

Wrong Side of the Yangtze River: Did a Map Mistake by the World Health Organization Contribute to Premature Conclusions About SARS2's Origin?

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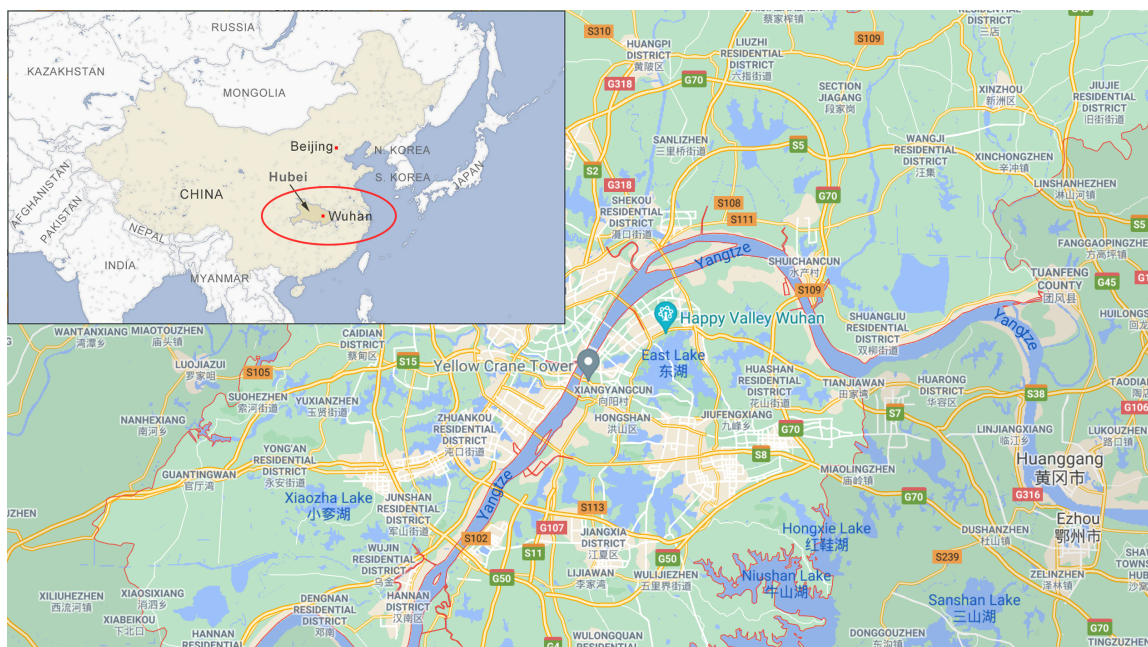


Figure 1: Map of China and Wuhan. Source: Google Maps and Voice of America.

Acknowledgements: While I alone am responsible for any errors in this document, a big thank you to Alina Chan, Billy Bostickson, Brian Reed, Charles Rixey, Daoyu, Dr Quay, Eva Dou, Francisco de Asis, Gilles Demaneuf, Lab Leak, Pathogenetics, Rodolphe de Maistre, Rossana Segreto, the Seaker, and Stuart Neil for information they posted and conversations held about SARS2, the location of Wuhan Institute of Virology campuses, and first COVID-19 patients.

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1 Executive Summary

Did a map mistake about the location of the first published COVID-19 patient contribute to premature conclusions about where SARS2—the virus that causes COVID-19—came from? This report explores that question.

The World Health Organization recently acknowledged that the report it convened to study the origin of SARS2 featured several “unintended errors” about early COVID-19 patients. The errors include where the first published SARS2 patient lived at the time of diagnosis, and this error is apparent in the report’s maps. Subsequent to the error in that report, other researchers appear to have repeated the error in their maps and corresponding analysis.

This raises an intriguing question: did a map mistake in a report published by the World Health Organization cause the authors of that report and other researchers to draw premature conclusions about the origins of SARS-CoV-2?

A specific example of where a premature conclusion appears to have been drawn by researchers who used the erroneous data that appeared in World Health Organization maps is this statement in *The Origins of SARS-CoV-2: A Critical Review*, Holmes et al (2021):

“Examination of the locations of early cases shows that most cluster around the Huanan market, located north of the Yangtze river (Fig. 1a-e)... There is no epidemiological link to any other locality in Wuhan...”

The analysis in the current study proceeds by first providing context about the ongoing debate about the origin of SARS2. That is followed by an analysis of maps from the World Health Organization’s report on the origin of SARS2, as well as publicly available information and investigative reporting by Washington Post reporters about the location and characteristics of the first published COVID-19 patient. The report then reviews a series of heatmaps of COVID-19 infections in Wuhan, where each map uses a different methodology but all show a similar pattern for the progression of COVID-19 through Wuhan’s districts. Finally, this report explores whether erroneous mapping of the first COVID-19 case contributed to premature conclusions about the origin of SARS2 and concludes by discussing research and public policy implications.

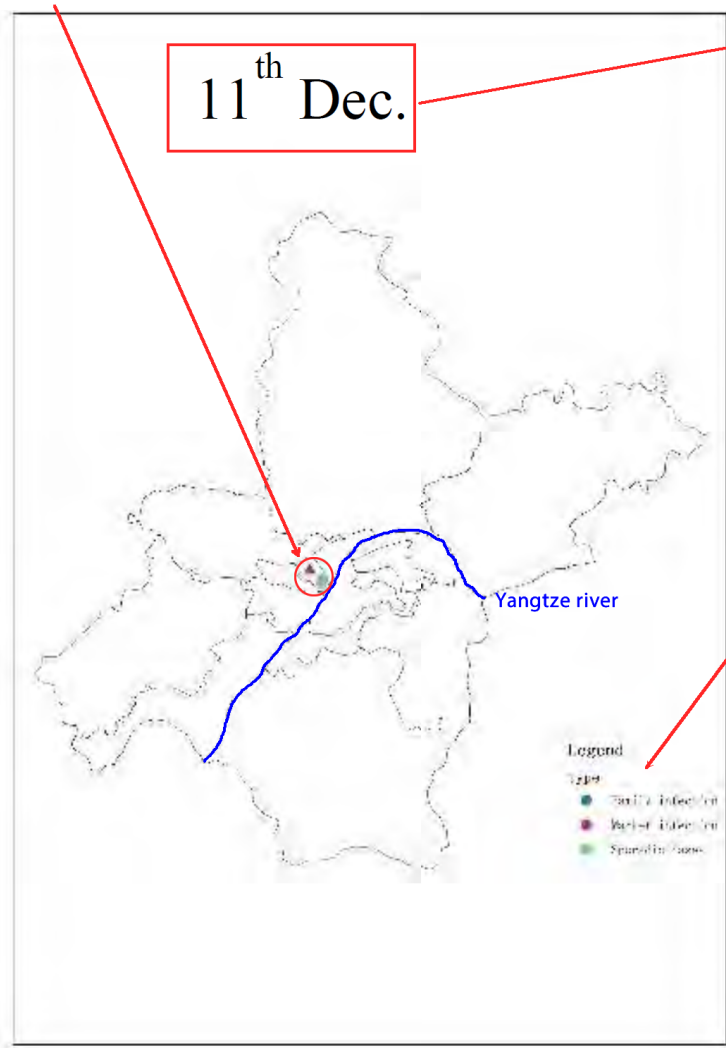


Important Note: We do not know who the first COVID-19 victim is. As the Wall Street Journal reported on Feb. 12, 2021, “Chinese authorities refused to provide World Health Organization investigators with raw, personalized data on early Covid-19 cases that could help them determine how and when the coronavirus first began to spread in China, according to WHO investigators who described heated exchanges over the lack of detail.”

This study therefore assesses what we know: details about the first *published* COVID-19 patient. That is sufficient to highlight deficiencies in the World Health Organization-convened report into the origin of SARS2 and subsequent research that relies on those deficiencies, but it cannot be conclusive evidence about SARS2’s origin.

Error:

First published COVID-19 patient, one of these two markers, is incorrectly located on the west side of the Yangtze river in this map. The correct location is Wuchang district on the east side of the river.



Inconsistent:

The map description ("The first stage of onset: 8-11 December 2019, cases were sporadic.") indicates that this map shows the first two published COVID-19 cases, from Dec 8, 2019 and Dec 11, 2019. The map itself contains two data markers.

However, this label, stating only "11th Dec" seems to indicate just one of the initial cases. This label is therefore inconsistent with the map's contents and description.

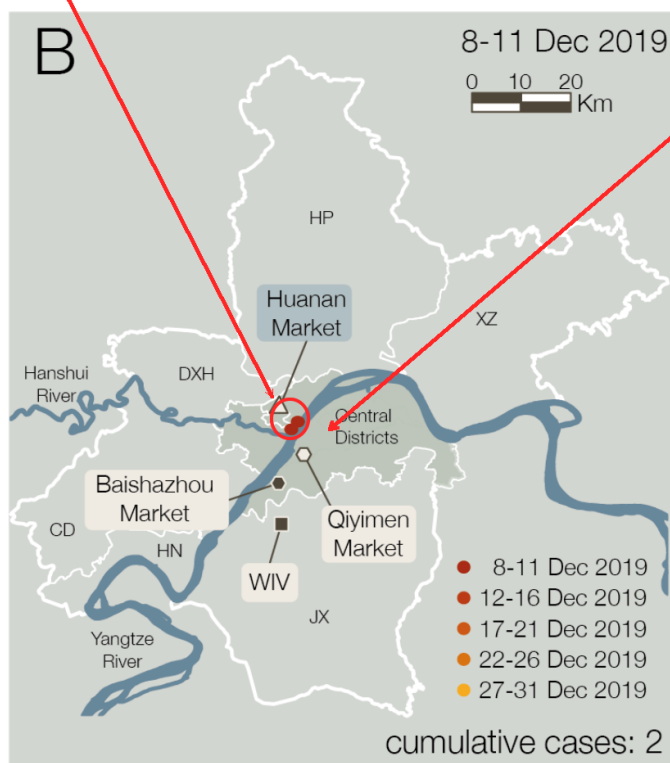
Deficient:

The map's resolution is so poor that the legend is unreadable

Figure 2: An error, an inconsistency, and a deficiency in the World Health Organization's Map of the First Two Published COVID-19 Cases in Wuhan, occurring Dec 8, 2019 and Dec 11, 2019. Source: WHO (2021): WHO-convened Global Study of Origins of SARS-CoV-2: China Part, Annexes page 156.

Error:

Dot that represents the first published COVID-19 patient is incorrectly located on the west side of the Yangtze river. The correct location is Wuchang district on the east side of river.



Omission:

The Wuhan Institute of Virology's headquarters in Wuchang district, on the east side of the river, is missing from this map.

The Wuhan Institute of Virology's headquarters has a bio-safety level 3 lab (BSL-3). COVID-19 pathogens are analyzed in this lab today according to Guan Wuxiang, the deputy director general of the Wuhan Institute of Virology.

Coronavirus research prior to the SARS2 pandemic took place in BSL-3 labs according to Shi Zhengli, head of a team that specializes in coronavirus research at the Wuhan Institute of Virology, and Peter Daszak, a close collaborator with the Wuhan Institute of Virology.

Figure 3: An Error and Omission in Holmes et al's Map of the First Two Published COVID-19 Cases in Wuhan, occurring Dec 8, 2019 and Dec 11, 2019. Source: Homes et al (2021): The Origins of SARS-CoV-2: A Critical Review

2 Glossaries

2.1 Glossary of Terms

These terms are used throughout this document:



- **BSL-2 lab:** Bio-safety level 2 lab (similar to protections in a dentist’s practice)
- **BSL-3 lab:** Bio-safety level 3 lab
- **BSL-4 lab:** Bio-safety level 4 lab (highest security level for the most dangerous pathogens, complete with inflated biohazard suits and breathing tubes)
- **Coronavirus:** pathogens that have “crown-like” projections on the pathogen’s surface. They are commonly found in bats. SARS1, which emerged in China in 2002/3 and SARS2, which emerged in China in 2019, are both coronaviruses.
- **SARS1:** Short for SARS-CoV-1, the SARS coronavirus that broke into the human population in Guangzhou, a city in China, in 2002/3.
- **SARS2:** Short for SARS-CoV-2, the SARS coronavirus that broke into the human population in Wuhan, a city in China, in 2019.
- **Heatmap:** a map that uses color gradients to present low and high values to the reader
- **Lab leak/lab incident:** when an infectious disease emerges in a human because of a mistake made by laboratory researchers.
- **TWiV:** This Week in Virology is a science podcast hosted by Vincent Racaniello
- **Wuchang district:** one of 13 districts in Wuhan, containing about 10% of Wuhan’s population.
- **Wuhan:** the city that experienced the SARS2 outbreak in China, which then spread to the rest of the world.
- **Wuhan Institute of Virology:** a collection of several laboratories and office buildings in Wuhan where scientists conduct research on the world’s largest collection of bat coronaviruses.
- **Wuhan Institute of Virology’s headquarters:** a lab and administrative building located in Wuchang district. The laboratory is BSL-3, and researchers currently conduct research on COVID-19 pathogens there.
- **Yangtze river:** the river that divides Wuhan into roughly two parts, one on the west side and the other on the east side. All Wuhan Institute of Virology buildings are on the east side of the Yangtze river.
- **Zoonosis:** when an infection disease jumps from a wild animal to a human.

2.2 Glossary of Individuals

The following people and statements by them are featured in this document:



- **Guan Wuxiang:** Deputy Director General of the Wuhan Institute of Virology in Wuhan.
- **Kristian Andersen:** Professor in the Department of Immunology and Microbiology at the Scripps Research Institute.
- **Peter Daszak:** President of the EcoHealth Alliance and zoologist. A close collaborator and funder of the Wuhan Institute of Virology.
- **Ralph Baric:** Professor at the Department of Microbiology and Immunology at the The University of North Carolina, Chapel Hill. Baric has been a close collaborator of Shi Zhengli's at the Wuhan Institute of Virology.
- **Robert Garry:** Professor of virology at the University of Texas at Austin.
- **Shi Zhengli:** Head of a team that specializes in coronavirus research at the Wuhan Institute of Virology, and a virologist.

3 Introduction

This report explores the following question: did a map mistake about the location of the first published COVID-19 patient contribute to premature conclusions about SARS2’s origin?

The World Health Organization’s recent report about the origin of SARS-CoV-2 (or SARS2) said that the first published COVID-19 patient lived on the west side of the Yangtze River, in the district where the Huanan Seafood Market is located. This is now understood to be incorrect.

In fact, the first published COVID-19 patient lived on the east side of the river, in Wuchang district. This district happens to be the location of the Wuhan Institute of Virology’s headquarters and bio-safety level 3 lab (BSL-3). This lab is currently analysing COVID-19 pathogens, according to the Deputy Director General of the Wuhan Institute of Virology, Guan Wuxiang. The head of a team that researches bat coronaviruses, Shi Zhengli, has confirmed that coronavirus research has previously and continues to take place in BSL-3 labs.

There are several striking facts about the prevalence of COVID-19 in Wuchang. In addition to being the home of the first published COVID-19 case, multiple independent geospatial analyses showed that Wuchang district had more intense clustering of COVID-19 cases than all of the other 13 districts in Wuhan. Wuchang also had a disproportionate number of cases relative to its population: despite accounting for 10% of Wuhan’s population, Wuchang accounted for 15% of Wuhan’s COVID-19 cases according to the Wuhan Municipal Health Commission. Finally, Wuchang district had the most total COVID-19 cases of all districts in Wuhan.

With these facts in mind, this report will explore whether improperly mapping the home address of the first published COVID-19 patient might have contributed to the authors of the World Health Organization’s report and other studies to make premature conclusions about the origin of SARS2. As a prelude to that, this study next discusses background details about the ongoing debate and investigation into SARS2’s origin.

3.1 SARS2’s Origin is Important

The origin of SARS-CoV-2 is important. Right now, we don’t know where the virus came from. There are two widely acknowledged possibilities, neither of which has been proven nor falsified. Either the virus leapt from a wild animal to a person (zoonosis) or the virus infected a person as a result of a lab-related incident.

Which of those actually happened – when we learn the answer – will influence how we respond to the current pandemic and prevent future pandemics. Finding the answer is therefore a high priority for governments, scientists, journalists, and the public.

3.2 Early and Continuing Controversy Over Lab Leak Hypothesis

In the earliest days of the pandemic, several prominent scientists criticized people for conspiracy theorizing if they wondered if a lab-related incident was the source of SARS2. In one now infamous example, in a letter published in the British medical journal *The Lancet*, several scientists stated, “We stand together to strongly condemn conspiracy theories suggesting that COVID-19 does not have a natural origin.”¹

This letter subsequently came under criticism because Peter Daszak, the president of the Eco-Health Alliance and close collaborator with scientists at the Wuhan Institute of Virology, seemingly

¹Charles Calisher et al, “Statement in support of the scientists, public health professionals, and medical professionals of China combatting COVID-19”, *The Lancet*, February 19, 2020, [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30418-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30418-9/fulltext)

hid his involvement in the letter’s creation. Even though seven of the 27 signatories of the letter were affiliated with EcoHealth Alliance², Daszak asked colleagues to sign it while saying the letter “will not have EcoHealth Alliance logo on it and will not be identifiable as coming from any one organization or person, the idea is to have this as a community supporting our colleagues.”³ In other words, Peter Daszak wanted to create the appearance—but not the reality—of a “grassroots” outpouring of support for the natural origin hypothesis. Of this episode, Katherine Eban, a journalist wrote:⁴

“It soon emerged, based on emails obtained by a Freedom of Information group called U.S. Right to Know, that Daszak had not only signed but organized the influential Lancet statement, with the intention of concealing his role and creating the impression of scientific unanimity.”

3.3 Shifting Opinions About the Likelihood of Zoonosis vs Lab Leak

For much of 2020 and part of 2021, the hypothesis that SARS2 emerged from a wild animal was – or at least was widely believed to be – the consensus view among journalists, scientists, and governments. That was thanks in part to the strongly worded letter published by the Lancet, which some say had a chilling effect on debate. To quote Katherine Eban again:

“The Lancet statement effectively ended the debate over COVID-19’s origins before it began. To Gilles Demaneuf, following along from the sidelines, it was as if it had been ‘nailed to the church doors,’ establishing the natural origin theory as orthodoxy. ‘Everyone had to follow it. Everyone was intimidated. That set the tone.’ ”

and:

“In one State Department meeting, officials seeking to demand transparency from the Chinese government say they were explicitly told by colleagues not to explore the Wuhan Institute of Virology’s gain-of-function research, because it would bring unwelcome attention to U.S. government funding of it.”

However, scientific, government, and public opinions have recently undergone significant shifts. This is likely because after nearly two years of strenuous search, none of the evidence for natural emergence that was found for SARS1, and that prominent virologists predicted would be found, have been found (this is discussed in more detail in the next section).

Among scientists, many have subsequently called for an investigation into the Wuhan Institute of Virology’s laboratories. In May 2021, for example, several scientists including one that was a close collaborator with the Wuhan Institute of Virology, Ralph Baric, stated, “We must take hypotheses about both natural and laboratory spillovers seriously until we have sufficient data.”⁵

²Alexander Moranos, *Twitter*, June 7, 2021, <https://twitter.com/alexandrosM/status/1401813071635501056>

³Peter Daszak email sent February 6, 2020,

https://usrtk.org/wp-content/uploads/2020/11/The_Lancet_Emails_Daszak-2.6.20.pdf

⁴Katherine Eban, “The Lab-Leak Theory: Inside the Fight to Uncover COVID-19’s Origins”, *Vanity Fair*, June 3, 2021, <https://www.vanityfair.com/news/2021/06/the-lab-leak-theory-inside-the-fight-to-uncover-covid-19s-origins>

⁵Jesse Bloom et al, “Investigate the origins of COVID-19”, *Science Magazine*, May 14, 2021, <https://science.sciencemag.org/content/372/6543/694.1>

In government, senior Biden administration officials “now believe the theory that the virus accidentally escaped from a lab in Wuhan is at least as credible as the possibility that it emerged naturally in the wild – a dramatic shift from a year ago, when Democrats publicly downplayed the so-called lab leak theory.”⁶

Among the American public, the majority of people now believes that SARS2 leaked from a lab in China. A July 2021 poll by Politico and Harvard found that “U.S. adults were almost twice as likely to say the virus was the result of a lab leak in China than human contact with an infected animal, which many scientists believe is the most likely scenario.” The poll found that 52 percent of Americans think SARS2 came from a lab, up from 29 percent in March 2021.⁷

3.4 Opinions May be Shifting Due to Lack of Evidence for Natural Emergence of SARS2, Despite Optimistic Predictions and Strenuous Searching

While the Chinese government has looked hard for evidence of the natural emergence of SARS2, none has been found. At the same time, optimistic predictions by virologists have failed to materialize. These may be contributing to a shift in opinion among scientists, government officials, journalists, and the public has seen recent shifts.

3.5 No Pre-Pandemic Antibodies to SARS2 Found

One of the more compelling reasons we have to believe that SARS1 emerged naturally is that there is evidence that animal traders who were not diagnosed with SARS1 during the SARS1 epidemic nevertheless had antibodies to SARS1.⁸ That suggests they had been infected at some previous date, and therefore that SARS1 was circulating among wild animals and periodically infecting humans.

It is striking that no similar evidence has been found for SARS2. If researchers were to find antibodies to SARS2 in blood bank samples taken before the start of the SARS2 pandemic, that would give substantial credence to the possibility that SARS2 was circulating among wild animals and perhaps periodically broke into the human population. No such antibodies from blood bank samples have been found (or if they have, the findings have not been published).

In contrast, for one to posit a natural emergence of SARS2 without evidence of pre-pandemic antibodies, one must assume that SARS2 was introduced just once, that introduction happened in downtown Wuhan due to interaction between a human and a wild animal, and that single introduction sparked the pandemic. While not impossible, this is a challenging set of conditions for the zoonotic hypothesis to meet.

3.6 No Intermediate Animal Host for SARS2 Found

A second compelling reason to believe that SARS2 emerged naturally is that civet cats were determined to be the likely intermediary host that infected humans within a few months of SARS1’s outbreak.

⁶Natasha Bertrand, “Senior Biden officials finding that Covid lab leak theory as credible as natural origins explanation”, *CNN*, July 16, 2021, <https://edition.cnn.com/2021/07/16/politics/biden-intel-review-covid-origins/index.html>

⁷Alice Ollstein, “POLITICO-Harvard poll: Most Americans believe Covid leaked from lab”, *Politico*, July 9, 2021, <https://www.politico.com/news/2021/07/09/poll-covid-wuhan-lab-leak-498847>

⁸CDC, “Prevalence of IgG Antibody to SARS-Associated Coronavirus in Animal Traders — Guangdong Province, China, 2003”, *Morbidity and Mortality Weekly Report*, October 17, 2003, <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5241a2.htm>

This may have contributed to Kristian Andersen, a virologist, predicting on January 30, 2020 that Chinese scientists could find the intermediate host of SARS2 “within a month”. Yet, in two years of searching, no such intermediate host has been identified. If SARS2 emerged in a similar manner to SARS1, it is surprising that an intermediate host has not yet been found.

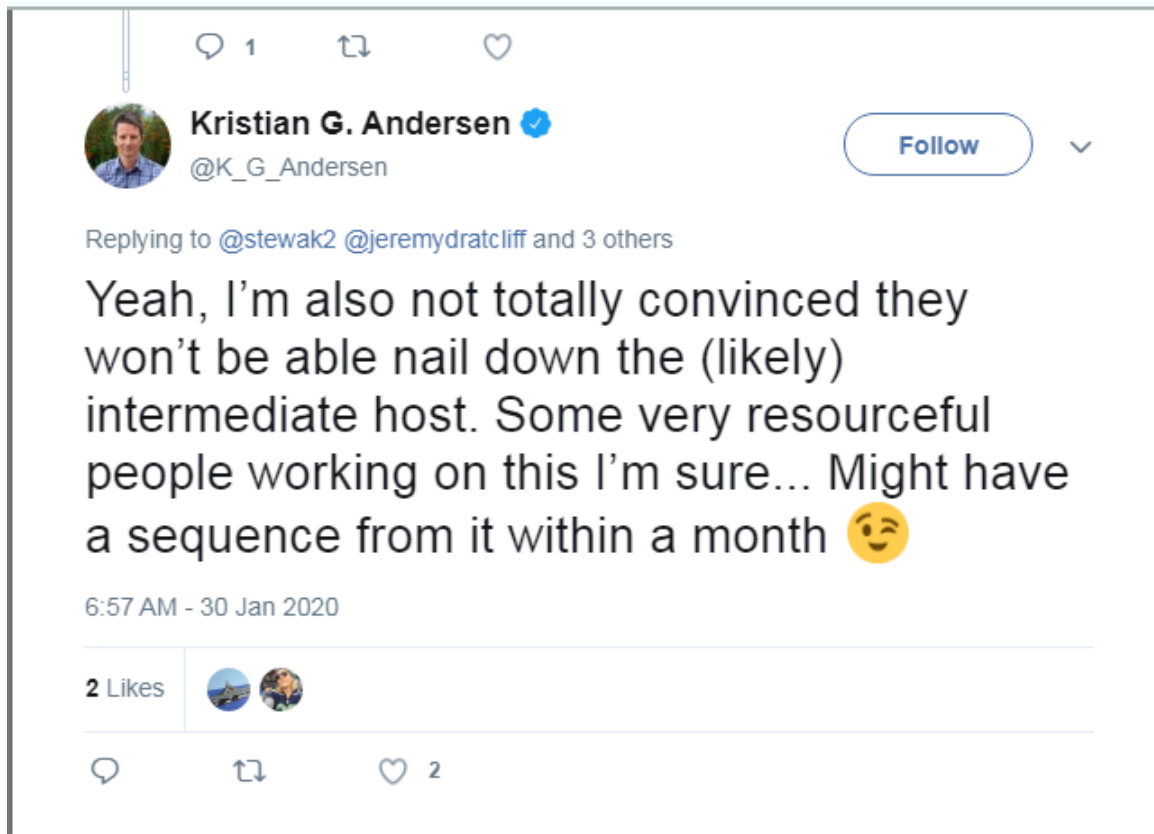


Figure 4: Prediction in January 2020 by Kristian Andersen, a virologist, that an intermediate host animal would be found shortly

We know that the search is ongoing, but so far without success. Robert Garry, also a virologist, said in a May 30, 2021 interview:

“I mean, there are people who are still in contact with our colleagues in China that I’m in contact with and they say, yeah they’re doing it, they’re intensely looking for the, uh, viruses in animals and other things like that. I think they’ll find it.”



Figure 5: Robert Garry (bottom right) discussed SARS2's origin on This Week in Virology (TWiV), May 30, 2021

4 Map Mistake: The First Published COVID-19 Patient Didn't Live in the Same District – or Even on the Same Side of the River – as the Huanan Seafood Market

The World Health Organization's recent report on SARS2's origins contains several maps about the first published COVID-19 patients.⁹ These maps feature important errors and other deficiencies.

The first map in the 'Spatial distribution' section of the Annex features two visible dots on the west side of the Yangtze river, in Jiangnan district. The description above refers to this map as "The first stage of onset: 8-11 December 2019, cases were sporadic". The two dots and the description suggest that the map includes the two first published cases, one who fell ill on December 8, 2019 and another who fell ill on December 11, 2019.

However, investigative reporting by Eva Dou and Emily Rauhala of the Washington Post showed that the World Health Organization's map erroneously indicated that the first patient lived in Jiangnan district, on the west side of the Yangtze river.¹⁰ In reality, the first patient lived in Wuchang district, which is on the east side of the river.¹¹

The map in the World Health Organization report's Annex also contains a number of other deficiencies. First, the resolution of the maps is remarkably poor, even in the original PDF Annex document. It can best be described as looking like a photocopy of a photocopy. As a result, the legend is too pixelated to read at any level of zoom. It is not possible to discern a third dot on the map even though the legend seems to imply that one may be present. In addition, the label on the map says "11th Dec", although the description above refers to "8-11 December 2019" cases and the map shows two dots.

The erroneous and otherwise deficient maps in the report the World Health Organization convened may have contributed to others making similar errors. For example, a recent paper by several prominent virologists maps the first two published COVID-19 patients' home addresses, placing both the December 8, 2019 and December 11, 2019 patients in Jiangnan district on the west side of the Yangtze river.¹² This is incorrect, because the December 8, 2019 case's home address was in Wuchang district, on the east side of the river.

The authors' error may have induced or contributed to a further omission in their map, which is the location of the Wuhan Institute of Virology's headquarters in Wuchang district. Perhaps the Wuchang campus of the Wuhan Institute of Virology seemed an unimportant detail to the authors because their map failed to place the first published COVID-19 patient's residence in Wuchang district. Their paper is still in the review stage, so perhaps this omission will be corrected prior to publication.

⁹World Health Organization, WHO-convened global study of origins of SARS-CoV-2: China Part", Annex, March 30, 2021, <https://www.who.int/publications/i/item/who-convened-global-study-of-origins-of-sars-cov-2-china-part>

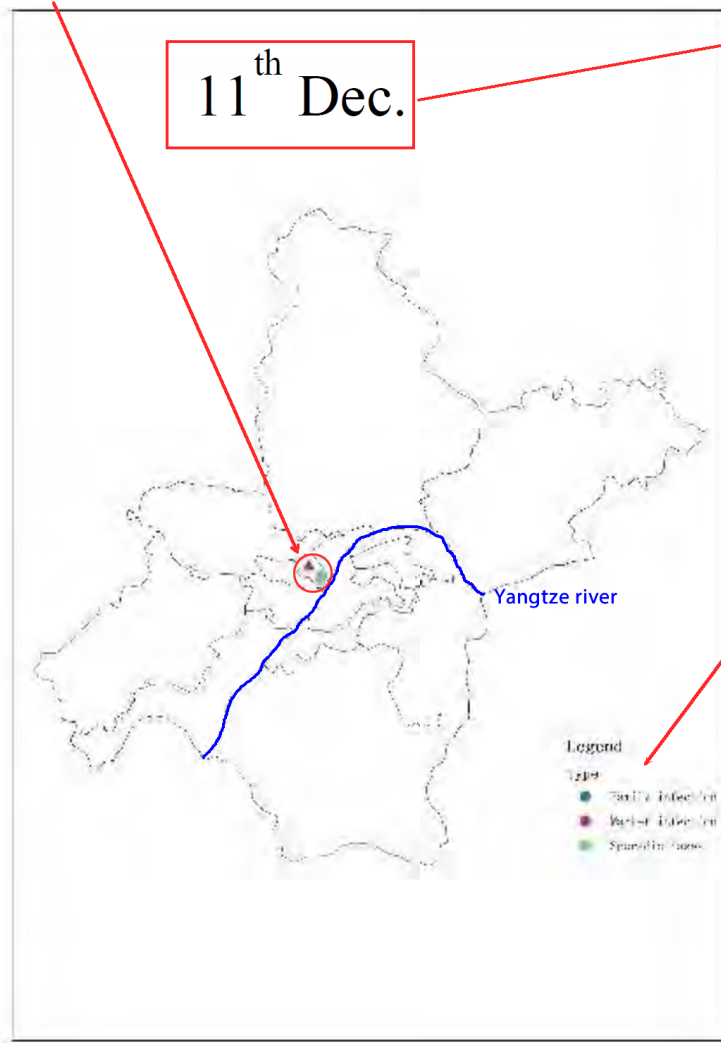
¹⁰Eva Dou and Emily Rauhala, "WHO clarifies details of early covid patients in Wuhan after errors in virus report", *Washington Post*, July 15, 2021, https://www.washingtonpost.com/world/asia_pacific/covid-wuhan-outbreak-who/2021/07/15/51e7e8a6-e2c6-11eb-88c5-4fd6382c47cb_story.html

¹¹The first published patient recovered and was discharged, so the past tense, 'lived' refers here to the patient's residence at the time of the illness rather than indicating that he died from COVID-19.

¹²Edward Holmes et al., "The Origins of SARS-CoV-2: A Critical Review", *Zenodo*, Jul 7, 2021, <https://doi.org/10.5281/zenodo.5112546>

Error:

First published COVID-19 patient, one of these two markers, is incorrectly located on the west side of the Yangtze river in this map. The correct location is Wuchang district on the east side of the river.



Inconsistent:

The map description ("The first stage of onset: 8-11 December 2019, cases were sporadic.") indicates that this map shows the first two published COVID-19 cases, from Dec 8, 2019 and Dec 11, 2019. The map itself contains two data markers.

However, this label, stating only "11th Dec" seems to indicate just one of the initial cases. This label is therefore inconsistent with the map's contents and description.

Deficient:

The map's resolution is so poor that the legend is unreadable

Figure 6: Maps of the Earliest COVID-19 patients, as presented in the Annexes of the "WHO-convened global study of origins of SARS-CoV-2: China Part" report. (These contain known errors.)

Error:

Dot that represents the first published COVID-19 patient is incorrectly located on the west side of the Yangtze river. The correct location is Wuchang district on the east side of river.



Omission:

The Wuhan Institute of Virology's headquarters in Wuchang district, on the east side of the river, is missing from this map.

The Wuhan Institute of Virology's headquarters has a bio-safety level 3 lab (BSL-3). COVID-19 pathogens are analyzed in this lab today according to Guan Wuxiang, the deputy director general of the Wuhan Institute of Virology.

Coronavirus research prior to the SARS2 pandemic took place in BSL-3 labs according to Shi Zhengli, head of a team that specializes in coronavirus research at the Wuhan Institute of Virology, and Peter Daszak, a close collaborator with the Wuhan Institute of Virology.

Figure 7: Map in a recent academic article (Holmes et al) that shows an incorrect home address for the first published COVID-19 case

5 Map Facts: What We Know About the First Published SARS2 Patient, Early COVID-19 Clusters, and the Headquarters of the Wuhan Institute of Virology

This section explores several facts: the first published COVID-19 patient lived in Wuchang district which is the same district as the location of the Wuhan Institute of Virology’s headquarters; the Wuhan Institute of Virology’s Wuchang headquarters has a BSL-3 lab and we know coronavirus research is done in BSL-3 labs and COVID-19 pathogen research is done in this lab specifically; and most independent geospatial analyses have found that the earliest clusters of COVID-19 cases were in Wuchang district.

5.1 The First Published COVID-19 Patient Lived In the District that Also Contains the Wuhan Institute of Virology’s Headquarters

The first COVID-19 victim may harbor clues about the origin of the virus. For that reason, there is widespread interest in identifying the characteristics of that person, including his or her name, occupation, location, and manner of infection.

Unfortunately, as the journalists at the Wall Street Journal noted, “Chinese authorities refused to provide World Health Organization investigators with raw, personalized data on early Covid-19 cases that could help them determine how and when the coronavirus first began to spread in China, according to WHO investigators who described heated exchanges over the lack of detail.”¹³

Yet, we do know a number of things about the first published COVID-19 victim, and in this section we explore those details. On February 26, 2021, the Wuhan Municipal Party Committee and Municipal Government said that “the earliest new coronary pneumonia patient registered in Wuhan was [surnamed] Chen”.¹⁴ He became ill on December 8, 2019, and later recovered and was discharged.

Intriguingly, the patient lived in Wuchang district, which contradicts information provided in the World Health Organization’s recent report on SARS2’s origin.¹⁵ Investigative reporting by Eva Dou and Emily Rauhala of the Washington Post showed that the World Health Organization erroneously indicated that Chen lived in Jiangnan district. That is the district that is home to the Huanan Seafood Market, which was initially believed by the Chinese government to be the source of the SARS2 outbreak, but is no longer thought to be so because COVID-19 cases that appeared earlier than cases connected to the market were unconnected to the market.

5.2 The First Published COVID-19 Patient Grocery Shopped at the Modern RT-Mart, and Didn’t Visit the Huanan Seafood Market

Chen is one of those early cases that was unconnected to the Huanan Seafood Market. Chen preferred to shop for groceries at the RT-Mart near his home in Wuchang, and he “denied having been to the

¹³Jeremy Page, “China Refuses to Give WHO Raw Data on Early Covid-19 Cases”, *Wall Street Journal*, Feb. 12, 2021, <https://www.wsj.com/articles/china-refuses-to-give-who-raw-data-on-early-covid-19-cases-11613150580>

¹⁴China News Network, “Details of the earliest new coronary pneumonia patient in Wuhan: Onset on December 8, 2019, denied having been to the South China Seafood Market”, February 26, 2020, *China News Network*, <https://web.archive.org/web/20200226112155/http://www.chinanews.com/sh/2020/02-26/9105420.shtml>

¹⁵World Health Organization, WHO-convened global study of origins of SARS-CoV-2: China Part”, *World Health Organization*, March 30, 2021, <https://www.who.int/publications/i/item/who-convened-global-study-of-origins-of-sars-cov-2-china-part>



Details of the earliest new coronary pneumonia patient in Wuhan: Onset on December 8, 2019, denied having been to the South China Seafood Market

February 26, 2020 16:49 Source: China News Network [participating in the interaction](#)

Chinanews Client, February 26 (Li Jinlei) On the 26th, "Wuhan Release" certified as the "Official Account of Wuhan Municipal Party Committee and Municipal Government" issued a micro-headline stating that the medical treatment team of Wuhan New Coronary Pneumonia Prevention and Control Headquarters responded : According to the query information system, the earliest new coronary pneumonia patient registered in Wuhan was Chen. The onset time was December 8, 2019. He recovered and was discharged after treatment by the hospital. The patient lives in a community in Wuchang and denied having been to the South China Seafood Market.



Figure 8: China News Article from February 26, 2020, which Reported on the Announcement by the Wuhan Municipal Party Committee and Municipal Government that the First Published COVID-19 Patient Lived in Wuchang District. Source: China News Network via Eva Dou: <https://twitter.com/evadou/status/1412949075335413762>

South China Seafood Market”, according to the Wuhan Municipal Party Committee and Municipal Government. This detail matters, because RT-Mart is a modern supermarket chain that is similar to Walmart or Tesco or Carrefour. While the Huanan Seafood Market may have fit the narrative of an outbreak of infectious disease amidst chaotic market stalls where live animals were sold, it is harder to imagine the tidy isles of RT-Mart being the source of anything particularly dangerous.



Figure 9: RT-Mart, where the first published COVID-19 patient preferred to shop, is an upscale supermarket chain. Source: Google Images.

As a result of the questions posed by Eva Dou and Emily Rauhala of the Washington Post, the World Health Organization has since clarified that it will “fix several ‘unintended errors’ in a joint report with China on the origins of the coronavirus crisis and will look into other possible discrepancies.”

Fact	Wuhan government (Municipal Party Committee)	WHO	Washington Post	Caixin
Surnamed Chen	✓		✓	✓
Lived in Wuchang	✓		✓	✓
Dec 8, 2019 onset of COVID-19	✓	✓	✓	
Shopped at RT-Mart		✓	✓	
Didn't shop at Huanan seafood market	✓	✓	✓	✓
Occupation: accountant/office worker		✓	✓	✓

Figure 10: Details reported about the first published COVID-19 patient are fairly consistent across multiple, independent sources

5.3 The Wuhan Institute of Virology's Headquarters is in Wuchang District, Where the First Published COVID-19 Case Lived

The Wuhan Institute of Virology's headquarters is in Wuchang district (known as the Xiaohongshan campus). The Wuhan Institute of Virology has several other campuses, all on the east side of the Yangtze river.

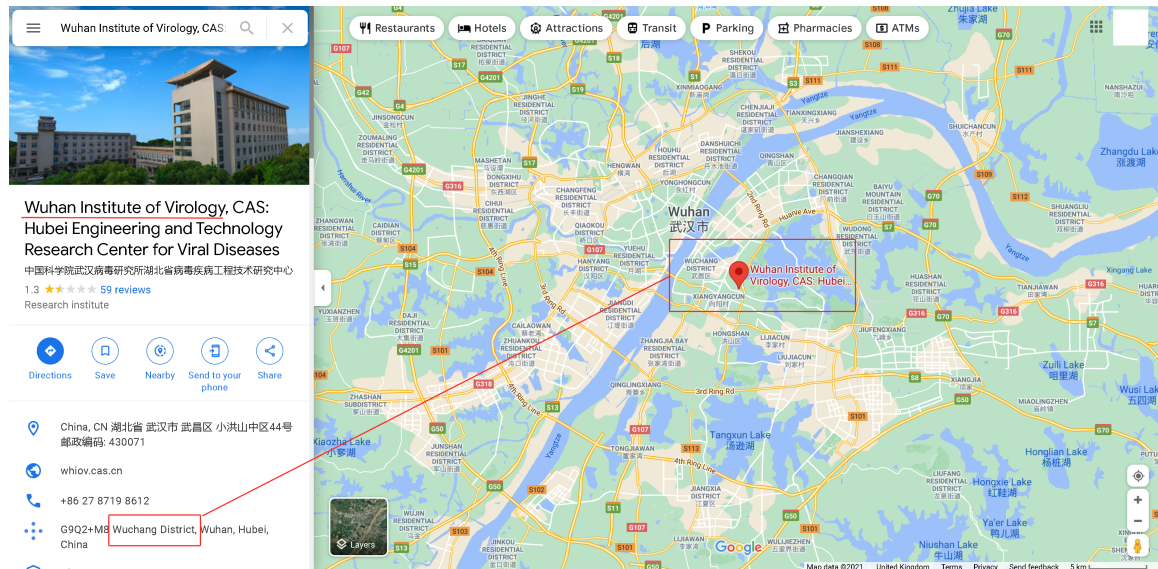


Figure 11: Wuhan Institute of Virology's headquarters in Wuchang (Xiaohongshan campus), which contains BSL-3 labs where they are currently studying COVID-19 pathogens. Source: Google Maps.

The Wuhan Institute of Virology's headquarters features a bio-safety level 3 (BSL-3) lab. This lab is currently being used to analyse COVID-19 pathogens.¹⁶ Several sources have indicated that coronavirus research was done in BSL-3 labs.

For example, Shi Zhengli, who leads a group of researchers who study bat coronaviruses at the Wuhan Institute of Virology, said in a recent interview with Science Magazine, "The coronavirus research in our laboratory is conducted in BSL-2 or BSL-3 laboratories."

Peter Daszak, a close collaborator and funder of the Wuhan Institute of Virology through his EcoHealth Alliance organization agreed. He said that, "SARSr-CoVs are not BSL-4 pathogens. BSL-3 is used for most, BSL-2 in many labs, and BSL-2 for clinical samples even of COVID-19 right now."

¹⁶BioSpace, "The Wuhan Institute of Virology's vital role in fighting COVID-19", May 18, 2020, <https://bit.ly/3iYCx0P> and Science Magazine, "Reply to Science Magazine", an interview with Shi Zhengli, December 6, 2020, <https://bit.ly/3l7zSEL>



Peter Daszak

@PeterDaszak



Replying to [@mjd1735](#) [@alandove](#) and 3 others

It's because SARSr-CoVs are not BSL-4 pathogens. BSL-3 is used for most, BSL-2 in many labs, and BSL-2 for clinical samples even of COVID-19 right now. [cdc.gov/sars/guidance/...](https://www.cdc.gov/sars/guidance/)

16:28 · 29 May 20 · [Twitter Web App](#)

1 Like

Figure 12: Twitter conversation where Peter Daszak, close collaborator with the Wuhan Institute of Virology, confirms that coronavirus work is done in BSL-2 and BSL-3 labs.

5.4 Geospatial Analyses Show that the Most Total Cases of COVID-19 and the Earliest COVID-19 Clusters were in Wuchang District, Where the Headquarters of the Wuhan Institute of Virology is Located

The most total COVID-19 cases among all districts in Wuhan were recorded in Wuchang district as of June 11, 2020, according to the Wuhan Municipal Commission of Health.¹⁷

Wuchang district also had a disproportionately high number relative to its population. While Wuchang district accounted for 10% of Wuhan's population, the district was the source of an outsized 15% of Wuhan's Covid-19 infections according to the Wuhan Municipal Health Commission.¹⁸

Table 1. Case statistics of Wuhan. (As of June 11th, 2020 source: Wuhan Municipal Commission of Health).

Districts	Cumulative Confirmed Case	Proportion
Jiang'an (MUA)	6563	13.037%
Jiangnan(MUA)	5242	10.413%
Qiaokou(MUA)	6854	13.616%
Hanyang(MUA)	4691	9.319%
Wuchang(MUA)	7551	15.000%
Qingshan(MUA)	2804	5.570%
Hongshan(MUA)	4718	9.372%
Dongxihu	2478	4.923%
Caidian	1424	2.829%
Jiangxia	860	1.708%
Huangpi	2117	4.205%
Xinzhou	1071	2.128%
East Lake Ecotourism Scenic District	483	0.959%
East Lake High-Tech Development District	2173	4.317%
Wuhan Economic Technological Development District	1088	2.161%
Other places	223	0.443%
Total	50340	100.00%

Figure 13: Total COVID-19 cases by district in Wuhan, June 11, 2020. Source: "Exploring Urban Spatial Features of COVID-19 Transmission in Wuhan Based on Social Media Data"

Multiple, independent data sources and a range of different methods are unanimous in demonstrating that Wuchang district was the location with the earliest clusters of COVID-19 cases. A comprehensive example of this comes from a study of 49,973 laboratory confirmed cases¹⁹. The cases include **the very first published case on Dec 8, 2019** to cases on Mar 18, 2020. These cases showed that Wuchang district was the source of the earliest COVID-19 infection clusters.

¹⁷Zhenghong Peng et al., "Exploring Urban Spatial Features of COVID-19 Transmission in Wuhan Based on Social Media Data", June 19, 2020, *International Journal of Geo-Information*, <https://www.mdpi.com/2220-9964/9/6/402>

¹⁸Wei-Ying Li et al., "Wuhan's experience in curbing the spread of coronavirus disease (COVID-19)", *International Health*, July 4, 2021, <https://academic.oup.com/inthealth/advance-article/doi/10.1093/inthealth/ihaa079/5923672?login=true>

¹⁹The authors note, "A laboratory confirmed case was defined if a patient had clinical feature (fever, respiratory symptom, etc), a clear epidemiological history and a positive test of SARS-CoV-2 virus or high-throughput sequencing of nasal and pharyngeal swab specimens."

Wuchang district had 7,484 confirmed cases over this period, or 15% of the total in Wuhan. Note that the percentage is the same as that reported by the Wuhan Municipal Commission of Health, and the total figure is virtually the same, both of which are good data cross-checks that bolster the comprehensiveness of this study.

In another approach, Du et al (2020) used the ratio of COVID-19 infections to influenza infections from retrospective testing data to estimate the number of symptomatic COVID-19 infections by district in Wuhan between December 30, 2019 and January 12, 2020. The authors estimated that Wuchang had the highest number of infections (177) during that time period.²⁰

Using a very modern methodology, another study gathered requests for COVID-19 help that were made on the Weibo social media app. Using that data, Peng et al (2020) showed that between December 20, 2019 and January 18, 2020, most help requests came from people located in Wuchang district.²¹

Finally, a study that used nucleic acid screening in nearly ten million residents in Wuhan, conducted by Cao et al (2020), to assess asymptomatic COVID-19 cases between May 14, 2020 and June 1, 2020 estimated that Wuchang had the highest prevalence of asymptomatic cases. The study estimated that about 8 out of every 100,000 residents in Wuchang had an asymptomatic COVID-19 infection. That is nearly 1.5 times the rate of asymptomatic infection detected Qingshan (5.6 infections per 100,000 residents) and Qiaokou (also 5.5 infections per 100,000 residents).

²⁰Zhanwei Du, "Using the COVID-19 to influenza ratio to estimate early pandemic spread in Wuhan, China and Seattle, US", July 14, 2020, [https://www.thelancet.com/pdfs/journals/ecclinm/PIIS2589-5370\(20\)30223-6.pdf](https://www.thelancet.com/pdfs/journals/ecclinm/PIIS2589-5370(20)30223-6.pdf)

²¹Zhenghong Peng et al., "Exploring Urban Spatial Features of COVID-19 Transmission in Wuhan Based on Social Media Data", June 19, 2020, *International Journal of Geo-Information*, <https://www.mdpi.com/2220-9964/9/6/402>

Wuchang district, Wuhan

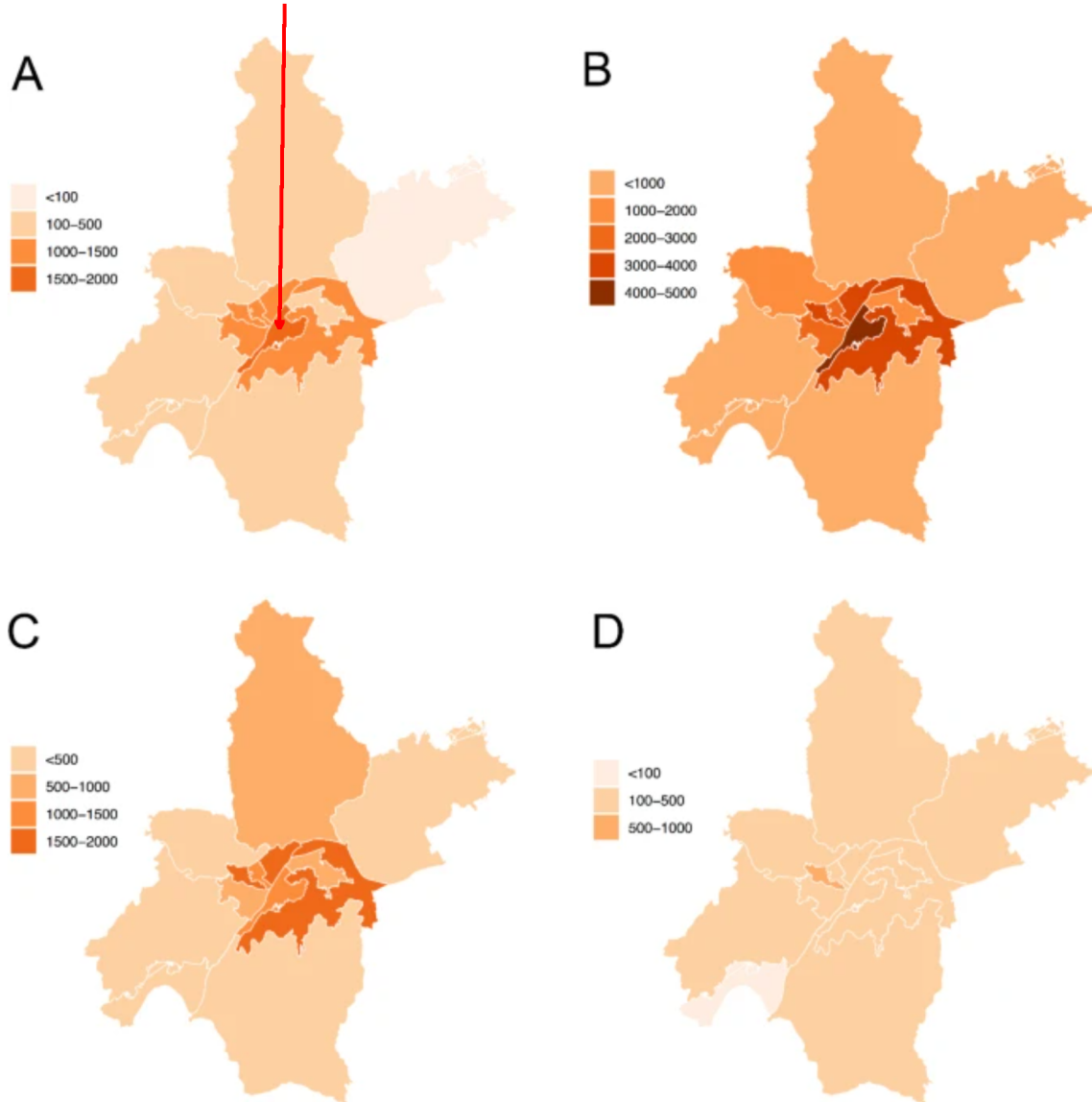


Figure 14: The number of new confirmed cases in Wuhan: a, from the first published case Dec 8, 2019 to Jan 23, 2020; b, from Jan 23 to Feb 4, 2020; c, from Feb 5 to Feb 15, 2020; d, from Feb 16 to Mar 18, 2020. Source: “Epidemiological characteristics and the entire evolution of coronavirus disease 2019 in Wuhan, China”

Wuchang district, Wuhan

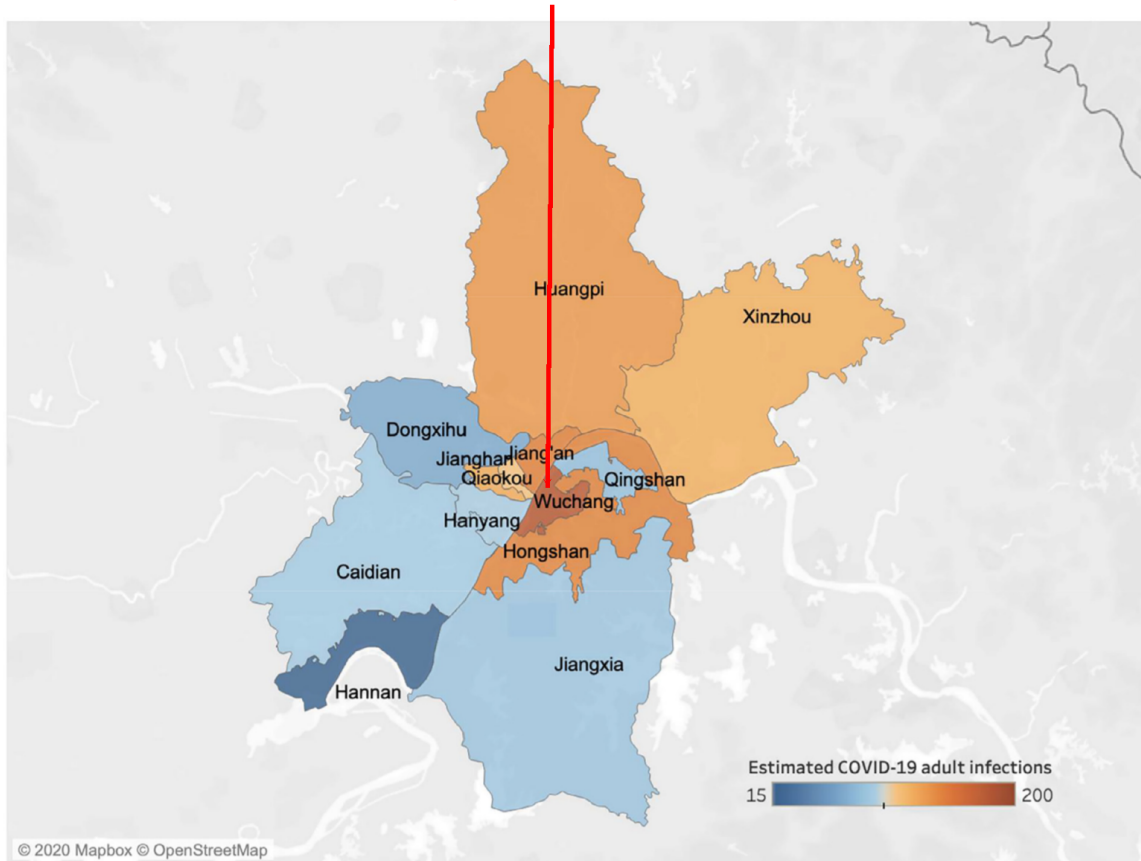


Figure 15: Estimated symptomatic COVID-19 infections of people over 30 years in the 13 districts of Wuhan from December 30, 2019 to January 12, 2020. Source: “Using the COVID-19 to influenza ratio to estimate early pandemic spread in Wuhan, China and Seattle, US”

Wuchang district, Wuhan

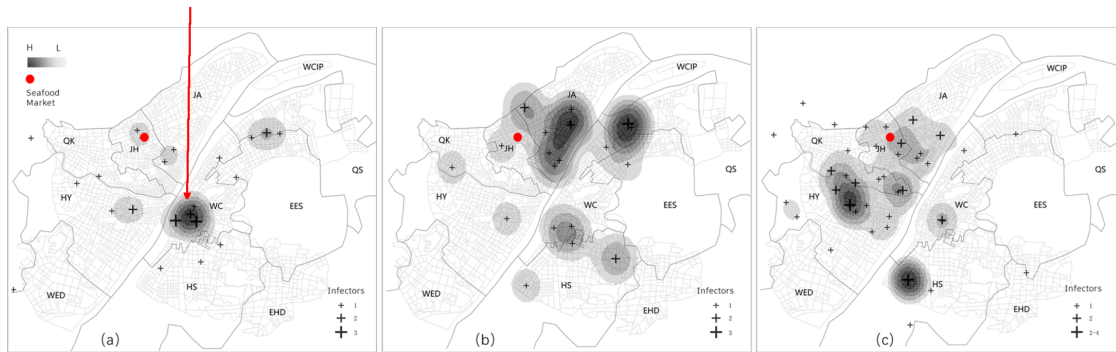


Figure 16: Clusters of COVID-19 help-seekers on Weibo social media, December 20, 2019 to January 22, 2020. Source: “Exploring Urban Spatial Features of COVID-19 Transmission in Wuhan Based on Social Media Data”

Wuchang district, Wuhan

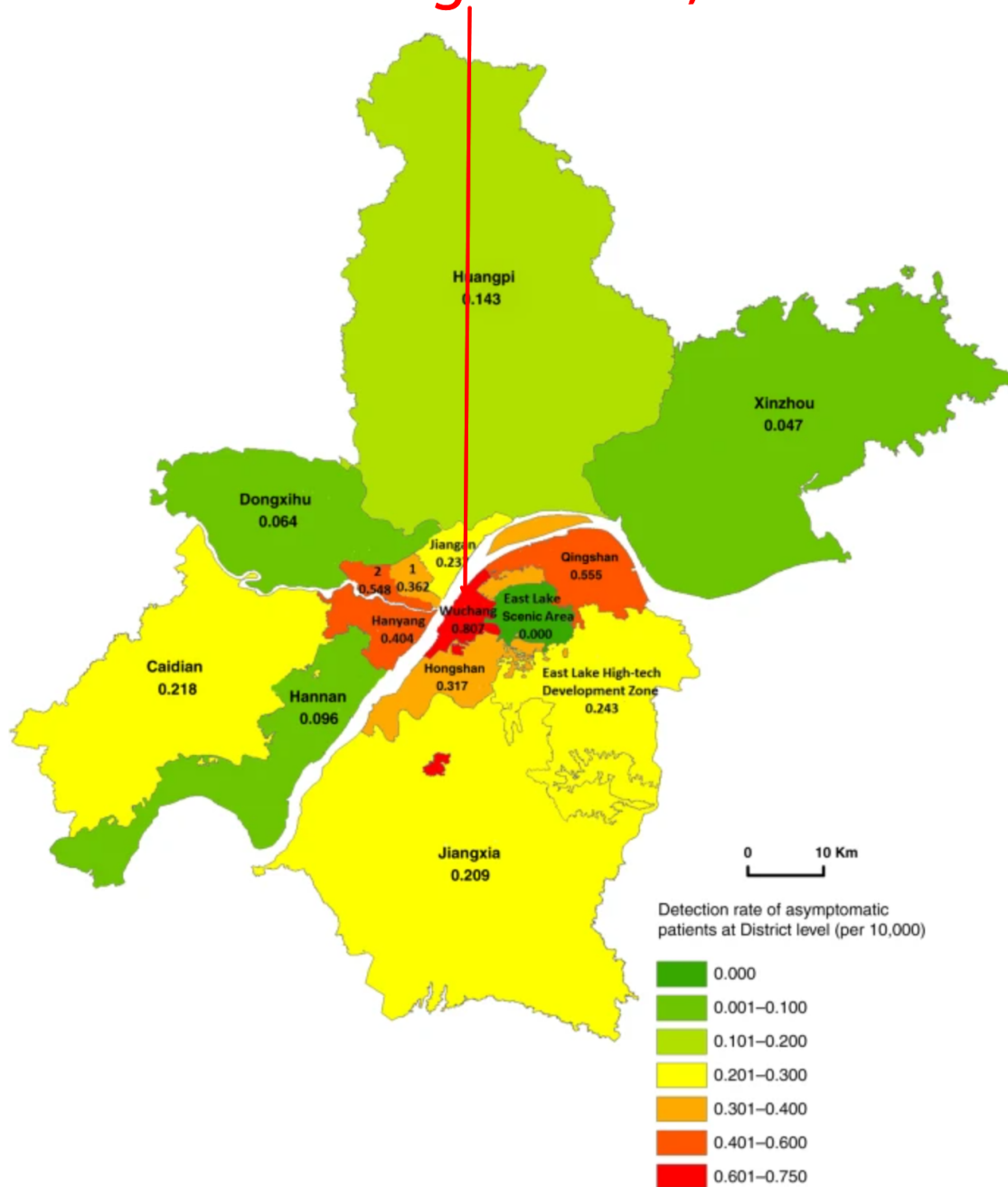


Figure 17: The geographic distribution of the detection rate of asymptomatic positive cases between May 14 and June 1, 2020 in Wuhan. Source: “Post-lockdown SARS-CoV-2 nucleic acid screening in nearly ten million residents of Wuhan, China”

6 Did Map Mistakes Contribute to Premature Conclusions About SARS2's Origin?

Did map mistakes contribute to incorrect conclusions about SARS2's origin? We must ask this question, because errors in analysis and mapping have the potential to lead authors astray in their conclusions. Errors can also compound into the future because subsequent authors may inadvertently base their analyses on incorrect information.

This report documents errors and deficiencies in the Wuhan map of the first published COVID-19 patient in the World Health Organization's report on SARS2's origin. It is therefore reasonable to ask: did those errors lead to other mistakes or omissions in analysis? The answer appears to be yes.

Consider the World Health Organization's report. The "Overview" says that the study's approach is to "to identify the zoonotic source of the virus and the route of introduction to the human population". The approach therefore assumes the conclusion, which is that the origin of SARS2 was zoonotic – in reality, no one yet knows what the source of SARS2 was.

The structure of the World Health Organization's report seems to have been affected by this approach. Out of 120 pages of analysis, only three pages devoted space to the possibility that the virus emerged because of a laboratory incident. Following this cursory three-page assessment, the authors concluded, "a laboratory origin of the pandemic was considered to be extremely unlikely."

Other, subsequent publications may have suffered similar blind spots because of the map error in the World Health Organization's report into SARS2's origin. For example, a recent paper by prominent virologists said:²²

"Examination of the locations of early cases shows that most cluster around the Huanan market, located north of the Yangtze river (Fig. 1a-e)... There is no epidemiological link to any other locality in Wuhan..."

These statements are now in doubt, because the first patient lived on the east side of the Yangtze River, in Wuchang district, rather than the west side. There is therefore an epidemiological link to another locality in Wuhan. Perhaps coincidentally but perhaps not, that locality is home to the Wuhan Institute of Virology's headquarters, which includes a BSL-3 lab.

Because of the map mistakes that appeared in the World Health Organization-convened report about the origin of SARS2, and the subsequent errors in analysis in other researchers' work, we urge all authors to be cautious and use multiple data sources where possible to verify data they wish to use in maps and analysis.

²²Edward Holmes et al., "The Origins of SARS-CoV-2: A Critical Review", *Zenodo*, Zenodo, Jul17, 2021, <https://doi.org/10.5281/zenodo.5112546>

7 Conclusion: Research and Policy Implications

There is still much to learn about the origin of SARS2. The topic is fast evolving. Furthermore, the Chinese government has been less than fully transparent, including about the first COVID-19 victims. The World Health Organization's report about the origin of SARS2 may have been affected by this lack of clarity.

This report illustrated a specific example of where that lack of clarity led to an incorrect map being included in the World Health Organization's report into the origin of SARS2, as well as where a premature conclusion appears to have been drawn by researchers who used the erroneous data that appeared in World Health Organization maps is this statement in *The Origins of SARS-CoV-2: A Critical Review*, Holmes et al (2021):

“Examination of the locations of early cases shows that most cluster around the Huanan market, located north of the Yangtze river (Fig. 1a-e)... There is no epidemiological link to any other locality in Wuhan...”

This conclusion appears to be false because the first published COVID-19 patient lived on the east side of the Yangtze river, in Wuchang district.

Due to the risk of errors like these, we urge all researchers to be cautious when examining data about COVID-19 victims, their characteristics, and their locations. We recommend that authors use multiple data sources wherever possible, which can help to limit the possibility of using erroneous data.

Policy-makers around the world have an important role to play to help ameliorate the risks that poor data will result in erroneous conclusions. They should continue to request the first COVID-19 patient data that the World Health Organization has requested and the Chinese government has so far refused to release. The success of our efforts to stamp out the COVID-19 pandemic and prevent future pandemics may depend on it.