I made some mistakes, but I learnt to be very careful. In those days, every time a melioidosis patient was confirmed, I would accompany the doctor to the ward. We spoke with the doctor in charge of the patient, and they would immediately prescribe antibiotics to the patient...

You need honour and power to get things done. When Dr Wan was here, she got things done. She dedicated more than a hundred percent of her work time to melioidosis. This was in addition to her other responsibilities in the hospital as a senior manager. She was a very dedicated person, and I learnt a lot from her.

There is a general belief in Thai society that honour, and prestige is hierarchical, in the sense that it flows from above (Komin 1990). Persons (2016) says a leader with *barami* earns respect and trust through the use of their power and influence for the collective good, or for the good of others. A leader's *barami* can also influence what social theorists refer to as the "Pygmalion effect" which is a form of self-fulfilling prophecy where the followers take on the expectation to perform (ibid.). Under Dr Wan's leadership, Tuk took on the prophecy to perform and demonstrate her capacities as a member of the melioidosis research team which worked with *farang* doctors, who are regarded with superiority in terms of knowledge production, as discussed in Chapter Four.

Merits-making and the cultivation of *barami*

Tuk told me that the major drive for her in working at the hospital was because she wanted to do good, by helping people in distress. She believed that hospitals are spaces where one can obtain a special kind of *bun*, as many patients and their families come in with some form of distress. Care in the Thai Buddhist sense is calibrated based on *bun* and *kam*, which influences the social, economic and political everyday lives of Thai Buddhists (Aulino 2019). It is embedded in the habituated practices of providing for others in a calculated manner (ibid.).

While assisting Dr Wan at the clinic, Tuk was responsible for making sure that the patients came in for their appointments. She soon learnt that many patients, particularly those who had recovered from the illness, did not want to return to the hospital for follow-up:

They (patients) came back [to the hospital] only when they got sick again.

I had to contact them one-by-one, to find out how they were, to check if they were still alive or whether they had died. I had to document the discussions with them and check whether they regularly took their medicines or not.

Many patients didn't come for follow-up. We had to contact them to find out if they had taken all the medicines given to them and to ask them to come in for more medicines.

We also wanted to know whether the patients who became infected with melioidosis again had recovered from the disease and got a reinfection or did they had a relapse of the disease.

Through the process of contacting the patients individually, Tuk began to understand the logistical challenges the patients faced in returning to the hospital for follow-up. She said in telephone conversations with them, she also tried to convince them to return to the hospital so that they could obtain the antibiotics they required to complete the treatment course. Volunteerism or extending one's role beyond one's responsibility in Thai culture is associated with *bun*, as a way of gifting others. *Bun* is offered in various material and non-material forms, which include providing services for others like volunteering (Chaisinthop 2014), or carrying out any act which is socially perceived to be doing good for others. It is also associated with being a good person, a moral conduct propagated by the Thai state (Chaisinthop 2014; Peleggi 2019).

Establishing relations through barami

Tuk further elaborated on why patients did not want to return to the hospital regularly for follow-up:

One reason why patients didn't want to come back for follow-up was because they wanted to save money. They don't want to spend it unnecessarily on transport. It costs to travel from their villages here. Some of them don't have relatives to bring them to the hospital.

Some don't want to come because they are not sick.

Tuk realised the importance of establishing a good relationship with the patients so that she could do her job, while *tham bun* (make merits) at the same time:

The most important part of my job was to develop a relationship with the patients. I couldn't do my job without their support.

It is important to show good gestures and respect to them. When they came to the hospital, it was my job to serve them and to help them.

The outpatient department was always very busy. I tried to support them whenever I could, not all the patients, but some of them, especially the elderly patients [smiles]. We could clearly see that some of them were poor and didn't have much money, especially to spend on expensive travel costs. So sometimes, when I noticed that they travelled from the same or nearby villages, I would give them appointments on the same day so that they could travel together. I sometimes asked one patient who had a pickup [truck] to pick another patient up from the same village when I found out that they didn't have anyone to bring them here (to the hospital) [giggles].

Patients don't want to come out (from the village) unnecessarily because they work every day and because they don't want to spend money. They don't want to waste it on coming all the way to the hospital unless they are sick.

It's not easy to travel from some villages [because of the lack of public transport]. Some patients don't have their children living with them to drive them all the way here.

Thai patients visiting government hospitals do not have to pay for basic health care, which is covered under UHC, but they have to absorb the costs of travel and food. Most patients spend long hours at the hospital, with frequent long intervals of waiting time before they get to see their doctors and before they can obtain their medicines from the pharmacy department. These long waits result in some patients missing public transport back to their villages and having to hire private vehicles which can be expensive. Realising that travel costs were a key concern for some patients visiting the Melioidosis Clinic, Tuk tried to identify ways to support them. Instead of having to wait for their medicines after their check-up, she volunteered to collect medicines from the pharmacy department and post them to the patient's homes. She said she was able to negotiate this special arrangement because the hospital staff knew that she worked for Dr Wan:

For some patients, the last bus from the municipality to their district left at three in the afternoon. From there, they travel to their villages. If they don't get to catch their bus on time, it becomes difficult. Some patients have to hire vehicles which is expensive to travel all the way from here. Even though health care is free, they have to pay a lot for their travel.

What I did was ask the patients for their drug prescription receipts so that I could collect them for them. That way, they didn't have to wait and could catch the bus home.

I collected the medicines from the pharmacy department later in the evening after wrapping up my work in the clinic and would send it to them by post the next morning.

It wasn't expensive to post the medicines to them and I didn't have to do it for all the patients. This way, I could also *tham bun* (make merits).

Care, or the moral act of giving, as I have experienced as a Thai Buddhist is particularly sacred in spaces of worship such as temples (Cook 2008), and in spaces of hope, as a gesture to assist those in distress or hardship, including in hospitals (Puaksom 2015), care homes and orphanages. In her ethnography on rituals of care for the elderly in northern Thailand, Aulino (2019) demonstrates how little emphasis is placed on cultivating authenticity and the desire

to care for others. She shows that what counts as providing for others becomes the logic to define what places and people should be engaged with for making merits. With her gesture, Tuk was able to *tham bun* while at the same time progress her work in the clinic through continued research participation of patients. Tuk added that the patients returned gestures she extended toward them:

They have also been very kind to me. Every time they came back to the hospital, they brought small packets of newly harvested rice from their village, or some fresh vegetables or fruits. I always told them not to bring these things, but they would get upset and say that they just wanted to thank me for helping them.

They didn't expect any special treatment and only wanted to show their appreciation.

The patients may have participated in the clinical trials for completely different reasons than what was intended by the research team (Fairhead, Leach, and Small 2006). Tuk's gesture extended toward melioidosis patients with the hope of obtaining *bun* strengthened the social bonds between her and the patients, allowing her to form a social identity symbolised by gifts (Yan 2020) exchanged at the Melioidosis Clinic. This identity relates to her desire to make merits, which lends to the construction of *barami*. Tuk's gesture was not extended exclusively based on her calibrated beliefs in *bun* to the kind Aulino describes in Thai rituals of care but was aimed at facilitating patients' return to the Melioidosis Clinic for follow-up. As Melissa Leach and James Fairhead (2011) demonstrate, consent to participating in a clinical trial is not a free choice. Their involvement in a British Medical Research Council's birth cohort study in the Gambia shows that it is cultivated within a broader frame of power and value. The act of collecting medicines for the patients and posting them to the patients' homes can therefore be understood as technology to consent patients into the dominant social arrangements to participate in clinical trials. The deployment of such technologies is tied to *bun* and *barami* which made the Melioidosis Clinic visible in Sunpasit Hospital.

Barami was socially produced and co-produced by Dr Wan, Tuk and the patients at the Melioidosis Clinic. While Dr Wan's *barami* allowed Tuk to obtain medicines on behalf of the

patients, she was perceived by the hospital staff as having *barami* to influence the patients' visits to the melioidosis clinic. Additionally, the presence of patients at the clinic contributed to the *barami* of Dr Wan and Tuk among melioidosis researchers.

Conclusion

This chapter centred around the Melioidosis Clinic which operated in Sunpasit Hospital during a particular period when attention to research and funding for the disease was at its highest in Thailand. I discussed the clinic as a site where science and healthcare intersects with social, religious, political and economic aspects of the lives and livelihoods of those who contributed to the production of knowledge through various forms of engagement, as researchers, research assistants, healthcare providers or research participants, all of whom form part of the 'trial community' (Geissler 2011b). In this space, particular forms of relationships were developed and characterised to facilitate how melioidosis is made known to different stakeholders in various ways, through its entanglement with the construction and reconstruction of *barami*.

I began the chapter by describing the spaces in and around Sunpasit Hospital where worship of objects like shrines and statues of Gods, kings and ancestors are observed to demonstrate the intersections between science, religion, power, hope, life, and livelihoods which evolve with the production and co-production of *barami*. I then went on to describe the day-to-day activities in the hospital's outpatient department where Mai worked on the construction of the image of *khon di* (good person). Through gestures of respect towards the patients, she made efforts to strengthen their trust in the hospital staff and the healthcare system, amidst distress patients experience in silence. I then discussed the clinic and the relationship Tuk cultivated with the patients.

I then discussed how Tuk tried to resolve the key concerns of some patients which discouraged them from returning to the clinic for follow-up. She identified travel costs and convenience as a key concern for the patients, which was associated with routines of waiting as part of their hospital visit. To reduce the waiting time, particularly for the elderly and for patients who depended on public transport to return to their villages, she collected medicines on their

behalf and posted them to their homes. In reciprocation, they returned to the clinic for their follow-up appointments and brought her local produce as gestures of appreciation.

The chapter demonstrated that the clinic was an everyday social space where merits were made, and gestures returned. It was a space where engagements between specific material objects like drug prescription receipts, medicines, rice, vegetables, and fruits from the villages were exchanged, and where acts of collecting and posting medicines to patients' homes formed an important part of long-term research in the clinic. Tuk was perceived by the hospital staff as having *barami* in influencing the patient's visits to the clinic for follow-up. She was able to negotiate the collection of medicines on behalf of the patients from the pharmacy department because of Dr Wan's *barami* in the hospital. The presence of the patients in the clinic significantly contributed to the success of the research in the clinic, and to the perceived *barami* of Tuk and Dr Wan in the opinion of the hospital staff.

The next chapter is about the production of data on melioidosis for the national disease surveillance system. Through the day-to-day activities of Sunpasit Hospital staff, I demonstrate the challenges they go through in producing fragile epidemiological data which is based on underrepresented numbers of melioidosis patients treated in the hospital. The chapter discusses attempts health authorities and melioidosis researchers make by introducing new tools and templates to collect true data on melioidosis. Different tools and technologies are tested and tried at Sunpasit Hospital, with the hope that they can be replicated in other hospitals to facilitate data transfer to the national system.

Chapter 7: The drive for true numbers in the visibility of melioidosis

What epidemiology makes of the diseases of populations depend on the individual enactments of these diseases it takes into account.

- Mol (2002, p. 130)

This chapter continues with a discussion on efforts made to stabilise the knowledge and information on melioidosis in research and public health practices. In Chapters Three, Four, Five and Six, I have demonstrated the efforts made by melioidosis researchers and health officials toward generating more evidence to make the disease visible nationally and internationally. One of the rationales for advocating for more visibility of melioidosis is to attract policymakers and donors to contribute resources for research, clinical care, and disease prevention, and control. An effective way to make melioidosis visible in public health is through presenting data on the disease in the national disease surveillance system⁶⁰. Melioidosis is listed as a notifiable disease under the MOPH's National Notifiable Disease Surveillance System (NNDSS) which regularly compiles statistics on pathogens of international public health concerns. The NNDSS represents different hopes and expectations different groups have for making melioidosis visible to national policymakers and the global health community.

This chapter delves into the everyday practices of the production of epidemiological data on melioidosis for NNDSS at Sunpasit Hospital. It reveals the challenges hospital staff face and the strategies they deploy to navigate through the complex landscape within which melioidosis data is situated. In considering the production of hospital-based data on

⁶⁰ The system in Thailand comprises of data on communicable and non-communicable diseases, occupational and environmental diseases, and various kinds of injuries. This data is used by MOPH to assess public health threats and to generate national statistics which is shared with the global health community.

meliodosis as a technology of visibility in public health, I review the efforts hospital staff, health officials and MORU researchers take to make melioidosis data accurately reflected in NNDSS. The key questions I ask are what constitutes good melioidosis data and how do they contribute to the visibility of melioidosis? How does the demand for counting impact the work of hospital staff? What is the role of epidemiological data in making Sunpasit Hospital truth spots for melioidosis? What happens when they are unable to compile accurate numbers to report melioidosis to the NNDSS?

In what follows, I begin by describing the processes within which data is compiled once a patient is suspected of or confirmed of melioidosis. Through the day-to-day work of an epidemiologist and her team in Sunpasit Hospital, I discuss the efforts they take to compile accurate numbers on melioidosis to report to the NNDSS. These include the introduction of new tools, templates and data recording systems to capture more similar data, and the need to consolidate different data sets which are developed for different purposes to form facts on melioidosis.

Report 506 and the NNDSS

Jin, a Sunpasit Hospital epidemiologist postponed several appointments I made with her when I began fieldwork at Sunpasit Hospital. She was busy because she was responsible for investigating every cluster of COVID-19 patients in Ubon. The hospital was designated by MOPH to treat all COVID-19 patients in Ubon and neighbouring provinces. This was during the period when all patients confirmed with COVID-19 in Thailand had to be hospitalised. During this period, diagnostics for the disease was not commercially available in Thailand and laboratory confirmation of patients was only carried out in government-designated hospitals⁶¹. Although Jin was responsible for reporting epidemiological data on patients with melioidosis and eighty-six other diseases to the NNDSS weekly, she had to drop this work and prioritise COVID-19-related activities for the duration of the pandemic period. A national law, the National Communicable Diseases Control Act B.E. 2558 (2015), which I have discussed in Chapter Three, requires government hospitals across the country to notify diseases

⁶¹ For more see (National Health Foundation 2022)

considered “dangerous to public health” to national authorities promptly (Department of Disease Control 2015).

One afternoon, when I finally had the opportunity to interview Jin, she warned me that she may have to rush out before the end of the interview if she was called upon for COVID-19-related activities. I asked her if I could follow her around so that I could have a better understanding of her work, but she politely declined saying that the work she carried out during that period was COVID-19 related, and not related to melioidosis. I asked her when she would resume the compilation of melioidosis-related data to report to NNDSS, and her response was:

I haven’t done it [collected data on melioidosis] for several months, but I will have to find time to go through the database later because we have to report it to the provincial health office before the end of the year. They have allowed us to delay the reporting because of COVID-19.

Although several patients admitted to the hospital were laboratory-confirmed with melioidosis and other diseases listed as notifiable diseases, COVID-19 was treated with exceptional attention. This has led to long-lasting public health, and economic and social impact on society. Framed as a global health security threat, the response to the pandemic justified the securitisation of the people (Kirk and McDonald 2021) and reflects on the hierarchies and priorities given to certain diseases over others, or certain aspects of responses to disease over others. Despite COVID-19 exceptionalism, health officials and MORU continued to explore ways to make melioidosis visible through the production of epidemiological data. MORU continued to compile data based on the positive laboratory tests carried out in the research laboratory which was formally confirmed at the hospital level by the clinical laboratory (see Chapter Five). But MORU is not responsible for formally reporting data to NNDSS, as this had to be done by the hospital, through a computerised data reporting system.

Report 506

The system for reporting diseases categorised as dangerous infectious pathogens” to NNDSS is known to public health officials in Thailand as Report 506 (R506). The name for this system is derived from the number assigned to the diagnostic category designated for diseases of respiratory conditions under WHO’s International Classification of Diseases (ICD)⁶². The template used for reporting R506 is shown in Figure 27. Data reported through R506 is compiled at the hospital level and transmitted upstream through the Provincial Health Office and the Regional Disease Control Offices⁶³, to the central level at the Bureau of Epidemiology in MOPH. The list of diseases required to be reported with R506 in Thailand increased over the years from fourteen diseases in 1968 to twenty-six in 1973, twenty-nine in 1976, fifty-three in 1982, sixty-eight in 1987, eighty-four in 2008, and eighty-seven in 2017 (Bureau of Epidemiology 2020). While new and emerging pathogens have been added to the list, diseases like tuberculosis and leprosy have been removed because they require more direct pathways of reporting data from the hospital level to the Department of Disease Control in the MOPH (Department of Disease Control 1 February 2023).

In conversations and interviews with senior health officials and MORU researchers, they emphasized how important it was for data on melioidosis to be accurately reflected in the R506. This is because the data from the system is a key instrument used by health policymakers:

When senior officials make decisions on priorities for infectious diseases, they consider data from the R506. But melioi[dosis] data in R506 is wrong. There are several problems with the [melioidosis] numbers in the database.

- A senior epidemiologist in MOPH. Interview in April 2021.

⁶² ICD is used as a basis for statistical comparison of the global causes of illnesses and deaths which occur in different places over time. The ICD is periodically updated to include new disease groups and pathogens.

⁶³ There are 13 regional disease control offices, twelve of which facilitates the coordination of disease control information and activities for a cluster of neighbouring provinces, while one regional office facilitates disease control activities for various districts of Bangkok.

It's important to have data on melioidosis in R506 because it forms the basis of our surveillance system. Without this data, it is difficult to convince decision-makers on how severely this disease impacts rice farmers.

- Dr Tam, MOPH. Interview in April 2021.

If we don't change anything in R506, it would be difficult. The question is how many cases and deaths are caused by melioidosis nationally? If they are not reported in R506, MOPH can't do anything. The bottom line is that if it is not reported to the central authorities, they can't push for more to be done on the disease.

- Dr Ek, MORU. Interview in October 2020.

Melioidosis research is important to understand the disease, but epidemiological data is needed. We need data. We can't say that patient data is incomplete if we want to seriously work on the disease.

- A senior public health policymaker. Interview in December 2020.

Thailand's disease surveillance system emerged out of a collaboration between MOPH and WHO to develop a reporting system for communicable diseases in 1963 and has since received support in terms of capacity building and funding from the government of the United States, including in the form of field epidemiology training (Bureau of Epidemiology 2020). This system is based on a top-down global health perspective (Bunkley 2021) where the data produced is expected to be clear, clean, reliable and accurate (Biruk 2018). The data reported needs to fit into the enumerated classification and categorisation of diseases, causes and deaths (Bowker and Star 1999; Harper 2014; Biruk 2018).

The R506 template (Figure 27) is an individual patient report that is aimed at obtaining information required to conduct epidemiological analysis to develop an understanding of a disease. Data compiled in R506 is used by local and provincial health officials to identify the source of infection and conduct further epidemiological investigations at the community level. At the MOPH level, it is deployed to further analyse the degree of risk and severity a disease poses to an individual, a community, and a population. It is also used to calculate the death rates a disease can cause in a group of people, or at the population level, based on which disease prevention and preparedness policies and activities are planned. The first part of the R506 template indicates the title of the document and the address of the Bureau of Epidemiology (left). The top right section is for the staff reporting the data to provide their identity number. The second part lists eighty-seven diseases for which this template is used. Melioidosis is numbered seventy-two. The third part is to record the patient's details which include name, patient number, telephone number, laboratory results, the names of parents and occupation for minors under fifteen years old, age, sex, marital status, nationality, occupation, and address. The fourth part is for the patient's symptom onset date, hospitalisation dates, and names and numbers of health centres or hospitals they visited, as inpatients or outpatients, and an account of their latest health condition. The fifth part is for the health centre or hospital staff to indicate their name and data documentation date and for the district and provincial health officials to document the names and the date they received the report.

The data compiled with the R506 form at the hospital level is consolidated at the provincial and regional levels before it is considered at the central level in the MOPH. At the central level, the data goes through several processes of statistical manipulation to determine the level of epidemiological risks melioidosis and other diseases pose to an individual or a population. This reiterates the importance of national-level data dependence on local health workers (Tichenor 2016). The MOPH website where the data is published states that this data does not represent the national statistics or the sentinel surveillance for the listed diseases and that the purpose of this data is for disease prevention (Bureau of Epidemiology). This means R506 is a tool that is used for identifying signals of threats which is part of multiple assemblages of biosecurity (Fortané and Keck 2015). The rationale for such data is so that political decisions

can be made to legitimize actions required to respond to the potential risks, disregarding whether the risk occurs or not (Lakoff 2017).

Compiling data

Jin is the only staff member of the hospital in a three-person team responsible for compiling data for R506. Her team members supported her with the data collection, which was carried out daily and involved visits to different spaces in the hospital and reviews of different forms of materials where patient-related data was stored electronically, and on papers inscribed by doctors. It also involved interviews with the patients and their relatives.

Jin told me that on a typical workday during the non-pandemic period, to compile data for R506, she would first go through the hospital's patients' registration records to find out if any new patients admitted to the hospital were suspected or confirmed with melioidosis. She noted down the wards they were in and would visit them later in the day. Melioidosis patients treated at Sunpasit Hospital are usually admitted to the intensive care unit, the internal medicine wards, the general wards, or the pediatric wards. The hospital has thirty-five general wards, ten special wards, and over a hundred intensive care beds. Jin always carried several printed copies of the R506 form, a notepad, and a pen with her when she visited these spaces. In the wards, she would first spend time in the nurse's office where she would review the patients' records by going through the electronic database and then review the printed folders.

While she browsed the database, some nurses would walk in and out of the office, but she did not interact with them. She said they were often busy while she was focused on the data she required to fill out the R506 form. She uses the desktop computer to routinely extract data in PDF format and inscribes them in the notepad she carried with her. The data for each patient was written down in separate R506 forms. She would then look through the printed documents neatly stacked in the folders. Flipping through the folders, she would review the printed documents, and take notes on any additional data she identified.

After reviewing the patients' records, Jin would visit each patient at their bedside. Here she said she would first reviews the files attached to the foot of their beds, and then interview them and their accompanying relatives:

I walk [to] the [different] wards every day. I spend time with the patients and their families, ask them about their symptoms and try to find out how they got infected. I try to get as much details from them as possible because I need to fill out the R506 form.

We need the correct information. We have to also find out where they got infected. Many patients don't know how they got infected. They don't know the disease...

As I have discussed in Chapter One, most patients first hear of melioidosis when they are diagnosed with it and the explanation their doctors give on how they got infected confuses some patients because it goes against their experiences. The data Jin obtained from the records of the hospital are data that emphasize the biological phenomenon, rather than the practices of care for patients' health and illnesses (Mol 2008). This data is abstracted from the social phenomenon that causes the illnesses and the experiences of the patients, including their diagnosis experiences (Bunkley 2021).

Although the different datasets Jin reviewed in the wards comprise of overlapping data, she said she discovered that the latest information, particularly related to the patient's diagnosis, was documented by the doctor on paper, and there may be a time lag before it is updated in the electronic database. She continued:

Sometimes we see patients from the same [geographical] areas. Whenever we find out that there is more than one patient from the same area, we should go out to the village to investigate. But for that, we need their correct address, and the addresses in the hospital record are generally not where the patients actually live, so we have to ask them for their current addresses every time we interview them.

Many patients did not live in their family homes in the villages. It is not uncommon for residents in the provinces, particularly in *Isan*, to migrate or relocate to other metropolitan or city areas to work as wage labourers or to establish their own businesses (Keyes 2012). Jin said although melioidosis is considered among the priority diseases under the law, it is not of priority concern to health authorities. For this reason, she did not generally have to conduct further epidemiological investigations at the village level. Despite knowing this, she wanted to have the correct address at hand, just in case she was asked to conduct further investigation. She said sometimes the provincial or regional health officials wanted more data, for which she may have to visit the patients' homes and did not want to be perceived as not being able to do her job. During my fieldwork, I also had the opportunity to accompany a group of MORU researchers who visited the homes of patients hospitalised at Sunpasit Hospital. They collected water from within and around patients' homes, which were tested in the laboratory to determine the presence of BP. The results of the tests were further used to study the genetic characteristics of the microbe.

When she returned to her office with the data, Jin would key the data from her desktop computer into the R506 system, one by one, offline. She said she spent time reviewing and cleaning the data, to make sure she put the correct information into the database. Once a week, she would submit the data into the online system. Once submitted, the data was accessible to the provincial, regional and central levels at the same time. The data is manipulated at each level, which is further discussed below.

The key public health objective for reporting melioidosis with R506 to NNDSS is so that MOPH can assess the risks the disease poses to individual patients and the population at large. It involves tedious processes of extracting data from different spaces of the hospital. This data forms an important part of disease risk assessment and preparedness plans designed at the central level. It reflects the dependence the central health authorities have on obtaining data from the local level. However, this data is mainly based on the requirements indicated in the R506 form which focuses on the biological characteristics of the disease and does not consider key information that can lead to a better understanding of the disease risk and inform prevention measures, such as experiences of the patients.

The flow of the melioidosis data

The pathway for the flow of data on infectious diseases generally moves up the reporting system from the local to the central level in MOPH. Once Jin submitted the melioidosis-related R506 form online from Sunpasit Hospital to the Provincial Health Office, it was verified and combined with data from hospitals in other districts in the province before it was transmitted to the Regional Disease Control Office. The regional officers again verified the details by removing duplicate data which may arise because one patient may have visited multiple hospitals in the province where their hospital record may indicate that they were suspected of melioidosis infection. The data was then submitted to the Bureau of Epidemiology in MOPH where it was statistically manipulated to produce multiple datasets, including a population-based assessment of the level of risks and the fatality rate.

Revealing numbers

Data on melioidosis has been reported on an ad-hoc basis in NNDSS since 2001 and has been available online from 2003 onwards. Since its classification as a 'dangerous communicable disease' in 2017, melioidosis has been reported from multiple provinces across the country but research confirms that the disease is under-diagnosed and under-reported (Hantrakun et al. 2019; Hinjoy et al. 2018). Data from NNDSS shows that in 2003, there were three hundred and sixty patients, including thirty deaths reported from thirty provinces. In 2022, 3,573 patients, including a hundred and fifty-seven deaths were reported from seventy-two out of seventy-six provinces in Thailand, including from the capital city, Bangkok (Bureau of Epidemiology).

Dr Ek, a senior MORU researcher whose work has significantly contributed to the visibility of melioidosis said not all hospitals systematically collect and report melioidosis data to NNDSS. As discussed in Chapters Four, Five and Six, Sunpasit Hospital is among the few hospitals in Thailand where melioidosis patients are systematically identified, and where data is regularly compiled by Jin and her team for the NNDSS. He said even in Sunpasit Hospital, where melioidosis data exists, the number of patients regularly identified with the disease is not consistently reported to NNDSS. To better understand what Ek said, I extracted some data on

meliodosis reported in NNDSS from 2018 to 2022. Table 1 shows the numbers of melioidosis cases and deaths nationally, and from Ubon.

Year	National		Ubon	
	Cases	Deaths	Cases	Deaths
2018	2701	81	569	69
2019	2819	81	547	62
2020	2793	14	485	0
2021	2206	6	349	0
2022	3573	157	623	99

Table 1: Data on the total annual number of melioidosis cases and deaths obtained from R506 reports for the years from 2018 to 2022. Source: adapted from (Bureau of Epidemiology).

Dr Ek also confirmed that most of the data on melioidosis reported from Ubon is based on data compiled at Sunpasit Hospital. Table 1 shows that most melioidosis deaths are reported from Ubon, except during the pandemic period between 2020 and 2021. The number of deaths nationally reported during the pandemic period was also low compared to other years. Despite these low numbers, the laboratory-confirmed data I obtained from Sunpasit Hospital showed that there were more melioidosis-related deaths documented in the hospital. For instance, in July 2021 alone, eight patients died of melioidosis in Sunpasit Hospital. This data also confirms inconsistencies in melioidosis data reported to NNDSS during the period when priorities and resources were almost exclusively dedicated to the COVID-19 pandemic. Despite these inconsistencies, the table also demonstrates that the melioidosis data compiled at Sunpasit Hospital, which according to Dr Ek, almost exclusively represented data on

meliodosis in Ubon, constitutes a significant part of the national data on melioidosis reflected in NNDSS.

The densely saturated work Jin and her team goes through to produce data for R506 involves going through multiple databases of the hospital to obtain the information required for filling the reports. These materials were acquired and handled with varying moods and concerns Jin had for obtaining accurate data, which is important for producing evidence on the disease (Biruk 2018). They involve hours of data sorting by going through both electronic and printed materials in different locations of the hospital. They reflect on the importance of certain functions and roles of health professionals who are critical and yet often overlooked in the health system (Adams 2016). These mundane practices health workers go through to record and report data are what brings the state and the bureaucracy to life (Harper 2014). Despite inaccuracies, they enable Sunpasit Hospital to report melioidosis data systematically and regularly to NNDSS which reaffirms the hospital as truth spots for melioidosis.

The impel for accurate data

Dr Ek has consistently raised concerns about the low numbers of melioidosis reflected in the NNDSS. Through his involvement in melioidosis research at Sunpasit Hospital and nationally for at least two decades, he said the inconsistencies and underreporting of melioidosis are observed from all provinces. For decades he has been advocating for more recognition of melioidosis nationally and internationally (see Chapters Three and Four). He has been working with MOPH officials to identify ways to accurately reflect the melioidosis situation in the country through data presented in the NNDSS.

Inconsistencies in numbers

After assuming a senior position in MORU headquarters in Bangkok in 2012, Dr Ek reached out to MOPH officials to draw their attention towards the disease. As discussed in Chapter Three, he initiated several meetings with public health officers at the national and provincial levels to draw their attention towards melioidosis and find ways for improving the reporting

of melioidosis data to NNDSS (Melioidosis Info 17 September 2012, 22 March 2012). During my fieldwork, he visited Ubon with senior MOPH officers to discuss with Sunpasit Hospital administrators, and provincial and regional health officers, urging them to systematically report accurate data on melioidosis to the NNDSS.

To resolve the problem of underreporting, Dr Ek said they had to begin at Sunpasit Hospital because this was where melioidosis-related data was systematically collected through regular screening and diagnosis of patients:

Patients are regularly screened [for melioidosis] in the hospital. When we began research in the early days, there were around 200 patients and about 70-80 deaths per year.

If they (hospital staff) don't put the data in R506 and send it to MOPH, we (researchers) can't do much about it. The local level must report up and the central level. An emphasis should be placed on the importance of reporting.

To demonstrate the inconsistencies in data reporting, MOPH and MORU teamed up to produce evidence, to justify their actions.

A study by Viriya Hantrakul et al. (2019) retrospectively compared routine microbiology databases from laboratories with data reported to NNDSS. The study involved 7,126 melioidosis patients hospitalised in sixty hospitals between 2012 – 2015. It shows that annually, on average, 1,700 patients were laboratory-confirmed with melioidosis, of whom approximately seven hundred died. However, only four percent of the deaths were reported to NNDSS during the period. The study also identified inconsistencies between the laboratory data and the hospital data from the same hospitals. This included the data from Sunpasit Hospital's clinical laboratory and that was reported to NNDSS.

To resolve the inconsistencies, they recommended that the laboratory data be included in the reports to NNDSS. NNDSS is based on R506, a template for which is shown in Figure 27, where partial data is obtained from the hospital records that form the Hospital Information System (HIS). While data from R506 is used to assess the disease risks and develop plans for disease prevention, the HIS database is reported upstream to the Medical Services Department in

MOPH for planning and policy considerations related to hospital services. The Laboratory Information System (LIS), on the other hand, is used for yet another purpose and is coordinated at the central level by the Medical Sciences Department.

Another study by Soawapak Hinjoy et al. (2018) shows that melioidosis is underdiagnosed and underreported in several provinces. The study states that despite being a requirement under the law, not all hospitals are aware of the need to report melioidosis to NNDSS:

We found that many hospitals did not realise that they should report melioidosis cases, saying that they were too busy to report them, or did not want to report a rapid increase of fatal melioidosis cases [for example, from zero to fifty in a single province]

- (ibid. p.8).

Their study also highlights that underreporting of deaths caused by melioidosis leads to the underestimation of the true burden of the disease in hospitalised patients in Thailand. Other studies show that melioidosis significantly impacts Thailand's public health system, with patients admitted to the hospital for long periods and sometimes multiple periods of hospitalisations (ibid.). Additionally, another study shows that an estimated over 2,000 melioidosis infections occur in *Isan* annually, of whom forty percent die (Limmathurotsakul, Wongratanacheewin, et al. 2010).

Dr Ek has been involved in several modelling studies to project the number of infections and deaths caused by melioidosis in Thailand and globally. His studies, which I have discussed in Chapters Three and Four, are based on calculations that consider areas where humans, animals, and environment confirmation of melioidosis or BP bacteria has been documented. Based on this data, he said the scale of the melioidosis problem is much larger than what is reported. However, after working with MOPH officials, he realised that the presentation of data based on modelling has been challenging to convince public health policymakers to pay more attention to the disease:

After interacting with MOPH officials, I realised that we need to strengthen melioidosis reporting in the NNDSS. It is the backbone of the Thai health

system. So, we've been discussing how to make the best use of it (the system), and how we can get melioidosis data correctly reported and reflected in the system.

Following his engagement with public health bureaucrats, Dr Ek prioritised support and advocacy for accurate reporting of melioidosis data. For him, the NNDSS is a key vehicle in making melioidosis visible. The data reflected in the NNDSS is considered important for policymakers, who rationalise their decisions based on the information. With this data, they also make decisions on what policies and what diseases should be prioritised. Based on these decisions, the resources are allocated, and activities are identified.

Biomedicine is increasingly mediated by categories and numbers which are used for various purposes. Numbers can also be used to negotiate power and display political resistance says Tichenor. She demonstrates how Senegalese health workers retained malaria data their government required to report back to the donors as a form of strike to highlight the lack of equipment and infrastructure in the country's health system (Tichenor 2016). Such statistics, Susan Erikson (2012) shows, are produced and performed differently in different countries, based on the norms of the health business. They can be manipulated and used as a tool to control people's behaviours (ibid.) as I have discussed in Chapter Three.

The parallel worlds of research and practice

Jin said she paid closer attention to the melioidosis data collection after she was reprimanded in a meeting with senior provincial health officials for the incomplete reporting of melioidosis data to the NNDSS:

Recently (some months before the pandemic was declared), in one meeting with senior officials in the provincial health office, I was criticised for not correctly reporting melioidosis data to the NNDSS. I was told that the data I was reporting was inaccurate and incomplete.

I didn't know what data was missing.

I have kept all the handwritten reports. I went back to check and found that they were consistent with the hospital database.

Jin said in that meeting, she also found that MORU had been conducting research on melioidosis in the hospital for decades, and she did not know of their presence in the hospital:

We have a melioi[dosis] research centre which is located in our hospital, but I didn't know about it. I've been working here since 2011, and my job is to report on all diseases monitored and reported in R506. This includes melioi[dosis]. But I didn't even know that they also collected data (on the disease).

Where epidemiological data collection for melioidosis surveillance is concerned, parallel worlds existed for research and clinical practice in Sunpasit Hospital. Although data and biological materials were shared between the clinical and the research laboratories as discussed in Chapter Five, there was no data sharing or interaction between the two spheres in relation to epidemiological reporting. Jin predominantly relied on the hospital's central database or HIS for her work. She insisted that she tried her best to obtain accurate data and did not hold back on reporting high numbers, despite concerns that it may impact the image and performance indicators of the hospital. She said she was aware that some hospitals avoided or delayed reporting melioidosis data, particularly on deaths among hospitalised patients because it could impact the hospital's performance indicators, a measure of success monitored by MOPH. However, she admitted that she did not report some data on patients' deaths due to other concerns which I will elaborate below.

Jin later found out that the data on melioidosis in the hospital's central database was inconsistent with that of the laboratory database. Following that, she has reached out to MORU researchers to request for their data but was declined saying that it was collected for research purposes. Jin had to find a way to obtain accurate data because melioidosis reporting is a legal requirement. She reached out to the hospital's laboratory department and after several months of discussions and negotiations which also involved the senior management of the hospital, an agreement was reached for the laboratory to share data on melioidosis confirmations with Jin and her team on a weekly basis.

Different kinds of diagnosis for a disease can reveal different results and lead to different outcomes. As Emma Bunkley (2021) demonstrates in her study on diabetes in Senegal, the purpose and outcomes of biomedical testing carried out in the form of laboratory diagnosis are different from the diagnosis based on disease symptoms observed or revealed by patients. These different diagnostic categories, Ian Harper (2014) argues, are based on certain logics of scientific taxonomies which stabilises biomedicine by keeping out other epistemologies related to health and wellbeing. This system of data collection, Bunkley says, is based on a top-down global health perspective of statistical imagination.

Complications in compiling melioidosis data

Out of all the diseases required to be reported with R506, Jin said melioidosis was the most complicated to compile data on. She said the difficulty was not only because the research team was also compiling similar data but it is also related to the medical complexities the doctors have in identifying the disease in patients. As demonstrated in Chapter Five, it can involve multiple tests and days of diagnosis to laboratory confirm melioidosis in patients. Additionally, melioidosis patients can have coinfections or multiple infections with other diseases.

The procedures Jin followed for collecting data on a day-to-day basis, as discussed above, began with going through the hospital registration to identify new patients suspected or confirmed with the disease. However, since many patients entering Sunpasit Hospital were usually not diagnosed with the disease on the day of their hospital admission, she sometimes misses out on the patients and finds out about them from the nurses only days later:

Sometimes I miss patients I need to report on and find out about them later. [This is because] some patient's records show that they have sepsis or other diseases, and melioi[dosis] is confirmed much later. Some patients are diagnosed with melioi[dosis] after staying in the hospital for weeks or months.

We must be careful and must check the records of all inpatients, even if they have been staying in the hospital for some time.

The different data sources Jin routinely goes through routinely to extract melioidosis-related data were stored in different software. The software used for storing Sunpasit Hospital's main database or HIS, is OP-Serve, which can be accessible by hospital staff from desktop computers located in different spaces of the hospital. The hospital's laboratory-confirmed melioidosis data is stored in Arabis, a special programme specifically designed to compile laboratory-confirmed data on bacterial infections. This database is accessible only to the staff of the hospital's main laboratory whose main function is to clinically diagnose patients. The password-protected system is also accessible to MORU laboratory technicians who are given special permission as they support the clinical laboratory with identifying melioidosis. The epidemiology database which transmits melioidosis-related data to NNDSS is compiled through R506 system.

What this demonstrates is that different databases are used for compiling different data, which move upstream to different departments at the central MOPH level, for different purposes. Despite these differences, efforts are being made to hold melioidosis together through what Mol (2002) terms "coordination". MOPH officials and Dr Ek are hopeful that they can be combined to establish a single fact on the disease. As I discuss in the section below, they believe that different data can be combined into a single dataset through technological manipulation.

Classifying and documenting deaths

According to MORU, data for patients who had been discharged from the hospital before the results of their laboratory confirmation with melioidosis is sent to the wards are not updated in the hospital database. These included patients who are transferred to another hospital or those who died of the disease prior to the availability of their laboratory results. This concern was raised in several studies carried out by MORU and MOPH officials. The study by Hantrakun et al. (2019) shows that not all patients who were laboratory-confirmed with melioidosis had melioidosis as a cause of death documented in their hospital records. Dr Ek further elaborated:

For some patients, especially those in critical condition, by the time the laboratory results come out, they may have already died, and their death certificates have already been issued. In such cases, the laboratory confirmation results are not recorded in hospital records.

For some patients, the bacteria culture doesn't turn out positive in the first test, so several specimens must be taken, and several tests have to be carried out before they can be confirmed.

Inscriptions on the causes of death in the NNDSS and death certificates of individuals are related to ethical, religious and occupational health concerns (Bowker and Star 1999). In their review of the causes of illnesses and deaths recorded in national databases and inscribed in individual patients' certificates Geoffrey Bowker and Susan Leigh Star show that classification plays an invisible role in ordering human interactions and can be deployed by certain people to make certain causes visible when needed. Dr Ek said he was particularly concerned about the number of deaths reported and wanted to advocate for it to be reflected in the patient's death certificates:

I realised that importance wasn't given to the disease, despite the scale of the problem. I noticed that the numbers reported to MOPH were not correct. Less than ten deaths were annually reported. We know that there are more deaths than reported. It didn't reflect the actual situation we observed in the hospital. Whenever we discuss numbers and check on how many deaths were reported, we realize that more work needs to be done so that the correct data is reflected in the surveillance system and in the patients' death certificates.

Death certificates are standardised bureaucratic procedures that document the cause of death at the time of certification. In other words, the cause of death coded from the ICD is based on the medical judgement, expertise, and authority of the doctor, to inscribe data which then forms the truth, which is produced in official statistics in bureaucracy (ibid.). When a patient has died and their death certificate has been issued, it increases the complexity of reporting data on that patient, said Jin. She explained that it was not possible to correct the death certificates that had been issued to the patient's relatives. Additionally, the data in the

death certificates form the national statistics. Although Jin may want to report data on melioidosis patients' deaths in the R506, she said she did not want to contradict the data inscribed in the patients' death certificates. Hence, to avoid complications, she said she did not submit R506 for patients whose laboratory confirmation was made available after their death certificates had been issued.

Jin did not submit R506 for these patients because only a single truth can be represented as the cause of a patient's death in their death certificate. This demonstrates that despite having possible multiple truths (Mol 2002) as the cause of a patient's death, Jin had difficulty in presenting them in different documents and reports that are linked to the statistics at the national level. According to Mol, there can be multiple enactments, but a disease is held together with a single truth through coordination and should there be a conflict in knowing or understanding it, a hierarchy is established to resolve the tension. To maintain a single truth as the cause of a patient's death, Jin did not report melioidosis for patients for whom death certificates had been issued. She said she was concerned that if she reported melioidosis as the cause of death for a patient whose death certificate and hospital record reflected another disease as the cause, it could complicate the data consistency in the different databases. This phenomenon contributes to the enigma of melioidosis. I argue that this failure of the bureaucratic documentation system to allow for the recognition of more than one cause of death among patients has led a hospital staff like Jin to avoid recording data on melioidosis as a cause of death for some patients, thus contributing to the fragility of the data on the disease. Despite its fragility, these numbers become real or reliable in the imaginations of global (Bunkley 2021) and national health institutions and are reflected in NNDSS.

The bureaucracy, tools, and templates

Recording and reporting data for melioidosis may seem like a mundane practice, but this process actualises the bureaucracy (Harper 2014) and constitutes an important part of the MOPH's work. As discussed earlier in this chapter, data compiled by hospital workers at the local level form an important part of the NNDSS, which is required by MOPH to assess disease risks and design prevention plans and activities. This mundane practice can also support

MORU researchers in negotiating for more attention towards melioidosis with global health institutions like WHO. Henceforth they are considered important for making melioidosis visible. During my fieldwork, both MORU and MOPH were discussing the introduction of new tools and templates for reporting melioidosis at Sunpasit Hospital, before introducing them in other hospitals nationally. The tools considered include a computer-based system that is deployed to generate hospital-based AMR reports, and a new case reporting template for recording and reporting data specifically designed for collecting melioidosis-related data which is made available in the national guideline.

MORU has been using the Antimicrobial Resistance Surveillance System (AMASS) tool to generate hospital-based AMR data for several years as part of its AMR research. Dr Ek proposed to the MOPH to consider using this tool to generate more data on melioidosis, stating that it could be easily adapted for the disease and that doctors in the hospital were already familiar with its use. Figure 28 shows the AMASS dataflow process. The offline data system allows for combining different data sources such as microbiology data, hospital admission data, and laboratory data, to generate an automated surveillance report. It also removes duplicate information and seems an ideal tool for consolidating data from different datasets into one report. Dr Ek said the use of AMASS will allow for the laboratory data to be incorporated with the hospital data, thus facilitating the manual labour carried out by Sunpasit Hospital's data collection team:

This system can help generate more national data on melioidosis. More data means there will be more attention towards melioidosis. It will allow the MOPH to obtain data on melioidosis more accurately at the national level.

If this programme is successfully used in Thailand, we can advocate for other countries to also use it to generate melioidosis data. With more data on melioidosis from different countries, it will be easier for the melioidosis network to advocate for it as NTD.

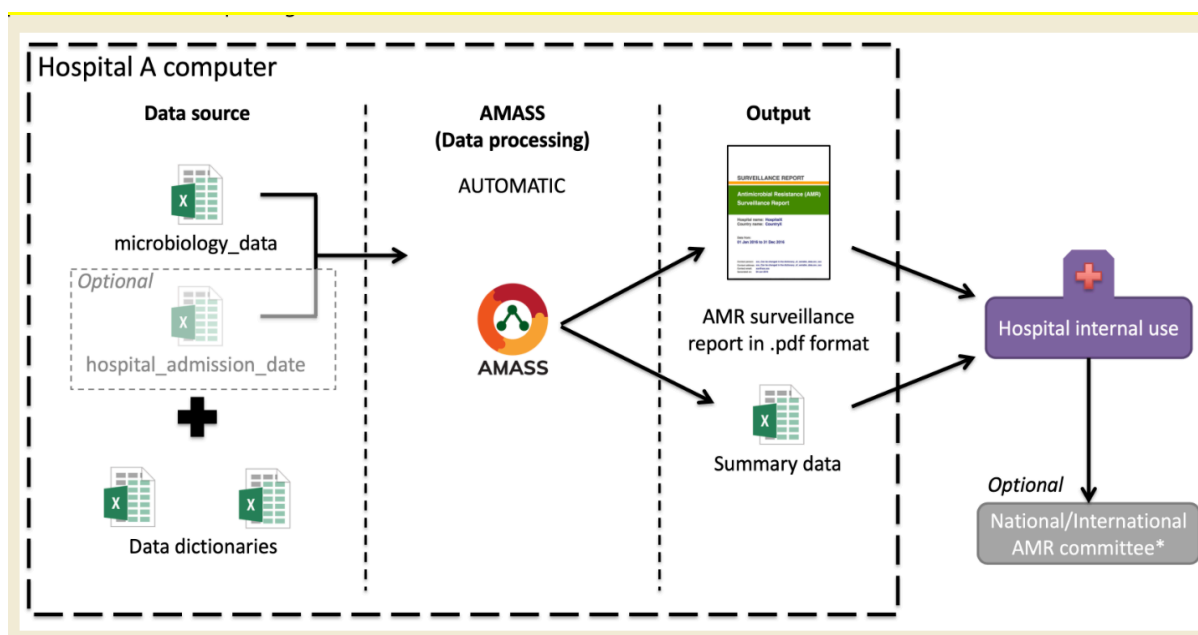


Figure 28: The AMASS system.

This system is deployed as part of AMR research. It enables local hospitals to generate AMR surveillance reports through the integration of microbiology data with different datasets of the hospital. Source: MORU.

While MORU advocated for the adaptation of AMASS to generate more data for melioidosis, MOPH introduced a detailed case investigation form in the recently published national melioidosis guideline. According to the guideline, the form should be used to document detailed information on each patient by interviewing them or their close relatives to obtain their treatment history before visiting the hospital, and details on their likely source of infection (Department of Disease Control 2021). This form does not replace but complements the R506 form (ibid.). As shown in Figure 29 (Department of Disease Control 2021), the three-page form comprises six sections. The first section is for recording general information on the patient which includes their name, national identity number, age, sex, occupation, nature of work, and address at the time of illness. Section two is for recording information on illness symptoms like fever, cough, joint pain, skin infection, weight loss and other information. The third section is for recording detailed information on laboratory tests carried out and the fourth section is for recording information on the patient's treatment. The fifth section, which is divided into two parts, is for recording information on risk factors. The first part requires information on underlying health conditions where the following infections have been listed

MORU researchers and MOPH officials are hopeful that the introduction of these new tools will generate more reports on melioidosis which will lead to the production of accurate data on the disease, and which will be reflected in NNDSS. While the political power of such data lies in its ability to be taken as the truth (Biruk 2018), the capacity to inscribe data into these reporting forms lies with the cooperation and facilitation of hospital staff like Jin. The deployment of the AMASS tool seemed like an ideal system that would ease the manual work carried out by Jin and her team as described above, but when I asked her about it, she told me that the introduction of these new tools would only increase the workload of the hospital staff. The AMASS system needed to be handled by doctors who are already pressed with time in treating patients, Jin said, adding that these templates would lead to the collection of data similar to R506. Jin also stated that even if these tools were introduced, they would have to continue to report data in R506 because that is a legal requirement that is not exclusive to melioidosis.

Sometimes the rationale behind the recording and reporting systems can be forgotten and complicate the understanding as to why certain data was deemed necessary to collect (Bowker and Star 1999). Rather than foregrounding data collection approaches based on local experiences, this system is based on a top-down global health perspective of statistical imagination (Bunkley 2021). I argue that the rationales for making melioidosis visible through the introduction of new tools and templates to generate more reports based on similar processes of data production distracts from other considerations that can contribute to the visibility of melioidosis. For instance, the deployment of new templates would not resolve the issue related to the registration of patients' deaths which may have been caused by more than one disease. Rather, they constitute part of the processes and activities that build and maintain the material culture of the bureaucracy (Bowker and Star 1999; Harper 2005; Biruk 2018). They form policies that dictate how much attention should be placed on certain priorities that influence the lives of the patients (Bowker and Star 1999; Bunkley 2021; Biruk 2018) while ignoring the social, economic and political factors that lead to the disease (Packard 2016). Templates like the case investigation form assume that the standardised data can be deployed to capture information on behaviour of patients which can be generalised (Davis 2020). Data compilation of this nature glosses over the social phenomena and contexts within which melioidosis occurs and is experienced. It does not account for the dispersed

nature of the presence of the microbe in the environment, particularly in the soil and the water in rice fields and focuses on identifying measures aimed at controlling people's behaviours. Like some indicators used in global health governance, these variables abstract the complexities that can make melioidosis visible across different contexts.

Conclusion

The different enactments performed to produce melioidosis data at Sunpasit Hospital are carried out for different purposes and mean different things to different actors. Despite these differences and the challenges faced in producing accurate data, efforts are being placed in holding melioidosis together through their hopes and aspirations, to make the disease visible nationally and internationally. This chapter discussed the efforts that go into the production of the epidemiological data that makes Sunpasit Hospital truth spots for melioidosis through the presentation of numbers and statistics that form national surveillance data.

Data production at the hospital level involves mundane practices carried out by health professionals whose functions are often overlooked, although they form an important part of the bureaucracy. The chapter demonstrates the complexities hospital staff go through in compiling data on melioidosis from various spaces of the hospital which involves interviews with patients at their bedside, review of paper-based documentation of patients' records and the extraction of different computer-based datasets to generate melioidosis reports for NNDSS. I discussed the parallel worlds within which different melioidosis-related data is produced through clinical practice in Sunpasit Hospital which take on different trajectories as they move upstream from the hospital to the central level through the bureaucracy. The epidemiological data compiled with R506 is a legal requirement, and its main purpose is for the production of population-level risk assessment and to plan for disease prevention.

But what happens when the data produced is fragile and has not been accurately represented in NNDSS? The chapter discussed efforts MOPH and MORU are taking to produce reliable melioidosis-related data, through the introduction of new technologies and templates. MORU is hopeful that the generation of more data on melioidosis will facilitate recognition of melioidosis as NTD among global health institutions like WHO. However, the introduction of

more tools to produce similar fragile data is part of the material culture of the bureaucratic practices. They lead to the production of more reports through the generation of more data and numbers, while glossing over alternative forms of data which demonstrate that melioidosis is complex across different contexts – biomedical practice, public health, social, economic, and political.

This chapter also discussed the tensions between the visibility of melioidosis and the documentation of a single cause of death for patients. While there could be multiple causes of death for a patient, the limits of recognition of melioidosis as another cause of death could be challenged, particularly for patients whose death certificates had been issued prior to the availability of their laboratory confirmation with melioidosis. Such complexities add to the enigmatic characteristic of melioidosis.

I will conclude this thesis with some key discussions on what makes me understand melioidosis an enigmatic disease in the next chapter.

CONCLUSION

What makes melioidosis an “enigmatic disease”? In this conclusion, I revisit how melioidosis was made visible to researchers and public health officials in spaces where biomedicine is practiced, and the factors that complicate its visibility in other spaces. In this context, I also discussed the limits of the public health responses that discount the relations between cultural practices and the political economy of rice cultivation, the result of which has led to ambiguity and confusion among melioidosis patients, their families and community health workers. I close by calling on other anthropologists and social scientists to join me in making sense of melioidosis socially and anthropologically.

This thesis has shown that melioidosis remains difficult to know and understand, and the disease is challenging to identify, prevent and control. The biology of the melioidosis-causing microbe, BP, contributes to this difficulty, both in understanding its life in the environment and in human bodies. Studies discussed in Chapter Four show that BP is dispersed in the soil and water in tropical areas and that the bacteria particularly thrive in rice fields. They also show that as high as forty percent of the patients tested positive for the disease die. The high fatality rate is partly because many patients arrive at the hospital with critical illness and since melioidosis symptoms are non-specific, it can take several days before a doctor suspects them with the disease. Additionally, the identification of BP is challenging even in microbiology laboratory spaces. In Chapter Five, I have shown that it requires expertise and that laboratory technicians must pay close attention to spot the microbe which grows slower on culture plates and is often covered under other microbes that commonly cause illnesses in humans. Bacteria culture can take several days to confirm melioidosis infection, which can delay the treatment of patients as antibiotics are not prescribed without laboratory confirmation due to concerns about its resistance and AMR. Patient treatment can also be challenged by comorbidity or multiple morbidities, which are commonly observed in melioidosis patients.

Despite these challenges, my thesis has shown that melioidosis is made visible in research and health policy, through practices in Sunpasit Hospital with support from long-term international

research investment on the disease. I have argued that while disease biology complicates its identification, it is made visible through multiple enactments in spaces of clinical and laboratory research and practices. Through the multi-sited ethnography, I traced the different ways in which melioidosis is known and how it remains unknown in medical research, hospital care, health policy, people's homes and rice fields. I paid particular attention to Sunpasit Hospital where I demonstrated efforts made by researchers, clinicians, patients, and public health officials to know and make melioidosis known through what Mol (2002) terms "multiple enactments". Mol's argument concerns multiple ontologies of a disease where she demonstrates that a disease can be made visible through multiple enactments that take place in different spaces which can lead to multiple ways of understanding it. Chapters Three, Four Five and Six have shown how melioidosis is made visible in the national health policy, in biomedical research and in hospital care. Chapter Seven discusses efforts to make melioidosis more prominent in the national disease surveillance system through the compilation of epidemiological data on melioidosis in Thailand.

Sunpasit Hospital and MORU laboratory as truth spots for melioidosis

What makes Sunpasit Hospital what Gieryn (2018) calls "truth spots" for melioidosis is the place's ability to systematically make melioidosis visible through several decades. With consistent funding and collaboration from Wellcome Trust through MORU, an Oxford and Mahidol universities' joint tropical research unit based in Bangkok, Sunpasit Hospital has been involved in melioidosis research since the mid-1980s. Unlike other hospitals in Thailand, research has allowed them to systematically identify melioidosis in patients and report data to national health authorities. This has provided both the hospital and MORU with authority over the knowledge produced on the disease and allowed them to establish their expertise with national health authorities and the globally melioidosis research network. A key factor contributing to their expertise is the material reality established in the hospital and the research laboratory. The laboratory hosts one of the largest archives of BP which is stored in freezers for future research. This was made possible through the establishment of a stepwise protocol for consistently making melioidosis visible, which has recently been made available in Thailand's first national guideline on melioidosis which was issued in 2021. The procedures

established for testing melioidosis were made possible through the manipulation of various objects and tests which led to the establishment of bacteria culture with Ashdown agar as the most appropriate way for confirming melioidosis infection in patients. The repeated performances carried out over several decades came to be established as an order to the patterns (ibid.) within which melioidosis is made visible within these spaces. As Gieryn says, the success of truth spots depends on the display of material grounds that lend legitimacy or a claim or belief.

Sunpasit Hospital is where MORU also established affirmation on the visibility of melioidosis through standardisation of treatment for the disease. Two-stage antibiotic treatment for patients is recognised as a method to reduce disease severity and save patients' lives, research for which has shown a reduction in death rates by half, as discussed in Chapter Four. The treatment protocol established out of knowledge obtained through several studies over the years is expected to be followed by hospitals across the country, according to the national guideline.

Both MORU and Sunpasit Hospital are recognised as melioidosis experts by national health authorities, but what enabled them to successfully influence the national health officials to pay attention to melioidosis was the *barami* of Thai researchers involved. Chapter Four discussed my interlocutors' acknowledgement of their *barami* as a key factor that led health authorities to pay attention to the disease. The Thai social capital observed in two prominent Thai melioidosis researchers influenced the development of the national health policy on melioidosis. *Barami* has been theorised in the context of Buddhism with kingship (Jory 2002; Keyes 4-8 July 1999; Jackson 1999), leadership (Sopranzetti 2021; Persons 2016) and material culture (Jackson 2021; Siani 2018) and health governance (Funahashi 2017), but this thesis shows that *barami* is not exclusive to traditional leadership characteristics. I have argued that *barami* can be observed in everyday Thai social life and has influenced knowledge production on melioidosis. Chapter Six showed how *barami* has fostered relationships between the melioidosis clinic staff and the patients. The social relations rendered in the form of collecting drugs for patients on their behalf and mailing them to their homes so that they did not have to wait for long hours in the hospital has led to the cultivation of *barami* of the clinic staff which facilitated their relationship with other hospital staff. As an expression of appreciation for the gesture of the clinic staff, patients reciprocated by regularly returning for their

appointments which led to the successful follow-up of patients, thus contributing to the melioidosis research.

The enigma of melioidosis

Although melioidosis is held together in Sunpasit Hospital, my research shows that it is obscured and made enigmatic in other spaces. Mol argues that despite the “multiples”, a disease is held together, and any conflict that arises is resolved through “coordination” which is based on an established hierarchy. Contrary to Mol’s argument, I have further argued that it is very difficult to hold melioidosis as a single disease in spaces outside Sunpasit Hospital, including at the community level, in people’s homes and rice fields. Chapter One discusses the confusion melioidosis patients and their families go through in making sense of melioidosis, a disease they first hear of when they or their family member is diagnosed with it. A key factor that complicates the understanding of melioidosis is the absence of discussion about the disease in relation to the broader policies and practices of the political economy of rice cultivation in Thailand. Chapter Two discusses the significance of rice to the people and the government by demonstrating that rice rituals are annually performed to foster relations between the people, the government, and the monarchy, and between humans and non-humans. Rice forms part of the national identity and the country is a leading exporter of the cereal. Rice generates a significant proportion of the nation’s income, the labour for which is dependent on farmers and the technologies which they must invest to qualify for the market. The government often promotes farming in the name of sufficiency economy, a concept for moderate living through farming practices that were introduced by the late king in the late 1990s. Realising the *barami* of the king on the Thai subjects, the government regularly promotes sufficiency economy as a Thai lifestyle, which some critics argue is a form of government control to maintain political order (Tosakul 2013; Schaffar 2018).

This thesis hypothesises that the importance of rice and rice cultivation to Thailand has contributed to a large imbalance in the government’s advocacy and awareness related to addressing the risks of melioidosis infection when compared with the information and activities that promote rice cultivation. Published research indicates a high concentration of the microbe in rice fields and identifies most patients treated for melioidosis in Sunpasit Hospital as rice farmers. In hospitals where melioidosis patients are identified, doctors advise

patients to avoid going into rice fields, and if they do so, they should protect themselves by wearing rubber boots. Although connections have been made in associating melioidosis infection with rice cultivation in Thailand, they remain fragile and are limited to the areas of medical research and hospital care where melioidosis patients are identified. These connections are not established in the broader discussions on rice cultivation in Thailand.

In Thailand, public health awareness and health advocacy campaigns for an infectious disease is associated with the level of risk it poses to individuals or a group of people, and the severity with which it impacts people's health and the health system. The Thai government prioritises public health responses to infectious disease threats where proactive public communication and health awareness campaigns are key strategies for preparedness, prevention, and control. As observed in the responses to diseases of international concern like SARS, Zika, bird flu, or diseases of local endemicity like dengue or leptospirosis, health authorities have engaged with the public through proactive and regular information dissemination to raise awareness of the disease and advise on protection measures. By contrast, their response to melioidosis where public communication and awareness campaign is concerned, has been almost absent. The response to melioidosis has mainly been hospital-based. Many people, including rice farmers living in disease-endemic areas, have never heard of melioidosis and patients I met through the course of my research heard of the disease for the first time when they were diagnosed with it. This confusion has thereby led patients and their families to rationalise the association between melioidosis infection with excessive chemical use in agriculture. Patients also rationalise exposure to clean fresh water as being safe from melioidosis infection.

Despite acknowledging the importance of publicly sharing information on melioidosis is a primacy to respecting people's right to health information, the government's melioidosis prevention activities responsabilise rice farmers to take action to protect themselves from infection. The blueprint for their health communication messages and activities which is discussed in Chapter Three, is adapted from research where tactics of evoking fear and anxiety were used to prompt farmers to take action to protect themselves. This is despite evidence from multiple global health events like Ebola or bird flu attesting to the failure of derogatory and fear-based public health responses. This calls for a redefining of the strategies and approaches in dealing with infectious diseases by considering the social factors and relations, including between humans and non-human microbes and the soil and water in rice fields.

These considerations need to be made by acknowledging the influence the actions of one have on another (Seeberg, Roepstorff, and Meinert 2020; Nading 2014; Niewöhner and Lock 2018).

My suggestion that *barami* may have contributed to making melioidosis enigmatic is linked to what McGoe (2019) terms “strategic ignorance”, which I have used to explain why a public health campaign for melioidosis may have been absent. I argued that strategic ignorance or a conscious decision not to make information on melioidosis widely known is linked to the government’s avoidance of liability. I made this association based on the government’s continuous promotion of rice cultivation, including under sufficiency economy and a statement made by a senior health official which I have discussed in Chapter Two. The senior officer expressed concerns over the broad dissemination of information on melioidosis as something that could lead to fear of disease infection which may impact the political economy of rice cultivation. With these concerns, melioidosis has been made enigmatic and has been abstracted from policies and practices related to rice cultivation in Thailand.

Towards an anthropology of melioidosis

This is the first anthropological and social science research on melioidosis that contributes to the broader medical anthropology and the anthropology of global health. My research contributes to knowing melioidosis from an anthropological perspective and to the emerging field of medical anthropology in Thailand. I followed Mol’s multiple enactments and have further argued that it is difficult to hold melioidosis together and it remains a complex disease difficult to understand, prevent and control.

This thesis has shown that melioidosis is a biologically and socially complex disease. It is challenging for the disease to hold together even in a special place like Sunpasit Hospital where it has been studied for decades and is systematically identified in patients. As shown in Chapter Seven, this complexity is reflected in efforts conventionally made to stabilise data reporting to the national disease surveillance system. While these challenges are being dealt with in Sunpasit Hospital, in spaces outside biomedical practices, melioidosis is obfuscated. As I have discussed above, the lack of publicly available information on melioidosis in relation to

the political economy of rice cultivation has led to confusion among patients, their families and community health workers.

Although decades of biomedical research have led to a significant understanding of the disease through standardised biomedical practices and laboratory-controlled settings, its ecology remains ambiguous because of the gap in understanding the local contexts and settings which is critical to knowing a disease (Kelly and Lezaun 2017). A discursive review of the melioidosis literature I conducted shows the association between melioidosis infection and extreme weather conditions in some studies, thus raising concerns about disease implications with climate change. As acknowledged by Dr Currie whose quote I began this thesis with, the scale of the presence of the microbe and the factors that drive its spread remain unknown. He and other scientists acknowledge that there are a lot more unknowns about melioidosis and the microbe.

Studying melioidosis requires an investigation into how a disease mediates social relations and how social relations mediate by the disease (Kelly, Keck, and Lynteris 2019). In this anthropology of melioidosis, I have demonstrated that studying a disease is also about studying ways in which it configures social relations. I considered the construction of *barami* in the visibility of melioidosis, both at the leadership level and in everyday practices in the hospital which is mediated by social exchanges involving objects like drug receipts.

More research is needed towards an anthropology of melioidosis. To better understand this enigmatic disease, a reconceptualisation is required so that it can be understood through multiple scales (Seeberg, Roepstorff, and Meinert 2020; Kelly and Lezaun 2017). What this means is for melioidosis to be understood from an individual to the collective level, from the biological to the social, and from humans to the non-humans (ibid.). These include considerations of individual patients' experiences, to understanding the relationships and processes that operate at a wider societal scale. It also includes the structural factors and the social hierarchies that shape the dynamics of the individuals and the collective, for instance, with the political economy of rice cultivation. Jens Seeberg et al. (2020) suggest new ways in which anthropology can work alongside biomedicine through the creation of "biosocial spaces" or neutral spaces where the boundaries between "nature" and "culture" can be blurred. These biosocial spaces, they propose, should be open to reconstructing and

relearning the biomedical categories. This means asking biomedical scientists and researchers to trouble with biomedicine in a social way, which is indeed a big challenge, especially in the context of medical anthropology in Thailand.

This thesis contributes to the visibility of melioidosis. In closing, I call on anthropologists and social scientists to join in the study of melioidosis. To make melioidosis visible means drawing attention to an infectious disease which is enigmatic, a disease where patients and their families are left to experience in isolation because of the little information publicly available and the limited space in which it can be discussed. Understanding melioidosis anthropologically means revealing the complex interactions between the biological and social factors that shape melioidosis and the factors that are shaped by melioidosis.

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