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Not Just the Flu: The Impacts of ASIAFLUCAP Influenza Policy Recommendations on Southeast Asia During the SARS-CoV-2 Pandemic

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NOT JUST THE FLU: THE IMPACTS OF ASIAFLUCAP INFLUENZA POLICY RECOMMENDATIONS ON SOUTHEAST ASIA DURING THE SARS-COV-2 PANDEMIC

by

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Abstract: During 2008 to 2011, a multi-year influenza pandemic study (ASIAFLUCAP) took place in six Southeast Asian countries: Thailand, Indonesia, Vietnam, Taiwan, Cambodia, and Laos, to analyze their healthcare system capacities and determine appropriate policy recommendations in order that they might be better equipped for future influenza pandemics. This research expands upon that project to see if the countries that implemented higher numbers of ASIAFLUCAP policy recommendations prior to or in the SARS-CoV-2 pandemic fared better than those countries which did implemented fewer recommendations. It finds that results are mixed across the sample, with no clear association between a country's adoption of ASIAFLUCAP policy recommendations and its subsequent SARS-CoV-2 response and overall situation.

Keywords: COVID-19, H1N1, healthcare capacity, public policy, Southeast Asia

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Introduction

Prior to the SARS-CoV-2 pandemic, there was serious concern that the next global pandemic would be some form of influenza due to constant viral adaptation.[1] H5N1, commonly known as avian or bird flu, has been considered a likely potential pandemic candidate for many years,[2] and numerous previous pandemics have stemmed from influenza viruses, such as the 1918 H1N1 pandemic, the 1968 H3N2 pandemic, and the 2009 H1N1 pandemic.[3]

Global health authorities have paid particular attention to Southeast Asia, a region of concern especially in relation to pandemic potential influenza. This has been the focus of numerous policy decisions and research projects to help lower pandemic risks in the area. One of these such projects was ASIAFLUCAP, a multi-year research project focused on finding Southeast Asian country capacity in the case of a pandemic. Support for this project came from the European Union and Rockefeller Foundation as well as multiple Southeast Asian partners and ran from 2008 to 2011. It included in-depth interviews and data analysis gathered from across Southeast Asia, resulting in multiple studies. The research project also included a modeling system which could

[1] Piret, Jocelyne, and Guy Boivin. "Pandemics Throughout History." *Frontiers in microbiology* vol. 11 631736. 15 Jan. 2021, doi:10.3389/fmicb.2020.631736.

[2] Mittal, N., & Medhi, B., "The bird flu: a new emerging pandemic threat and its pharmacological intervention," *International Journal of Health Sciences, 1*(2) (2007): 277–283.

[3] Jocelyne Piret and Guy Boivin, "Pandemics throughout History," *Frontiers in Microbiology* 11 (2021), https://doi.org/10.3389/fmicb.2020.631736.

estimate a country's pandemic outcomes given a certain level of disease infectiousness, allowing modeling for multiple disease spread scenarios.[4]

While the world faced an influenza pandemic during the ASIAFLUCAP project, it paled in comparison to the SARS-CoV-2 pandemic that plagues us today. At the time of this writing, the official death count from COVID-19 numbers over 6.2 million people globally;[5] the World Health Organization (WHO) estimates of excessive death associated with COVID-19 suggest a much higher number of 14.9 million.[6] These realities beg the question of whether previous policy recommendations have helped to mitigate additional deaths. This paper aims to expand upon ASIAFLUCAP research by asking if countries in Southeast Asia who adopted ASIAFLUCAP policy recommendations for pandemic potential influenza have fared better in the subsequent SARS-CoV-2 pandemic. Has the institutional memory of past policy recommendations shaped pandemic response now? And were the adaptations made post ASIAFLUCAP beneficially beyond simply pandemic-level influenza?

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[4] Mart Lambertus Stein et al., "Development of a Resource Modelling Tool to Support Decision Makers in Pandemic Influenza Preparedness: The ASIAFLUCAP Simulator," *BMC Public Health* 12, no. 1 (December 2012), https://doi.org/10.1186/1471-2458-12-870.

[5] "WHO Coronavirus (COVID-19) Dashboard," World Health Organization (World Health Organization), accessed May 5, 2022, https://covid19.who.int/.

[6] "Global Excess Deaths Associated With COVID-19, January 2020 - December 2021", *World Health Organization*, 2022, https://www.who.int/data/stories/global-excess-deaths-associated-with-covid-19-january-2020-december-2021/.

Due to the nature of the peer-review process, this study will only address work from the ASIAFLUCAP study in 2008-2011 and SARS-CoV-2 public health policy decisions from January 2020 through December 2021. This paper only covers a snapshot in time of the SARS-CoV-2 pandemic but aims to provide some insight into the impacts of public health policy recommendations, even as applied far beyond their intended timeframe and scope.

Background

Though generally speaking the geographic area of Southeast Asia is in the southeastern part of the Asian continent, there is no singular consensus for what countries make up the region. For example, the World Health Organization's member states for the region include Bhutan, India, Sri Lanka, North Korea, and Thailand, among other countries.[7] The economic trade coalition for the region, the Association of Southeast Asian Nations (ASEAN) includes Indonesia, Malaysia, Singapore, the Philippines, and others.[8] For the purposes of this

Fig. 1. Map of Southeast Asia

[7] "About WHO in the South-East Asia Region," World Health Organization (World Health Organization), accessed April 6, 2022, https://www.who.int/southeastasia/about.

[8] Wood, Johnny, "What Is ASEAN?", World Economic Forum, May 9, 2017, https://www.weforum.org/agenda/2017/05/what-is-asean-explainer/.

Fig. 1. Cacahuate, amendments by Globe-trotter and Texugo, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons.

research, the countries included in the ASIAFLUCAP study were used as the bounds for the region, namely Thailand, Vietnam, Indonesia, Taiwan, Cambodia, and Laos. This narrowed the study parameters to build on the work of other academics.

Due to geographic and other factors, Southeast Asia has long been a region of the world that global health authorities pay close attention to.[9] Many countries in the region have a thriving wildlife wet market industry, where largescale human and animal presence as well as insufficient market management practices leaves much potential for the spread of disease.[10] Additionally, there are regularly outbreaks of dengue fever and other mosquito borne illness in the region.[11] As the globe faces increasing threats due to climate change, Southeast Asia and other regions may be

[9] Piya Hanvoravongchai et al., "Pandemic Influenza Preparedness And Health Systems Challenges In Asia: Results From Rapid Analyses In 6 Asian Countries", *BMC Public Health* 10, no. 1 (2010), doi:10.1186/1471-2458-10-322.

[10] Zoe F. Greatorex et al., "Wildlife Trade and Human Health in Lao PDR: An Assessment of the Zoonotic Disease Risk in Markets," *PLOS ONE* 11, no. 3 (2016), https://doi.org/10.1371/journal.pone.0150666.

[11] Joseph L. Servadio et al., "Climate Patterns And Mosquito-Borne Disease Outbreaks In South And Southeast Asia", *Journal Of Infection And Public Health* 11, no. 4 (2018): 566-571, doi:10.1016/j.jiph.2017.12.006.

particularly at risk for the emergence of vector-borne diseases, such as dengue, Zika, or tick-borne encephalitis.[12]

It is for these reasons that the field of public health has paid special attention to Southeast Asia and put research attention and funding towards helping prevent disease circulation and potential pandemics. One such project, whose policy recommendations make up the basis of this paper, was the ASIAFLUCAP project. This study analyzed pandemic-level influenza healthcare system capacity within five Southeast Asian countries between 2008 and 2011. This study is also unique in that it began prior to the 2009 H1N1 pandemic but continued and adapted the tools it utilized when the pandemic arose.

Motivation

The ASIAFLUCAP project was chosen as it analyzed healthcare system capacity across multiple countries within Southeast Asia. This multi-year project suggested policies for Southeast Asian countries to adopt regarding influenza, which governments of respective countries showed various levels of enthusiasm towards.

When the ASIAFLUCAP project was funded, the global health community was particularly concerned about the possibility of a future pandemic arising from an influenza virus (and rightfully so, as one year into the ASIAFLUCAP study, Southeast Asia faced the 2009 H1N1 pandemic). This project was not funded with coronavirus public health policies in mind. And

[12] Cyril Caminade, K. Marie McIntyre, and Anne E. Jones, "Impact of Recent and Future Climate Change on Vector-Borne Diseases," *Annals of the New York Academy of Sciences* 1436, no. 1 (2018): pp. 157-173, https://doi.org/10.1111/nyas.13950.

despite global misinformation around the nature of the virus, spread through internet-based means in addition to through political figures,[13] SARS-CoV-2 is distinct from influenza viruses on many levels. Despite this, there are some similarities between the broad viral categories: both diseases are airborne in their transmission method and highly contagious.[14] In addition, this research allows governments to see if the policy implementation transferred to the current pandemic, despite the specialized recommendations, as well as to see if there are ways benefits of these polices spillover into general system strengthening and capacity building.

More specifically, this research asks if these specific influenza pandemic healthcare recommendations have broader influence and impact beyond their original intentions. Specifically when it comes to public policy decisions, which can have a long-lasting impact, and in capacity-building within healthcare systems, it is important to determine what effects, if any, these recommendations have on subsequent pandemic realities, such as the SARS-CoV-2 pandemic.

Methods

This paper draws its data from the ASIAFLUCAP project healthcare policy recommendations, which are pulled from the official European Union project report documents as well as several papers that resulted from this project and were later published, namely research by

[13] In the United States, for example, former US President Donald Trump has repeatedly conflated COVID-19 with seasonal influenza (Stepansky).

[14] Jill Seladi-Schulman, "H1N1 Influenza Vs. COVID-19 Comparison: Similarities & Differences", *Healthline*, 2022, https://www.healthline.com/health/h1n1-vs-covid-19#quick-comparison-table.

Hanvoravongchai et al. (2010). Secondarily, it compares these outcomes to later healthcare capacity analysis for the respective Southeast Asian countries during the SARS-CoV-2 pandemic.

Data collection was gathered through first reviewing the work of the ASIAFLUCAP project and inputting the policy recommendations they discussed into an Excel document. If there was an indication in the ASIAFLUCAP project documents or accompanying studies that a particular country had indicated it was going to focus on this policy recommendation, this was noted underneath the country name.

After determining what the policy recommendations were from ASIAFLUCAP, the COVID-19 situation for each country was documented, looking at overall caseloads per million, partial vaccination rates, complete vaccination rates, and deaths per million. This data was sourced from Our World in Data,[15] the data source from which official World Health Organization COVID-19 statistics also stem. Additionally, overall response to the SARS-CoV-2 pandemic was summarized. To determine whether a policy recommendation was implemented, a literature review was done of the sample countries, focusing on keywords such as "*country name*", "COVID-19", "healthcare system", "response", "capacity", etc. Studies were limited to those written in the English language. Some countries had sparse amounts of research accessible, which is noted in the results. Specific policies within countries were analyzed, stating if this was a continuation of

[15] Hannah Ritchie et al., "Coronavirus Pandemic (COVID-19)", *Our World In Data*, 2022, https://ourworldindata.org/coronavirus. Data from COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University and https://github.com/owid/covid-19-data/tree/master/public/data/vaccinations/locations.csv.

previous influenza policy recommendations, a new policy entirely, or a hybrid of some sort. Case studies were selected if they were peer-reviewed and addressed the target countries of Thailand, Vietnam, Indonesia, Taiwan, Cambodia, or Laos, in the context of the SARS-CoV-2 pandemic. If sources were unable to be located specifically to SARS-CoV-2, the search range was expanded to the general post 2012 period, which is when the ASIAFLUCAP project concluded.

From the ASIAFLUCAP study documents, including the study by Hanvoravongchai et al. (2010), and the European Union's closing report (2013), this research identified eleven broad recommendations made for the country sample, as well as two gaps or weaknesses for countries to address, landing at thirteen total.

Of these recommendations, two were very vague and difficult to track, and as such were not considered on a country-to-country basis in this analysis:

Strengthen collaboration and information sharing between nations: This recommendation was broad and difficult to track, especially as countries in the sample have varying levels of information transparency. Post ASIAFLUCAP, Taiwan specifically noted wanting to grow in this area.[16]

Speed up research and prepare for future: This recommendation was one of the most broad; different countries interpreted this in diverse ways as is apparent through the other decisions implemented post-ASIAFLUCAP project.

[16] "Final Report Summary - ASIAFLUCAP (Health System Analysis To Support Capacity Development To Respond To Pandemic Influenza In Asia)", *Cordis.Europa.Eu*, 2013, https://cordis.europa.eu/project/id/201823/reporting.

Three more were influenza pandemic specific recommendations, and as such not considered for this analysis, though are noted here:

Stockpile influenza antivirals: The Vietnamese government implemented this post ASIAFLUCAP;[17] however, these antivirals were not useful for the SARS-CoV-2 pandemic. In every other country in the sample, no research was found to provide insight on this recommendation's implementation.

Adapt public education campaigns to shift focus from animal-human transmission to human-human transmission and respiratory health hygiene / when to seek care: This is an influenza specific recommendation made during the H1N1 pandemic. While SARS-CoV-2 transmission is possible between animals and people, it is extremely unlikely and not the primary method of transmission.[18] As such, this recommendation was not addressed in this analysis.

Key weakness / gap: public H1N1 vaccine compliance: This was not directly applicable to SARS-CoV-2, though COVID-19 vaccination compliance rates remain a critical area of focus during the current pandemic. It is notable that unlike the H1N1 vaccine compliance issues, all countries in

[17] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu,* https://cordis.europa.eu/project/id/201823/reporting.

[18] Katherine Unger Baillie, "From animals to people and back again", *Penn Today*, 2021, https://penntoday.upenn.edu/news/animals-people-and-back-again.

the sample managed to meet the 40% WHO threshold goal for 2021 with their COVID-19 vaccination rates.[19]

Additionally, the ASIAFLUCAP project made a recommendation for the global community, rather than only the six-country sample, and as a result, this was not considered applicable for individual analysis.

Explicit rationing or prioritization policy for vaccines and medication: The ASIAFLUCAP Project was ongoing when 2009 H1N1 pandemic occurred, and this did not happen. Wealthy countries bought more vaccine doses than they needed, leading to dosage expiration and waste. All the while, less-wealthy, often more affected countries, did not receive vaccines.[20] This has also been reflected during the SARS-CoV-2 pandemic, though the international COVAX program has contributed to vaccine distribution and there are ongoing efforts to raise global vaccination rates.[21]

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[19] "Strategy To Achieve Global Covid-19 Vaccination By Mid-2022", *World Health Organization*, 2022, https://cdn.who.int/media/docs/default-source/immunization/covid-19/strategy-to-achieve-global-covid-19-vaccination-by-mid-2022.pdf?sfvrsn=5a68433c_5.

[20] Reidar K. Lie and Franklin G. Miller, "Allocating A COVID-19 Vaccine: Balancing National And International Responsibilities", *The Milbank Quarterly*, 2020, doi:10.1111/1468-0009.12494.

[21] "Strategy To Achieve Global Covid-19 Vaccination By Mid-2022", *World Health Organization*, 2022, https://cdn.who.int/media/docs/default-source/immunization/covid-19/strategy-to-achieve-global-covid-19-vaccination-by-mid-2022.pdf?sfvrsn=5a68433c_5.

With these limitations, only seven recommendations were left remaining, which were addressed on a country-by-country basis in terms of the SARS-CoV-2 pandemic, post-ASIAFLUCAP period.

ASIAFLUCAP Recommendations and Subsequent SARS-CoV-2 Pandemic Handling

Research Analysis -- Were ASIAFLUCAP Recommendations Implemented?

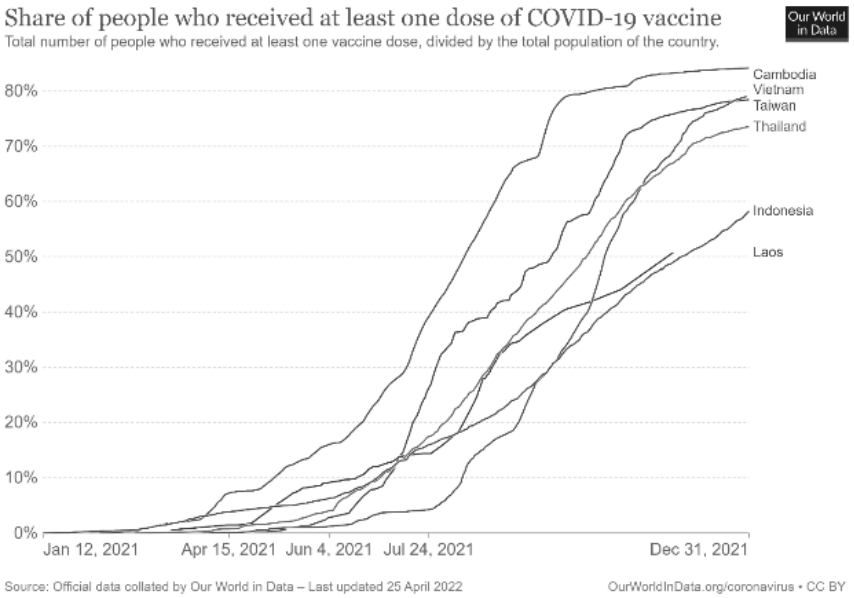
ASIAFLUCAP Policy Recommendations from Hanvoravongchai et. al (2010)

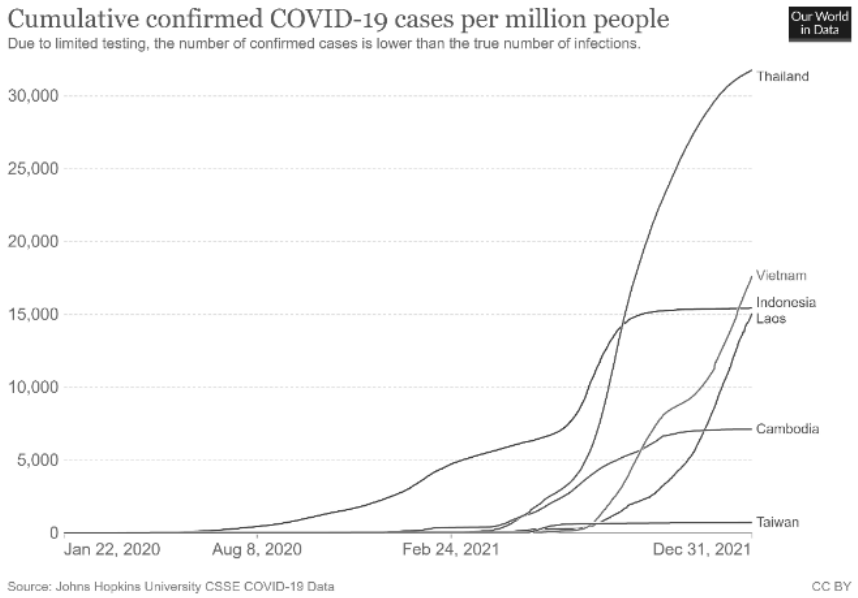
	Thailand	Vietnam (Viet Nam)	Indonesia	Taiwan	Cambodia	Laos (Lao PDR)
Stockpile influenza antivirals	Implemented by government in Vietnam (EU report, p. 15); otherwise no research found to provide updates. This recommendation was not relevant for SARS-CoV-2 pandemic.					
Ration or prioritize vaccines and medication	This recommendation was made for wealthy countries and WHO to implement. The ASIAFLUCAP Project was ongoing when 2009 H1N1 outbreak occurred and this did not happen; during SARS-CoV-2, this recommendation did not happen entirely, although there has been distribution through COVAX, etc.					
Adapt public education campaigns to shift focus from animal-human transmission to human-human transmission and respiratory health hygiene / when to seek care	This is an influenza specific recommendation made during the H1N1 pandemic; while SARS-CoV-2 transmission is possible between animals and people, it is extremely unlikely and not the primary method of transmission (PennToday), so this recommendation is not as applicable.					
Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics	Implemented; Volunteers utilized during SARS-CoV-2 pandemic to facilitate contact tracing and make cloth masks (Nittayasoot 2021, p. 314)	Implemented to some extent; Volunteers were utilized during SARS-CoV-2 pandemic, though only fully implemented in 62.5% of sampled districts (Van Hoang et. al 2021, p. 5)	Implemented to some extent; Remained an issue both pre-SARS-CoV-2 and currently due to "a shortage of specialists and poorly-equipped referral facilities, as well as weak coordination" (Mahendradhata et. al 2021, p. 4) Usage of volunteers implemented, but not sufficient. Discussion about recruiting fifth year medical students and other volunteers (Mahendradhata et. al 2021, p. 2, 5)	Not applicable; The hospital system in Taiwan is not referral-based since 1995, so pre-ASIAFLUCAP (Wu et. al 2010), additionally has a very well-developed healthcare system (Yen 2020)	Implemented; Converted hospitals and convention centers into makeshift hospitals during surges (Nov et. al 2021, p. 5)	Implemented; Utilized volunteers to staff quarantine facilities for people returning to Laos from Thailand (High 2021 p. 146)
Integrate pandemic prep response into broader disaster prep system	No research was found to provide any updates on this policy recommendation	Implemented; Established a national emergency operations center in 2013 (Van Hoang et. al 2021, p. 1)	No research was found to provide any updates on this policy recommendation	No research was found to provide any updates on this policy recommendation	No research was found to provide any updates on this policy recommendation	No research was found to provide any updates on this policy recommendation
Scale up capacity: increase healthcare staff	Implemented; Was in process pre-ASIAFLUCAP recommendation, but improved post as well. "To accommodate the rapid increase in service utilization required for the implementation of [health care coverage plan], the Thai government more than doubled the number of qualified nurses and midwives... between 2002 and 2018. During the same period, the government implemented policies to almost treble [sic] the number of qualified medical doctors" (Nittayasoot 2021, p. 312). Additionally, Thailand implemented a field epidemiology program in 1980 which was successful and has since been modeled by other countries (Corwin et. al 2021, p. 1522)	Implemented; Was in process in 2007, pre-ASIAFLUCAP, working to create a network of healthcare professionals modelled after Thailand system to help in case of disease outbreaks (Corwin et. al 2021, p. 1522)	Implemented to some extent; This still remains an important need for Indonesia; they currently face a significant shortage of physicians, nurses, midwives and specialists, and this has been exacerbated by the deaths of medical staff due to COVID-19 (Mahendradhata et. al 2021, 2)	Not applicable; Not identified as much of an issue for Taiwan particularly compared to other countries, as "relatively few provinces in Taiwan were estimated to have gaps, at least in general health system resources (beds, ventilators, and human resources), with quantities of these resources often considerably above those predicted to be needed for this scenario." (Rudge, Hanvoravongchai et. al 2012, p. 3)	Implemented; In 2011, implemented healthcare training modelled after Thai system (Corwin et. al 2021, p. 1522)	Implemented; Laos has implemented some training for professionals to manage H5N1 outbreaks modelled after the Thai system (Phommasack et. al 2012; Corwin et. al 2021, p. 1522)
Scale up capacity: increase healthcare infrastructure	No research was found to provide any updates on this policy recommendation	Implemented; Identified that there was a shortage of isolation rooms which would be a future policy focus (EU p. 15)	Current hospital capacity remains insufficient and unequally distributed across the country. Medical waste disposal is also a huge issue (Mahendradhata et. al, 2021, p. 3-4)	Not applicable; Not identified as much of an issue for Taiwan particularly compared to other countries, did have relatively few provinces in Taiwan were estimated to have gaps, "at least in general health system resources (beds, ventilators, and human resources), with quantities of these resources often considerably above those predicted to be needed for this scenario." (Rudge, Hanvoravongchai et. al 2012, p. 3)	Implemented; Considered renovating isolation wards (EU p. 15) and later did this (Corwin et. al); Nit et. al noted that overall infrastructure has been developed since 2011 with the help of WHO and partner countries (2021, p. 1)	No research was found to provide any updates on this policy recommendation

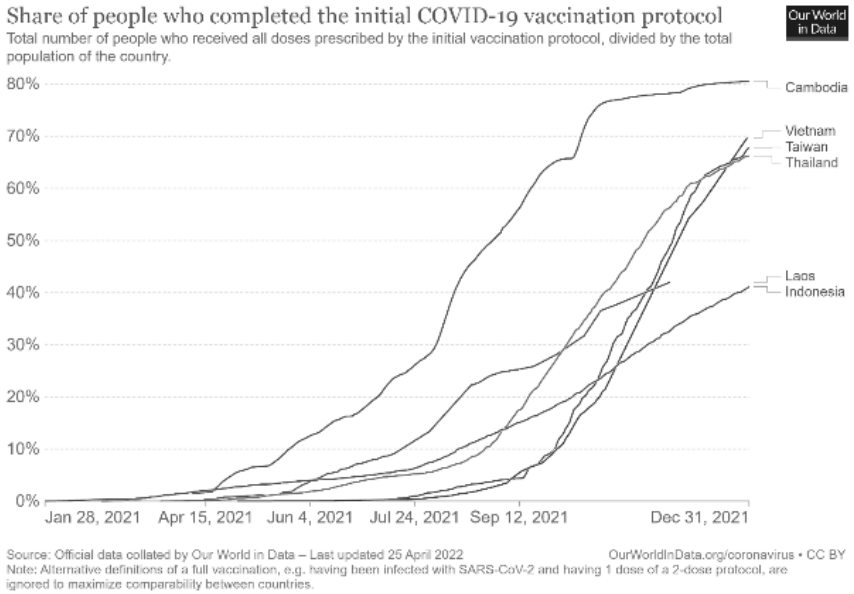
Weaknesses / Gaps Identified from EU report at the close of the project (2013); not specifically addressed with a policy recommendation						
	Thailand	Vietnam (Viet Nam)	Indonesia	Taiwan	Cambodia	Laos (Lao PDR)
Noted public H1N1 vaccine compliance as a key weakness / gap	This is not directly applicable to SARS-CoV-2, though COVID-19 vaccination compliance rates still remain an important area of focus during the current pandemic. It is noteworthy that despite this being an area of weakness and gap during H1N1, all countries in the sample managed to meet the 40% WHO threshold goal for 2021 with their COVID-19 vaccination rates.					
Noted a key weakness / gap in risk communication and risk management of governments	Implemented; Public risk communication was identified as a weakness in H1N1 2009 pandemic which Thailand wanted to improve upon (EU report); daily broadcast of SARS-CoV-2 pandemic news through all media channels (Nittayasoot 2021, p. 314)	Implemented; During SARS-CoV-2, information broadcasted daily through different official media channels, locally on social media. In early period of pandemic, lack of clarity (Ha et. al 2021, p. 6). Healthcare workers noted often needing to look on their own for new information about the pandemic (Van Hoang et. al 2021 p. 6) There was daily broadcasting of pandemic-related information however (Ha et. al 2021, p. 6, 11)	Implemented to some extent; Remained an issue during the SARS-CoV-2 pandemic. Public health campaigns initially adopted dismissed the severity of the crisis, led by health minister, who is known for unapproved treatments. Misinformation pushed. (Mietzner 2020, p. 231). Overall had a very fragmented, late adopted approach to containing the virus (Mietzer 2020 p. 243)	Implemented; Noted this as an area of future policy decisions (EU p. 16); in SARS-CoV-2 pandemic, emphasis on regular and transparent communication (Yen 2020)	Implemented; Risk communication through "behavioural preventative message" (Nit et. al 2021), unclear if this was continual or simply a one-time thing. Also shared information through social media and phone messaging (Nit et. al 2021)	No research was found to provide any updates on this policy recommendation
ASIAFLUCAP Broad Policy Recommendations from EU report at the close of the project (2013)						
	Thailand	Vietnam (Viet Nam)	Indonesia	Taiwan	Cambodia	Laos (Lao PDR)
Strengthen collaboration between nations, information sharing	This recommendation was rather broad and difficult to track, especially as countries in the sample have varying levels of information transparency. Post ASIAFLUCAP, Taiwan specifically noted wanting to grow in this area (EU 2012).					
Improve equitable distribution and timely access to resources	Implemented; Was in process pre-ASIAFLUCAP. Since 1972 has required mandatory rural service, has also had ongoing efforts to get drs from underserved populations and distribute human resources more equitably (Nittayasoot 2021, p. 313)	Implemented to some extent; Willingness to contribute resources existed across different groups, but implementation was difficult due to complicated procedures (Ha et. al 2021, p. 6)	Implemented; Relies a lot on the global supply chain for resources, has started to produce PPE and medical supplies domestically due to SARS-CoV-2 pandemic; resources distributed across provinces by government (Mahendradhata et. al 2021, p. 3)	Implemented; Established in SARS-CoV-2 pandemic through distribution of masks as form of PPE (Yen 2020, p. 462)	Implemented; Distributed resources during SARS-CoV-2 pandemic including hygiene kits and handwashing supplies (Nit et. al 2021)	No research was found to provide any updates on this policy recommendation
Increase governement transparency	"Parliamentary oversight of the government that took power in 2019 has resulted in an increase in overall government openness and transparency. However, due to the military's continued sway over government operations and its majority within the National Assembly, high-level decisions continue to be made, and legislation passed, opaquely and with little regard to the protestations of opposition lawmakers." (Freedom House Thailand 2021)	Policies were implemented that were transparent for at-risk communities during SARS-CoV-2 (Hung et. al 2021); as a whole there is limited transparency: "The CPV leadership operates with considerable opacity. The National Assembly passed an access to information law in 2016, but its provisions are relatively weak. Information can also be withheld if it is deemed to threaten state interests or the well-being of the nation." (Freedom House Vietnam 2021)	Transparency remains an issue, especially with government's undercounting of cases and downplaying the severity of SARS-CoV-2 pandemic (Mietzner 2020). More broadly, "civil society groups can comment on and influence pending policies or legislation, [but] government transparency is limited by broad exemptions in the freedom of information law and obstacles such as a 2011 law that criminalizes leaking vaguely defined "state secrets" to the public." (Freedom House Indonesia 2021)	Emphasized transparency in SARS-CoV-2 pandemic through communication methods, governance; daily press conferences (Wen 2020, p. 464). Government overall is very transparent and open (Freedom House Taiwan 2021)	"Nepotism and patronage undermine the functioning of a transparent bureaucratic system. A draft access to information law was finalized in 2019, but the government added the bill to its long-term strategic plan, delaying its implementation to 2023. International information rights groups have criticized the bill, warning it does not meet international standards." (Freedom House Cambodia 2021)	"There is no access to information law in Laos. However, the 2012 Law on Making Legislation increased legislative transparency". There have also been instances of government withholding of information (Freedom House Laos 2021)
Speed up research and prepare for future	This recommendation was one of the most broad; different countries interpreted this in different ways as is apparent through the other decisions implemented post-ASIAFLUCAP project.					

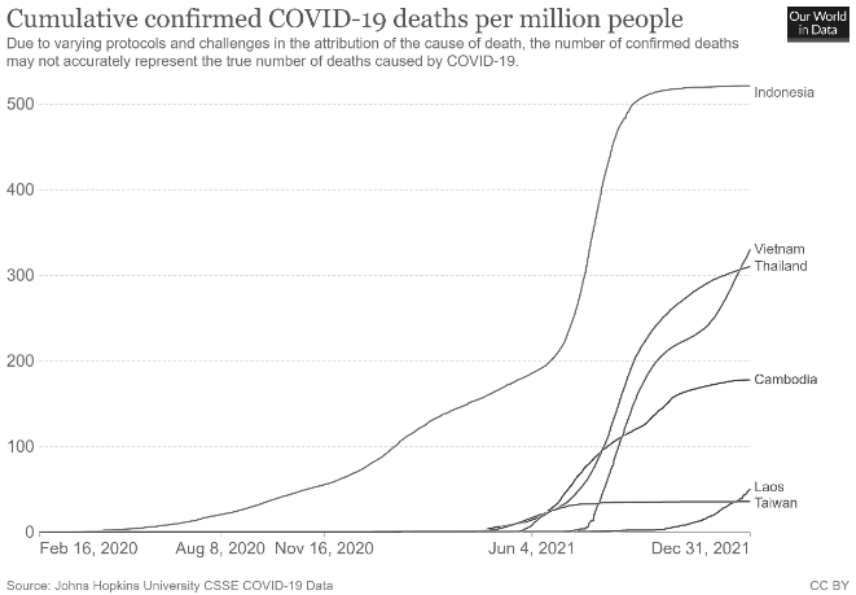
SARS-CoV-2 Pandemic by Country (as of 31 December 2021)						
	Thailand	Vietnam (Viet Nam)	Indonesia	Taiwan	Cambodia	Laos (Lao PDR)
Overall response:	First case outside China reported here, delta variant overwhelmed them though many measures in place (Rampal et. al 2021, p. 789)	Satisfactory (Van Hoang et. al, p. 9); echoed by Rampal et. al (2021, p. 789)	High transmission rates, low testing rates (Rampal et. al 2021, p. 788)	Very effective response overall, despite its proximity to mainland China (Yen 2020)	Very high overall vaccination rates (fastest only second to Singapore in ASEA) (Rampal et. al 2021, p. 787); mass testing and contact tracing, training healthcare workers (Nit et. al 2021); initial response was praised, but subsequent infections skyrocketed and controversial lockdown implementation which left people food-insecure (Tatum 2021, p. 2035)	Very successful; low caseload including asymptomatic cases (Flower et. al 2021); early containment measures but low testing rates (Rampal et. al 2021, p. 788)
Reported hospitalizations:	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights	Data was not available from Our World in Data, as a result relying on peer-reviewed research for insights
Cumulative confirmed COVID-19 cases per million:	31,785.68	17,635.51	15,424.42	713.85	7,110.22	15,050.09
Cumulative confirmed COVID-19 deaths per million:	310.19	329.98	521.40	35.63	177.74	50.41
Reported at least 1 dose total:	73.50%	79.00%	58.30%	78.40%	84.20%	50.80%
Reported completed vaccination total:	66.20%	69.70%	41.10%	67.70%	80.60%	42.00%
Key	Highest caseload, death count, lowest partial and complete vaccination rate					Lowest caseload, death count, highest partial and complete vaccination rate

SARS-CoV-2 Pandemic Data Visualization for Sample Countries









Results

Thailand

In practice, Thailand adopted five out of seven the recommendations from the ASIAFLUCAP project to varying capacities. It remained unknown whether two of the recommendations were implemented. In addition, Thailand was already making progress on two of the recommendations' years prior to partaking in the ASIAFLUCAP project. The recommendations and Thailand's subsequent outcomes are as follows:

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics: In Thailand, volunteers were utilized during the SARS-CoV-2 pandemic to facilitate contact tracing and make cloth masks.[22]

Integrate pandemic prep response into broader disaster prep system: No research was found to provide any updates on this policy recommendation.

Scale up capacity: increase healthcare staff: This policy initiative in Thailand predated the ASIAFLUCAP recommendation but improved post-ASIAFLUCAP as well. "To accommodate the rapid increase in service utilization required for the implementation of [health care coverage plan], the Thai government more than doubled the number of qualified nurses and midwives... between

[22] Natthaprang Nittayasoot et al., "Public Health Policies And Health-Care Workers' Response To The COVID-19 Pandemic, Thailand", *Bulletin Of The World Health Organization* 99, no. 4 (2021): 314, doi:10.2471/blt.20.275818.

2002 and 2018. During the same period, the government implemented policies to [triple]... the number of qualified medical doctors".[23] Additionally, Thailand implemented a field epidemiology program in 1980 which was successful and has since been modeled by other countries.[24]

Scale up capacity: increase healthcare infrastructure: In Thailand, ASIAFLUCAP modeling found resource gaps, particularly in available ventilators, in the event of an influenza pandemic.[25] Post study, the European Union funding report noted that Thai leadership acquired additional ventilators for the Ministry of Public Health Hospitals.[26] They also expressed interest in improving human resources in future policy decisions[27] and increasing overall healthcare infrastructure within the country.[28]

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[23] Ibid, 312.

[24] Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1522, doi:10.4269/ajtmh.20-1499.

[25] R. Krumkamp et al., "Health Service Resource Needs For Pandemic Influenza In Developing Countries: A Linked Transmission Dynamics, Interventions And Resource Demand Model", *Epidemiology And Infection* 139, no. 1 (2010): 59-67, doi:10.1017/s0950268810002220.

[26] "Final Report Summary - ASIAFLUCAP (Health System Analysis To Support Capacity Development To Respond To Pandemic Influenza In Asia)", *Cordis.Europa.Eu*, 2013, https://cordis.europa.eu/project/id/201823/reporting.

[27] Ibid.

[28] Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1519-1525, doi:10.4269/ajtmh.20-1499.

Key weakness / gap: risk communication and risk management of governments: As a result of the ASIAFLUCAP project, Thailand also identified their communication around public risk as a weakness to improve on;[29] this was shown in the 2009 H1N1 pandemic which occurred during the ASIAFLUCAP study. During the SARS-CoV-2 pandemic, Thailand communicated risk and public health information through the daily broadcast of SARS-CoV-2 pandemic news through all media channels.[30]

Improve equitable distribution and timely access to resources: This policy initiative was in process pre-ASIAFLUCAP recommendation. Since 1972, Thailand has required mandatory rural service for doctors and has also had ongoing efforts to get doctors from underserved populations and distribute human resources more equitably.[31]

Increase government transparency: Freedom House states that in Thailand, "[p]arliamentary oversight of the government that took power in 2019 has resulted in an increase in overall government openness and transparency. However, due to the military's continued sway over government operations and its majority within the National Assembly, high-level decisions continue to be made, and legislation passed, opaquely and with little regard to the protestations of

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[29] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu*, https://cordis.europa.eu/project/id/201823/reporting.

[30] Natthaprang Nittayasoot et al., "Public Health Policies And Health-Care Workers' Response To The COVID-19 Pandemic, Thailand", *Bulletin Of The World Health Organization* 99, no. 4 (2021): 314, doi:10.2471/blt.20.275818.

[31] Ibid, 313.

opposition lawmakers."[32] Freedom House gave Thailand a score of 1/4 in their scoring system in terms of its openness and transparency operations.[33]

Fast forwarding to the SARS-CoV-2 pandemic, Thailand found itself with the first case of the virus reported outside of China. Despite putting public health measures into place to prevent viral spread, the Delta variant of SARS-CoV-2 overwhelmed Thailand.[34] By the end of 2021, they had accumulated 31,785.68 cases per million people, the highest of any of the Southeast countries sampled for this research. They also had the third-highest death count per million out of the countries sampled. Despite this, 73.5% of their population had received a first dose of a COVID-19 vaccine by December 31, 2021, and 66.20% of the population had a complete vaccination series, well over the World Health Organization's goal of 40% vaccination compliance for every country by the end of 2021.[35]

[32] "Thailand: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/thailand/freedom-world/2021.

[33] Ibid.

[34] Sanjay Rampal et al., "The Epidemiology Of COVID-19 In Ten Southeast Asian Countries", *Medical Journal Of Malaysia* 76, no. 6 (2021): 789, https://pubmed.ncbi.nlm.nih.gov/34806661/.

[35]"Strategy To Achieve Global Covid-19 Vaccination By Mid-2022", *World Health Organization*, 2022, https://cdn.who.int/media/docs/default-source/immunization/covid-19/strategy-to-achieve-global-covid-19-vaccination-by-mid-2022.pdf?sfvrsn=5a68433c_5.

Vietnam

Vietnam adopted all seven out of seven recommendations from the ASIAFLUCAP project to varying levels of effectiveness, including one recommendation which was implemented prior to partaking in the ASIAFLUCAP project. Details are as follows:

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics: Volunteers were utilized during the SARS-CoV-2 pandemic, though Van Hoang et. al (2021) reported that this was only fully implemented in 62.5% of sampled districts.[36]

Integrate pandemic prep response into broader disaster prep system: In 2013, Vietnam established a national emergency operations center.[37]

Scale up capacity: increase healthcare staff: Vietnam had begun to address this need as early as 2007, pre-ASIAFLUCAP, working to create a network of healthcare professionals modelled after Thailand system to help in case of disease outbreaks.[38] At a district level, ASIAFLUCAP found

[36] Minh Van Hoang et al., "Covid-19 Preparedness And Response Capability: A Case Study Of The Hanoi Primary Healthcare System", *Health Services Insights* 14 (2021): 5, doi:10.1177/11786329211019224.

[37] Ibid, 1.

[38] Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1522, doi:10.4269/ajtmh.20-1499.

that Vietnam lacked trained human resources,[39] though healthcare workers were predicted to be mostly sufficient should Vietnam be faced with an influenza pandemic scenario.[40]

Scale up capacity: increase healthcare infrastructure: Post-ASIAFLUCAP, Vietnam identified that there was a shortage of isolation rooms which would be a future policy focus.[41] In addition, Vietnam had an insufficient number of mechanical ventilators, the lack of which was predicted to be a major cause of avoidable death within the region.[42] The research was unclear if there have been tangible policy initiatives in this area.

Key weakness / gap: risk communication and risk management of governments: During SARS-CoV-2 pandemic, information was broadcasted daily through different official media channels as

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[39] "Final Report Summary - ASIAFLUCAP (Health System Analysis To Support Capacity Development To Respond To Pandemic Influenza In Asia)", *Cordis.Europa.Eu*, 2013, https://cordis.europa.eu/project/id/201823/reporting.

[40] James W. Rudge et al., "Health System Resource Gaps And Associated Mortality From Pandemic Influenza Across Six Asian Territories", *Plos ONE* 7, no. 2 (2012): e31800, p. 3, doi:10.1371/journal.pone.0031800.

[41] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu,* https://cordis.europa.eu/project/id/201823/reporting.

[42] James W. Rudge et al., "Health System Resource Gaps And Associated Mortality From Pandemic Influenza Across Six Asian Territories", *Plos ONE* 7, no. 2 (2012): e31800, p. 3, doi:10.1371/journal.pone.0031800.

well as locally on social media.[43] Despite this, there was a lack of clarity around communication in the early period of the pandemic.[44] Additionally, healthcare workers noted often needing to look on their own for new information about the pandemic.[45]

Improve equitable distribution and timely access to resources: Ha et. al found that within Vietnam, there was a willingness to contribute resources which existed across different societal groups, but implementation was difficult due to complicated procedures.[46]

Increase government transparency: Policies were implemented that were transparent for at-risk communities during SARS-CoV-2;[47] there is limited transparency within the country overall. Freedom House states that "CPV leadership operates with considerable opacity. The National Assembly passed an access to information law in 2016, but its provisions are relatively weak. Information can also be withheld if it is deemed to threaten state interests or the well-being of the

[43] Bui Thi Thu Ha et al., "Community Engagement In The Prevention And Control Of COVID-19: Insights From Vietnam", *PLOS ONE* 16, no. 9 (2021): 6, 11, doi:10.1371/journal.pone.0254432.

[44] Ibid, 6.

[45] Minh Van Hoang et al., "Covid-19 Preparedness And Response Capability: A Case Study Of The Hanoi Primary Healthcare System", *Health Services Insights* 14 (2021): 6, doi:10.1177/11786329211019224.

[46] Bui Thi Thu Ha et al., "Community Engagement In The Prevention And Control Of COVID-19: Insights From Vietnam", *PLOS ONE* 16, no. 9 (2021): 6, doi:10.1371/journal.pone.0254432.

[47] Nguyen Tuan Hung et al., "Policy Response For Disadvantaged Groups During The COVID-19 Pandemic: Vietnam Experiences", *International Social Work* 64, no. 5 (2021): 750-755, doi:10.1177/00208728211017975.

nation"; it ultimately gave Vietnam a score of 1/4 in their scoring system in terms of its openness and transparency operations.[48]

Despite these investments, during SARS-CoV-2, Vietnam had the second largest confirmed per million caseload and per million deaths count out of the six countries analyzed. By December 31, 2021, the country had amassed 17,635.51 cases per million people, with 329.98 deaths per million. Additionally, Vietnam's vaccination rates were the second highest of the countries sampled, with 79.00% of the country having received at least a first dose of a COVID-19 vaccine by December 30, 2021, and with 69.70% having reported completing the vaccination sequence.

Indonesia

Indonesia adopted six out of seven the recommendations from the ASIAFLUCAP project. One of the recommendations remained unknown regarding its implementation status. In addition, Indonesia chose to implement a healthcare facility framework survey to cover all its districts post ASIAFLUCAP, which was not an ASIAFLCAP recommendation but an additional outcome.[49] The official recommendations and their outcomes within Indonesia are as follows:

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[48] "Vietnam: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/vietnam/freedom-world/2021.

[49] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu*, https://cordis.europa.eu/project/id/201823/reporting.

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics: Indonesia's ability to handle pandemic surges remained an issue before and during SARS-CoV-2 due to "a shortage of specialists and poorly-equipped referral facilities, as well as weak coordination".[50] Within the country, volunteers were utilized, but insufficient. Mahendradhata et. al discussed the possibility of recruiting fifth year medical students and other volunteers to address this further, but as of the time of writing, this had not been implemented.[51]

Integrate pandemic prep response into broader disaster prep system: No research was found to provide any updates on this policy recommendation.

Scale up capacity: increase healthcare staff: More can be done; this remains an important need for Indonesia. They currently face a significant shortage of physicians, nurses, midwives, and specialists, and this has been exacerbated by the deaths of medical staff due to COVID-19.[52]

Scale up capacity: increase healthcare infrastructure: This continues to be a need within Indonesia. Current hospital capacity remains insufficient and unequally distributed across the country. Medical waste disposal is also a huge issue.[53]

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[50] Yodi Mahendradhata et al., "The Capacity Of The Indonesian Healthcare System To Respond To COVID-19", *Frontiers In Public Health* 9 (2021): 4, doi:10.3389/fpubh.2021.649819.

[51] Ibid, 2, 5.

[52] Ibid, 2.

[53] Ibid, 3-4.

Key weakness / gap: risk communication and risk management of governments: This remained an issue during the SARS-CoV-2 pandemic. Public health campaigns initially adopted dismissed the severity of the crisis, led by the Indonesian health minister, who is known for pushing unapproved treatments and pushed misinformation about COVID-19.[54] Overall, the country has had a very fragmented, late adopted approach to containing SARS-CoV-2.[55]

Improve equitable distribution and timely access to resources: Indonesia relies heavily on the global supply chain for resources, which proved problematic during SARS-CoV-2. There has been a movement towards producing personal protective equipment (PPE) and medical supplies domestically due to SARS-CoV-2 pandemic; these resources have been distributed across provinces by the government.[56]

Increase government transparency: Transparency remains an issue within Indonesia, especially with government's undercounting of cases and downplaying the severity of SARS-CoV-2 pandemic.[57] More broadly, Freedom House states that "civil society groups can comment on and

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[54] Marcus Mietzner, "Populist Anti-Scientism, Religious Polarisation, And Institutionalised Corruption: How Indonesia's Democratic Decline Shaped Its COVID-19 Response", *Journal Of Current Southeast Asian Affairs* 39, no. 2 (2020): 231, doi:10.1177/1868103420935561.

[55] Ibid, 243.

[56] Yodi Mahendradhata et al., "The Capacity Of The Indonesian Healthcare System To Respond To COVID-19", *Frontiers In Public Health* 9 (2021): 3, doi:10.3389/fpubh.2021.649819.

[57] Marcus Mietzner, "Populist Anti-Scientism, Religious Polarisation, And Institutionalised Corruption: How Indonesia's Democratic Decline Shaped Its COVID-19 Response", *Journal Of Current Southeast Asian Affairs* 39, no. 2 (2020): 227-249, doi:10.1177/1868103420935561.

influence pending policies or legislation, [but] government transparency is limited by broad exemptions in the freedom of information law and obstacles such as a 2011 law that criminalizes leaking vaguely defined “state secrets” to the public".[58] They gave Indonesia a score of 2/4 in their scoring system in terms of its openness and transparency operations.[59]

Indonesia had incredibly low testing rates during the SARS-CoV-2 pandemic, but still faced high rates of transmission.[60] This is striking, because even with probable undercounting, Indonesia’s COVID-19 caseload was the third largest out of the countries sampled. They had 15,424.42 cases per million confirmed by the end of 2021, and the highest death rate of countries sampled, with 521.40 deaths per million. Compared to other areas in the region, Indonesia boasted a low vaccination completion rate, with 58.30% of the country having received at least one dose, and 41.10% having completed their vaccination sequence, respectively.

Taiwan

Taiwan adopted three out of seven the recommendations from the ASIAFLUCAP project. One of the recommendations’ implementation statuses remained unknown, and the other three recommendations were not as applicable for Taiwan as they were for the rest of the sample. The details are as follows:

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[58] "Indonesia: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/indonesia/freedom-world/2021.

[59] Ibid.

[60] Sanjay Rampal et al., "The Epidemiology Of COVID-19 In Ten Southeast Asian Countries", *Medical Journal Of Malaysia* 76, no. 6 (2021): 788, https://pubmed.ncbi.nlm.nih.gov/34806661/.

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics: This recommendation was not very applicable to Taiwan, as the hospital system in Taiwan is not referral-based and has been this way since 1995, so pre-ASIAFLUCAP.[61] Additionally, Taiwan has a very well-developed healthcare system.[62]

Integrate pandemic prep response into broader disaster prep system: No research was found to provide insight on this recommendation's implementation in Taiwan, so it remains unknown if it was implemented.

Scale up capacity: increase healthcare staff: This ASIAFLUCAP recommendation was not identified as an area Taiwan needed to improve, as "relatively few provinces in Taiwan were estimated to have gaps, at least in general health system resources [including] human resources... quantities of these resources [were] often considerably above those predicted to be needed" for an influenza pandemic scenario.[63]

Scale up capacity: increase healthcare infrastructure: This was not identified as a concern for Taiwan by ASIAFLUCAP researchers, who noted that few provinces in Taiwan were estimated to

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[61] Tai-Yin Wu, Azeem Majeed and Ken N Kuo, "An Overview Of The Healthcare System In Taiwan", *London Journal Of Primary Care* 3, no. 2 (2010): 115-119, doi:10.1080/17571472.2010.11493315.

[62] Wei-Ting Yen, "Taiwan's COVID-19 Management: Developmental State, Digital Governance, And State-Society Synergy", *Asian Politics &Amp; Policy* 12, no. 3 (2020): 455-468, doi:10.1111/aspp.12541.

[63] James W. Rudge et al., "Health System Resource Gaps And Associated Mortality From Pandemic Influenza Across Six Asian Territories", *Plos ONE* 7, no. 2 (2012): 3, doi:10.1371/journal.pone.0031800.

have gaps, "at least in general health system resources (beds, ventilators, and human resources), with quantities of these resources often considerably above those predicted to be needed".[64]

Key weakness / gap: risk communication and risk management of governments: Post ASIAFLUCAP, Taiwanese government identified this as an area of focus in future policy decisions.[65] By the SARS-CoV-2 pandemic, Yen (2020) found that Taiwan placed emphasis on regular and transparent communication surrounding COVID-19.[66]

Improve equitable distribution and timely access to resources: Taiwan practiced this in the SARS-CoV-2 pandemic through distribution of masks as forms of PPE.[67]

Increase government transparency: Taiwan emphasized transparency during the SARS-CoV-2 pandemic through both their communication methods and governance, implementing daily press conferences surrounding the COVID-19 situation.[68] Overall, Freedom House indicated that the

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[64] Ibid.

[65] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu*, https://cordis.europa.eu/project/id/201823/reporting.

[66] Wei-Ting Yen, "Taiwan's COVID-19 Management: Developmental State, Digital Governance, And State-Society Synergy", *Asian Politics &Amp; Policy* 12, no. 3 (2020): 455-468, doi:10.1111/aspp.12541.

[67] Ibid, 462.

[68] Ibid, 464.

government is very transparent and open, and gave Taiwan a perfect 4/4 in their scoring system in terms of its openness and transparency operations.[69]

Overall, in the SARS-CoV-2 pandemic, Yen (2020) found Taiwan had a remarkably effective pandemic response, despite its proximity to China, the location of the initial SARS-CoV-2 outbreak.[70] Taiwan has performed extremely well in terms of caseload per million and overall death rates per million, with the lowest counts in each of the countries sampled. By December 31, 2021, Taiwan had 713.85 cases per million and 35.63 deaths per million, and 78.40% of the country had received at least one dose of a COVID-19 vaccine. Their overall reported completed vaccination rate was 67.70%, which was third highest in the sample.

Cambodia

Cambodia adopted six out of seven the recommendations from the ASIAFLUCAP project to varying capacity levels, including one recommendation which was implemented prior to partaking in the ASIAFLUCAP project. One of the recommendations remained unknown regarding its implementation status. The recommendations and implementations are as follows:

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics:

[69] "Taiwan: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/taiwan/freedom-world/2021.

[70] Wei-Ting Yen, "Taiwan's COVID-19 Management: Developmental State, Digital Governance, And State-Society Synergy", *Asian Politics &Amp; Policy* 12, no. 3 (2020): 455-468, doi:10.1111/aspp.12541.

Cambodia converted hospitals and convention centers into makeshift hospitals during virus surges in the SARS-CoV-2 pandemic.[71]

Integrate pandemic prep response into broader disaster prep system: No research was found to provide any updates on this policy recommendation.

Scale up capacity: increase healthcare staff: In 2011, Cambodia implemented healthcare training modelled after the Thai system to assist in healthcare staff capacity.[72]

Scale up capacity: increase healthcare infrastructure: Considering the ASIAFLUCAP recommendations, Cambodia made plans to renovate their isolation wards,[73] and later

[71] Tam Nov et al., "Impact Of The Third Wave Of The COVID-19 Pandemic And Interventions To Contain The Virus On Society And Patients With Kidney Disease In Cambodia", *Renal Replacement Therapy* 7, no. 1 (2021): 5, doi:10.1186/s41100-021-00372-6.

[72] Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1522, doi:10.4269/ajtmh.20-1499.

[73] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu*, https://cordis.europa.eu/project/id/201823/reporting.

accomplished this.[74] Nit et. al additionally stated that overall healthcare infrastructure has been developed since 2011 with the help of WHO and partner countries.[75]

Key weakness / gap: risk communication and risk management of governments: Risk was communicated through "behavioural preventative message[s]".[76] It is unclear if this was a continual response or isolated. Additionally, the government shared information through social media and phone messaging.[77]

Improve equitable distribution and timely access to resources: The Cambodia government distributed resources to constituents during the SARS-CoV-2 pandemic, including hygiene kits and handwashing supplies.[78]

Increase government transparency: Freedom House states that in Cambodia, “[n]epotism and patronage undermine the functioning of a transparent bureaucratic system. A draft access to information law was finalized in 2019, but the government added the bill to its long-term strategic plan, delaying its implementation to 2023. International information rights groups have criticized

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[74] Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1519-1525, doi:10.4269/ajtmh.20-1499.

[75] Buntongyi Nit et al., "Understanding The Slow COVID-19 Trajectory Of Cambodia", *Public Health In Practice* 2 (2021): 100073, doi:10.1016/j.puhip.2020.100073.

[76] Ibid.

[77] Ibid.

[78] Ibid.

the bill, warning it does not meet international standards".[79] They gave Cambodia a score of 1/4 in their scoring system in terms of its openness and transparency operations,[80] indicating that transparency within the government is limited.

Specific to the SARS-CoV-2 pandemic, Cambodia implemented mass testing and contact tracing, as well as training of healthcare workers.[81] The country's initial response was praised, but subsequent variants skyrocketed their transmission rates, and the government implemented a controversial lockdown which left many people food-insecure and led to protests within the country.[82]

Cambodia had the second-lowest caseload per million in the sample at 7,110.22 cases per million by December 31, 2021. Their death rate per million was 177.74. Where the country stood out was in terms of their population vaccination rates. Not only did Cambodia boast the highest vaccination rates of the country sample and remarkably high rates overall, but Cambodia also had a remarkably fast vaccination campaign, rivaled only by Singapore in ASEA.[83] 84.20% of their

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[79] "Cambodia: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/cambodia/freedom-world/2021.

[80] Ibid.

[81] Buntongyi Nit et al., "Understanding The Slow COVID-19 Trajectory Of Cambodia", *Public Health In Practice* 2 (2021): 100073, doi:10.1016/j.puhip.2020.100073.

[82] Megan Tatum, "Cambodia Ends Controversial COVID-19 Restrictions", *The Lancet* 397, no. 10289 (2021): 2035, doi:10.1016/s0140-6736(21)01196-x.

[83] Sanjay Rampal et al., "The Epidemiology Of COVID-19 In Ten Southeast Asian Countries", *Medical Journal Of Malaysia* 76, no. 6 (2021): 787, https://pubmed.ncbi.nlm.nih.gov/34806661/.

population had received at least a first dose by December 31, 2021, with 80.60% of the population reported to have completed vaccination.

Laos

Post ASIAFLUCAP, the Laotian government indicated they would continue having necessary meetings with departments and government to determine where to go with these findings.[84] Despite this, information regarding Laos's implementation of ASIAFLUCAP recommendations was particularly difficult to find and sparse; more research overall needs to be done in order to accurately assess the impacts of ASIAFLUCAP policy recommendations on its SARS-CoV-2 situation. Because research identified paints a partial picture of the situation and was included in the initial ASIAFLUCAP project, it was still incorporated into the overall sample and this subsequent research analysis. Laos adopted in some capacity three out of seven the recommendations from the ASIAFLUCAP project. Four of the recommendations' implementation statuses remained unknown. Recommendations and Laos's subsequent outcomes are as follows:

Shift to away from reliance on a referral-based hospital system, utilizing volunteers and community level surge capacity (hospital overflow) to support system during pandemics: Laos utilized volunteers to staff quarantine facilities for people returning to Laos from Thailand during the SARS-CoV-2 pandemic.[85]

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[84] "Final Report Summary - ASIAFLUCAP (Health System Analysis to Support Capacity Development to Respond to Pandemic Influenza in Asia)", 2013, *Cordis.Europa.Eu,* https://cordis.europa.eu/project/id/201823/reporting.

[85] Holly High, "Laos In 2020", *Asian Survey* 61, no. 1 (2021): 146, doi:10.1525/as.2021.61.1.144.

Integrate pandemic prep response into broader disaster prep system: No research was found to provide any updates on this policy recommendation.

Scale up capacity: increase healthcare staff: Post ASIAFLUCAP recommendation, Laos implemented some training for professionals to manage H5N1 outbreaks. This was modelled after the Thai system.[86] It is unclear if this has continued into the SARS-CoV-2 pandemic.

Scale up capacity: increase healthcare infrastructure: No research was found to provide any updates on this policy recommendation.

Key weakness / gap: risk communication and risk management of governments: No research was found to provide any updates on this policy recommendation.

Improve equitable distribution and timely access to resources: No research was found to provide any updates on this policy recommendation.

Increase government transparency: According to Freedom House, "[t]here is no access to information law in Laos. However, the 2012 Law on Making Legislation increased legislative transparency".[87] There have also been instances of government withholding of information, such

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[86] Bounlay Phommasack et al., "Capacity Building In Response To Pandemic Influenza Threats: Lao PDR Case Study", *The American Journal Of Tropical Medicine And Hygiene* 87, no. 6 (2012): 965-971, doi:10.4269/ajtmh.2012.12-0074; Andrew Corwin et al., "The Impact Of Preparedness In Defying COVID-19 Pandemic Expectations In The Lower Mekong Region: A Case Study", *The American Journal Of Tropical Medicine And Hygiene* 104, no. 4 (2021): 1522, doi:10.4269/ajtmh.20-1499.

[87] "Laos: Freedom In The World 2021 Country Report", *Freedom House*, 2022, https://freedomhouse.org/country/laos/freedom-world/2021.

as after a 2018 dam collapse.[88] In terms of its transparency and openness, Freedom House scored Laos as 1/4 for its government operations.[89]

In terms of the SARS-CoV-2 pandemic, Laos's response has been successful. They have had an exceptionally low caseload, including asymptomatic cases, which has been confirmed through checking for antibody prevalence among the population.[90] The country had early containment measures, but low testing rates.[91]

As of the end of 2021, Laos had an overall COVID-19 caseload of 15,050.09 cases per million, which placed them at the third highest caseload per million in the sample. Despite this, their death count per million was low at only 50.41 COVID-19 deaths per million. By November 23, 2021, 50.80% of the population had received at least a first dose of a COVID-19 vaccination, with 42.00% of the country having completed their vaccination sequence.

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[88] Ibid.

[89] Ibid.

[90] Barnaby Flower and Michael Marks, "Did Laos Really Control The Transmission Of SARS-Cov-2 In 2020?", *The Lancet Regional Health - Western Pacific* 13 (2021): 100202, doi:10.1016/j.lanwpc.2021.100202.

[91] Sanjay Rampal et al., "The Epidemiology Of COVID-19 In Ten Southeast Asian Countries", *Medical Journal Of Malaysia* 76, no. 6 (2021): 788, https://pubmed.ncbi.nlm.nih.gov/34806661/.

Discussion

As illustrated by the data, the six Southeast Asian countries in the sample had a varied response in their ultimate SARS-CoV-2 outcomes. This was an unexpected finding; it was anticipated that the ASIAFLUCAP influenza recommendations would benefit countries at large and equip them further for the SARS-CoV-2 pandemic, especially because of the long-term benefits that result from strengthening a country's healthcare systems and overall capacity to handle a disease outbreak.[92] While these benefits remain a possibility, they cannot be determined by these research findings alone.

The country which adopted all seven of the ASIAFLUCAP recommendations in some capacity, Vietnam, had a caseload and death rate per million ranked second highest in the entire sample. In contrast, Laos only adopted three of the recommendations, and its caseload per million was the third lowest, with its death rates per million the second lowest. While it is possible that missing data for Laos might have swayed the results, it is inconclusive.

Similarly, both Cambodia and Indonesia implemented six of the seven ASIAFLUCAP recommendations in some way, and lacked research for the same key recommendations, having adopted practices within their respective countries in the same six categories. Surprisingly, the

[92] Commission on a Global Health Risk Framework for the Future; National Academy of Medicine, Secretariat. The Neglected Dimension of Global Security: A Framework to Counter Infectious Disease Crises. Washington (DC): National Academies Press (US); 2016 May 16. 3, Strengthening Public Health as the Foundation of the Health System and First Line of Defense. https://www.ncbi.nlm.nih.gov/books/NBK368392/.

SARS-CoV-2 pandemic results for both countries differ wildly. Indonesia has the third-highest number of cases per million, the highest deathrate per million, the second lowest partial vaccination rate, and the lowest vaccination rate out of the countries sampled. In contrast, Cambodia ranked second lowest in cases per million, third lowest in deaths per million, and boasted the highest partial and completed vaccination rates. This discrepancy is apparent in the SARS-CoV-2 pandemic, but in terms of ASIAFLUCAP recommendation adoption, the two countries mirror one another in many ways.

Thailand's caseload per million was highest in the sample and ranked third with all other measures. It adopted five out of the seven recommendations. This contrasts with Taiwan, whose caseload and death rate per million ranked lowest out of the entire sample. This was an unsurprising finding, considering that out of the six countries sampled, Taiwan's healthcare systems are much further advanced, and the country has the resources to control viral spread in ways that other countries in the sample lacked. Taiwan implemented three out of seven of the ASIAFLUCAP recommendations; of the recommendations applicable to them as a country, Taiwan implemented three out of four. Of the two democracies listed in the sample, Taiwan boasted a higher vaccination rate, while it was higher than Thailand's rates, it remained lower than some other Southeast Asian countries in the sample.

Research Limitations

The present study identified existing peer-reviewed field research and as a result is limited by the questions asked by other researchers. Study results were limited to those available in the English language, which had already gone through the peer-review process.

Additionally, it is difficult to identify the data reliability for some of the countries within the sample, especially if they have limited transparency around information. On the ground research is preferred, as it allows researchers to see for themselves what the situations are.

The SARS-CoV-2 pandemic is still ongoing, and as a result, these policies are being analyzed without the benefit of hindsight. This data is new and emerging, and it is possible that a country's COVID-19 caseload or overall situation may have shifted even since this writing. Current (as of May 2022) SARS-CoV-2 updates for each country will be discussed in the conclusion. In addition, the data surrounding completed vaccination sequences do not include booster or additional doses, which have proved instrumental in more recent SARS-CoV-2 variants, such as BA.1 and BA.2.[93]

This research is also limited by the reality that influenza and coronaviruses are not identical. Some of the ASIAFLUCAP recommendations were not applicable to the SARS-CoV-2 pandemic, were vague, or applicable to the world-at-large rather than the six-country sample, and there is a possibility that this may skew the results.

Conclusion

This research examined the effects of ASIAFLUCAP policy recommendations and their subsequent implementation in six Southeast Asian countries: Thailand, Vietnam, Indonesia,

[93]Bhavana Kunkalikar, "Research Highlights Importance Of Booster Vaccine Doses To Protect Against All Omicron Variants", *News-Medical.Net*, 2022, https://www.news-medical.net/news/20220427/Research-highlights-importance-of-booster-vaccine-doses-to-protect-against-all-Omicron-variants.aspx.

Taiwan, Cambodia, and Loas. It particularly centered on these recommendations in relation to the SARS-CoV-2 pandemic.

Out of thirteen recommendations and weaknesses identified by ASIAFLUCAP researchers, seven were identified which were applicable to the SARS-CoV-2 pandemic situation and specific enough to analyze. This study unexpectedly showed that there was no clear association between a country's adoption of influenza pandemic policy recommendations and its subsequent situation in the SARS-CoV-2 pandemic. Further research is needed to determine if there is evidence of long-term effects of ASIAFLUCAP implementation, both with the ongoing SARS-CoV-2 pandemic and anticipated future disease outbreaks.

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Appendix:

Honors Research Symposium Presentation, May 21, 2022, Seattle Pacific University

Hi, my name is Rebekah and I am an honors, global development and social justice student at SPU. I want to give a disclaimer before I begin that for the next fifteen minutes I will be talking about policy recommendations and health outcomes directly related to influenza and SARS-CoV-2 (the virus which causes COVID-19), so if that is not something you need in your life right now, please take care of yourself and feel free to step out at any point.

Have you ever wondered what the long-term impact of your actions are? Today, you ended up here, in this room, for any number of reasons -- maybe you care about someone presenting, or wanted to spend some time thinking about tools, or you just chose a group at random because you're required to be here! But for some reason, you are here, and there is a possibility that something said in this room will have a tangible impact on your life.

My honors project stemmed from this wonderment about long-term impact. In the course of my initial research, I stumbled upon ASIAFLUCAP, a research project led by the European Union and Rockefeller Foundation from 2008 to 2011 within six Southeast Asian countries: Vietnam, Indonesia, Thailand, Taiwan, Cambodia, and Laos, which are circled on the map. Taiwan is the upper right corner, the upper left circle contains Vietnam, Thailand, Cambodia, and Laos, and Indonesia circled at the bottom of the image.

ASIAFLUCAP basically wanted to know if these Southeast Asian countries could handle an influenza pandemic, especially since there have been concerns about pandemic-level influenza in the global health world for years. (In fact, there actually was an influenza pandemic during the ASIAFLUCAP study, the 2009 H1N1 pandemic, which affected the six countries

ASIAFLUCAP studied.)

At the close of this project, the researchers left a series of recommendations for the countries to implement in order to better handle future influenza pandemics. I found myself wondering if after all of these years of meetings with various country health officials, pouring research funding into modeling different pandemic scenarios, and writing up reports, what the impact was. Did these recommendations, and the ways they were implemented by governments, have an impact beyond their initial intent? Specifically, have countries that implemented more of these recommendations had better outcomes in our current SARS-CoV-2 pandemic?

The answer I discovered? It's hard to know.

Before I delve into a few specifics of my honors project, I want to discuss a little bit about why this process matters even though the results I found were not what I anticipated, nor were they entirely satisfying to me, especially after I poured so much of my time and energy into this project.

The topic of our panel is Tools Are Inescapable: An Investigation of Value, Intent, and Ethics. When we think about tools, the Cambridge Dictionary offers a helpful definition: "something that helps you to do a particular activity".

In the case of ASIAFLUCAP, governments utilized the researchers' recommendations in order to prepare for future influenza pandemics. I, in turn, decided to apply this tool to the SARS-CoV-2 pandemic, which was risky. The reality of life is that there is risk when you are using tools for non-intended purposes. My research utilized policy recommendations that were made specifically for handling influenza pandemics, and I decided to utilize these recommendations and outcomes as a tool for looking at the SARS-CoV-2 pandemic.

Because influenza and SARS-CoV-2 are not the same thing, we cannot draw hard and fast conclusions, though it might be tempting to. This doesn't mean that what we can find out from the research isn't important. As my faculty advisor, Dr. Ediger, has told me before, apples and oranges aren't the same, but they're both fruit. Similarly, I utilized past research that was designed for influenza specifically, but that doesn't mean that the policies they recommended, which countries later implemented, had no effect on our current situation. Influenza and SARS-CoV-2 are not the same thing, but they are both airborne, highly contagious viruses that have the capacity to overwhelm healthcare systems. They're both fruit, so to speak.

Another reality of working with tools is that you may not have the entire picture available to you when utilizing a tool. There are often disparities between the level of information one party and another have, a phenomenon which economics calls asymmetric information. A personal example of this is as follows. Maybe you can relate!

I was recently tasked with keeping my sister's plant collection alive. She sent me a text to water them every one to two weeks. It was only when one of the plants started to die that I found out it needed to be in direct sunlight and watered on a regular schedule, information which I didn't have prior.

Just like with my sister's plants, I was operating with incomplete information for my research project. Some of the countries that were in the initial ASIAFLUCAP study have very little information accessible surrounding SARS-CoV-2 in their country, especially results in English that have gone through a rigorous peer-review process. As I will discuss later, there is also huge variation in the amounts of governmental transparency for each country. And as someone completing this project remotely in the United States, I couldn't conduct on-the-ground

research to see what was fully going on in any of these places. All of these are limitations that can come up when utilizing tools or attempting research, which can make discerning impact complicated.

From the ASIAFLUCAP study documents, including the study by Hanvoravongchai et al. and the European Union's closing report in 2013, I identified thirteen total recommendations. Of these, there were seven which I ultimately deemed appropriate to utilize for my research. Other recommendations were not analyzed due to their specificity for influenza (such as stockpiling flu antivirals), because they were for the globe at large, rather than individual countries, or were vague and difficult to quantify.

With the remaining seven ASIAFLUCAP recommendations, I looked to see if countries had implemented the policy recommendations in some way, and noted whether or not it was completely implemented or to an extent that was needed if that information was available to me.

The recommendations called on the six Southeast Asian countries to shift away from a reliance on a referral-based hospital system, so that they were utilizing volunteers and had overflow spaces (such as hotels or pop-up shelters) to support the healthcare system during an influenza pandemic.

They also stated that countries needed to integrate their pandemic preparation response into a broader disaster preparation system, a request that was only met by Vietnam in the establishment of their national emergency system in 2013, according to Minh Van Hoang et. al.

The other recommendations included increasing healthcare staff and infrastructure, risk communication, improving equitable distribution and timely access to resources, and increased government transparency.

Overall, the implementation of these policies was extremely varied. When comparing the implementation of them to later outcomes during the SARS-CoV-2 pandemic (through the end of 2021), the results were all over the board.

Indonesia adopted six out of seven recommendations and ended up with the third highest number of COVID-19 cases per million and the highest number deaths per million out of the sample. Thailand adopted five out of seven recommendations and had the highest number of confirmed COVID-19 cases per million in the sample, with the third highest death counts as well. Vietnam implemented all seven recommendations, and as of December 2021, had the second-highest number of COVID-19 cases and deaths per million out of the sample. Cambodia adopted six out of seven recommendations and had the second *lowest* number of cases and third lowest deaths per million, as well as the highest partial and complete vaccination rates. Laos adopted in some capacity three out of seven, with the third *lowest* number of cases and second lowest deaths per million. Taiwan implemented 3 recommendations (out of the four applicable to them), and had the lowest number of cases and deaths per million in the sample.

As these findings show, I found no clear association between a country's adoption of influenza pandemic policy recommendations and its subsequent situation in the SARS-CoV-2 pandemic. Further research is needed to determine if there is evidence of long-term effects of ASIAFLUCAP implementation, both with the ongoing SARSCoV-2 pandemic and anticipated future disease outbreaks.

In the beginning of my research, I anticipated that the ASIAFLUCAP influenza recommendations would benefit countries at large and equip them further for the SARS-CoV-2 pandemic, especially because previous research has illustrated the long-term benefits that result

from strengthening a country's healthcare systems and overall capacity to handle a disease outbreak. While these benefits remain a possibility, they cannot be determined by my findings alone.

This process overall taught me that tools and how we use them can be ambiguous and have unexpected outcomes. As academics and creators, we must be willing to contend with the possibilities that our work could be used in ways it was not initially intended, and remember to consider the long term goals when we think of our work and our lives. We aren't doing this for just ourselves. Others will inevitably be impacted by our engagement with ideas and the world around us.

I still have a lot of curiosity about long term impact, and what it means to use the tools we have to build a better world than the one we're living in right now. This research process has shown me that sometimes there aren't easy answers --- and sometimes you start a process (or a research project) and don't get to see the results you hope for. Maybe someday someone else will take my work and add to it, finding the answers I was looking for. As for me, I am learning to be okay with the ambiguity. Thank you.

Questions for the audience (You are welcome to think about them on your own, or discuss in groups with those around you):

- What tools do you utilize in your day-to-day life?
    - Do you use any in ways that were unintended by the original creators?
    - How does this affect your engagement with the tool, if at all?
- Where in your life do you need more information in order to make better decisions?
- What do you want to be the impact of the tools you create and/or your actions?

Not Just the Flu:

The Impacts of ASIAFLUCAP Influenza Policy Recommendations on Southeast Asia during the SARS-CoV-2 Pandemic

Rebekah Huber

Image Source: ASEAN UP

- What tools do you utilize in your day-to-day life?
    - Do you use any in ways that were unintended by the original creators?
    - How does this affect your engagement with the tool, if at all?
- Where in your life do you need more information in order to make better decisions?
- What do you want to be the impact of the tools you create and/or your actions?