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China and the COVID Data Crisis

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The COVID Data Emergency

COVID-19 ignited the worst global public health emergency in 100 years. As of mid-2023, almost 700 million people had been infected worldwide. The World Health Organization (WHO) estimates that 7 million have died, but other authoritative estimates suggest the number of COVID deaths could exceed 30 million.⁶⁴⁷ COVID-19 also created a severe “data emergency” that has impeded efforts to respond to the public health crisis and has undoubtedly cost many additional lives.

Data is key in any crisis response: timely, accurate, accessible data, freely shared and updated. As the COVID virus spread rapidly across the globe in early 2020, the need for accurate information about the origin, nature, and trajectory of the disease became urgent. Medical professionals and public health authorities, initially working in the dark as to the nature of the disease agent, desperately sought crucial data to understand and model its transmissibility, virulence, and mutation rates, as well as how to diagnose, treat, and prevent the illness. Governments urgently needed guidance on how to manage the economic, social, and political impact of the pandemic.

But the supply and quality of vital epidemiological data was compromised from the beginning.

Medical scientists and public health authorities around the world ran up against gaps and deficits in the availability, completeness, and integrity of COVID information.

Some of these problems were the natural consequence of the confusion created by an unforeseen and fast-moving crisis. The first months of the pandemic everywhere were characterized by severe uncertainty and frantic improvisation. Some of the most important early data was never properly collected or retained.

But the worst data deficiencies arose from active policies of information suppression in China, where the disease originated. Some of the most critical data was withheld, or intentionally altered, even destroyed. These policies have continued to this day.

It is becoming clear that the COVID impact on China was and is much worse than portrayed in official statistics. In December 2022, after years of maintaining a storyline of “miraculous” success in containing the virus (often cited by Beijing as evidence of the superiority of the Chinese political system), the country abruptly abandoned its “zero-COVID” policy. This suddenly exposed an “immunologically unprepared”⁶⁴⁸ population of 1.4 billion people to the ravages of the highly contagious Omicron variant.

At the same time, the suppression of key data intensified. China eliminated mass testing and simply stopped reporting some of the most important statistics.⁶⁴⁹ Shortly after China's abandonment of zero-COVID in December 2022, *The New York Times*, in an article titled "As Cases Explode, China's Low COVID Death Toll Convinces No One," wrote: "China's murky statistics are fueling widespread public distrust. Its narrow definition of COVID deaths⁶⁵⁰ 'will very much underestimate the true death toll,' the W.H.O. says."⁶⁵¹

It is worse today. Even the most basic data is now unavailable. As *Nature* magazine reported in June, "China no longer publishes its COVID-19 case count."⁶⁵² Hundreds of millions of Chinese have sickened, and likely millions have died, overwhelming the Chinese healthcare system and wreaking social and economic havoc. Beijing's deliberate coverup of the crisis has damaged China's economy and accelerated the diversifications by many Western companies away from reliance on Chinese supply chains, a trend that will impact the global economic landscape for decades to come.

This essay will survey the data gaps and distortions created by China's systematic suppression of COVID-related information and will review independent estimates of the true impact of the pandemic in terms of infection and mortality in the Chinese population.

Gaps in the Epidemiological Data

China has been the source of many of the major infectious diseases that have emerged in the last century. The country is thus often on the medical front line of new outbreaks. It is where "things happen first"—where critical early data related to a new disease first becomes available. Understanding the epidemiological patterns that develop in China, which first reveal the symptomatic expression, transmissibility, and the virulence of a new infectious agent, is vitally important for public health authorities in other countries.

Unfortunately, the initial instinct of local Chinese officials is often to cover up problems or hide data that do not fit the official storyline.⁶⁵³ China has a history of public health scandals involving faulty vaccines (multiple incidents),⁶⁵⁴ and cover-ups and mismanagement related to the initial

outbreaks of SARS (2003),⁶⁵⁵ bird flu (2004)⁶⁵⁶ and (2013);⁶⁵⁷ and swine flu (2019).⁶⁵⁸

Therefore, it is not surprising that the medical crisis created by COVID in China has unfolded behind a curtain of secrecy, active falsification, and even destruction of data—almost from the first day. Researchers and medical personnel have been put under gag orders. Those who tried to tell the truth in the first weeks of the outbreak were persecuted for "spreading rumors" (famously, and tragically, the case of Dr. Li Wenliang and several other doctors).⁶⁵⁹ Scientific labs in China refused to cooperate with international requests for COVID data.⁶⁶⁰ Official reporting on COVID mortality was shut down after April 2020. Even today, Beijing continues to publish COVID statistics that no one believes, and which are dismissed by most of the media, international authorities,⁶⁶¹ and even (according to leaks) by some Chinese officials themselves.⁶⁶²

Nevertheless, Chinese government statistics can be examined to reveal something of the true scope of the problem, or at least to show how far the official picture differs from reality. This essay will discuss three ways of assessing the plausibility of the official numbers:

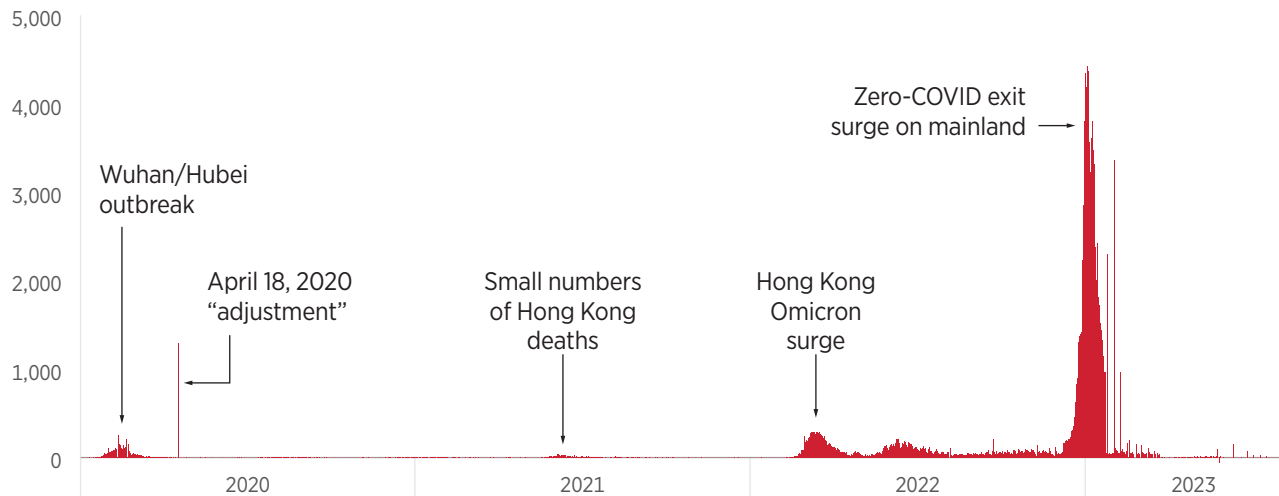
- Analyzing the raw COVID mortality statistics: How many deaths from COVID were reported? Are the numbers believable?
- Comparing China's reported infection and mortality rates with the rates reported for other similar countries: Does China fit the pattern seen elsewhere?
- Analyzing the reported case-fatality rate: Of those who became infected how many later died?

Raw COVID Mortality Figures. The COVID-19 outbreak occurred in China in late 2019 and early 2020 in the Hubei province and its capital, Wuhan. In addition to silencing medical "whistleblowers," Chinese authorities delayed sharing data showing that human-to-human transmission of the virus was occurring. Nevertheless, after some initial confusion, the data collection process seems to have functioned quasi-normally, without undue

CHART 1

New Reported COVID Deaths in China

DAILY FIGURES FROM JANUARY 2020 TO JULY 2023



SOURCE: World Health Organization, “China Situation,” <https://covid19.who.int/region/wpro/country/cn> (accessed November 16, 2023).

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manipulation, for the next few months. China’s infection and mortality figures for the first quarter of 2020 seem plausible today, following a pattern in line with the early experiences in other countries.

But then, in April 2020, Chinese COVID reporting was frozen.⁶⁶³ COVID mortality for the next 22 months was officially nonexistent. In February 2022, a small cluster of deaths was reported—due to the inclusion of mortality figures for Hong Kong, which utilized more open reporting policies. However, except for the Shanghai outbreak in the spring of 2022, China did not report a single new death on the mainland from mid-April 2020 until December 8, 2022, when the zero-COVID policy was canceled.⁶⁶⁴ Even when the Omicron variant slammed Shanghai in the spring of 2022—leading to tens of thousands of reported infections and a three-month near-total lockdown of a city of 25 million people, officials reported just three deaths from COVID.⁶⁶⁵

When, after more confusion and testing halts, zero-COVID was lifted, the authorities adjusted the death toll to about 90,000. Then, in March

2023, the official daily death rate abruptly plunged back to near zero.

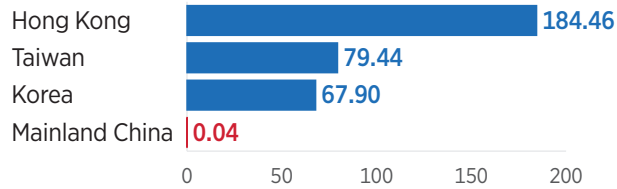
This pattern is an epidemiological impossibility. A disease as infectious as COVID-19—especially the Omicron variant, which is said to be as much as “30 times more infectious than the ancestral SARS-CoV-2”⁶⁶⁶—could not simply disappear. While it is reasonable to believe that the Chinese government’s strict pandemic controls reduced COVID-19 infections and related deaths between mid-2020 and the country’s first Omicron outbreak in January 2022, the long flat-zero periods in the data record for 2022—when Omicron outbreaks were a constant struggle—are evidence that COVID mortality data for Mainland China has been and is still being suppressed.

COVID Infection and Mortality Rates vs. Close Comparables. China’s reported mortality rate, that is, deaths per 100,000 population, is implausibly low. The mortality rates for Hong Kong, Taiwan, and Korea (all countries that followed similar, strict zero-COVID policies) are between *1600 and 4000 times higher* than China’s reported COVID

CHART 2

COVID Mortality Rate

COVID DEATHS PER 100,000 POPULATION



NOTES: Figures for Hong Kong, Taiwan, and Korea are from January 2020 to July 2023. Figures for Mainland China are from April 2020 to December 2022, which is the period from the post-Wuhan blackout to the lifting of the “zero-COVID” policy.

SOURCES: World Health Organization, “China Situation,” <https://covid19.who.int/region/wpro/country/cn> (accessed November 16, 2023); Worldometer, “Reported Cases and Deaths by Country or Territory,” <https://www.worldometers.info/coronavirus/#countries> (accessed November 16, 2023); and Kathy Leung, Gabriel M. Leung, and Joseph T. Wu, “Modelling the Adjustment of COVID-19 Response and Exit from Dynamic Zero-COVID in China,” December 14, 2022, *British Medical Journal*, preprint, <https://www.medrxiv.org/content/10.1101/2022.12.14.22283460v1> (accessed November 16, 2023).

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mortality rate for the period from April 2020 (when reporting shut down) to December 2022 (when zero-COVID ended). While it may be argued that Mainland China followed a somewhat stricter version of zero-COVID, it cannot account for this astronomical discrepancy.

The New York Times assembled data on COVID infection rates and mortality rates from the beginning of the pandemic through March 2023. Unlike many other sources, the *Times* database provides separate figures for Mainland China, Taiwan, and Hong Kong. (Singapore and New Zealand also followed very strict zero-COVID regimes, and are also included here.)

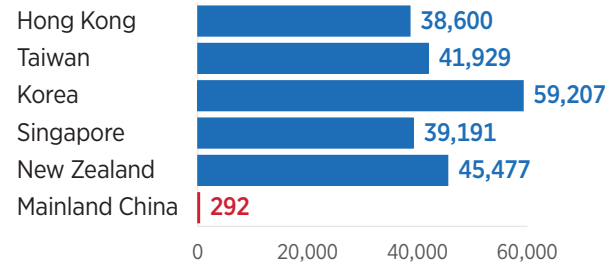
The difference in reported infection rates is extreme: *143 times higher* for Hong Kong than for the mainland.

In general, Hong Kong followed a similar zero-COVID program.⁶⁶⁷ Yet despite this, and despite spending more than five times as much per capita on healthcare (approximately \$3030 for Hong Kong alone⁶⁶⁸ versus \$583 for China overall—which *included* HK), which should have improved

CHART 3

COVID Cases per 100,000 Population

FIGURES AS OF MARCH 10, 2023



SOURCES: Johns Hopkins University & Medicine, “Mortality Analyses,” <https://coronavirus.jhu.edu/data/mortality> (accessed November 16, 2023), and “Tracking Coronavirus in China: Latest Case Count,” *The New York Times*, updated March 10, 2023, <https://www.nytimes.com/interactive/2021/world/china-covid-cases.html> (accessed November 16, 2023).

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treatment outcomes, Hong Kong had a COVID death rate *30 times higher* than the mainland.

These gross disparities are indicative of a vast program of systematic underreporting. Health workers are said to have been pressured to “keep ‘COVID-19’ off death certificates to limit reported numbers.”⁶⁶⁹ Mortality figures have sometimes been released “accidentally” by local officials, and then quickly retracted.⁶⁷⁰ In December 2022, the central authorities changed the official criteria for assigning COVID as a cause of death.⁶⁷¹ *The British Medical Journal* reported that as of late 2022, “China has effectively stopped counting COVID cases and deaths, abandoning mass testing and adopting new criteria for counting deaths that will exclude most fatalities from being reported.”⁶⁷²

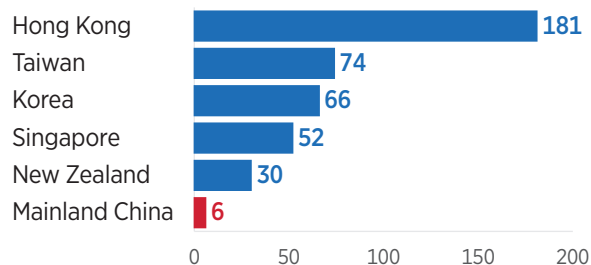
In July 2023, some Chinese provinces even deleted *all* mortality data, to avoid disclosing peripheral information (e.g., figures on cremations ballooning to almost double the normal level) that could be used to infer the true scope of the crisis.⁶⁷³

Infection Rate vs. Mortality Rate. The case-fatality rate (CFR) counts COVID deaths as a percentage of confirmed cases. A scientific study⁶⁷⁴ authored

CHART 4

COVID Deaths per 100,000 Population

FIGURES AS OF MARCH 10, 2023



SOURCES: Johns Hopkins University & Medicine, “Mortality Analyses,” <https://coronavirus.jhu.edu/data/mortality> (accessed November 16, 2023), and “Tracking Coronavirus in China: Latest Case Count,” *The New York Times*, updated March 10, 2023, <https://www.nytimes.com/interactive/2021/world/china-covid-cases.html> (accessed November 16, 2023).

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by researchers in Hong Kong and Shenzhen cited the following figures for COVID infections rates and mortality in Mainland China: “As of 6 December 2022, mainland China has tallied just over 349,938 confirmed COVID-19 cases and 5,235 COVID-related deaths.”

This equates to a CFR of 1.5 percent, which is not out of line with other countries. (The U.S. CFR is 1.1 percent, according to Johns Hopkins data.⁶⁷⁵) However, 88 percent of the reported Chinese deaths took place in the first three months of 2020, in Hubei province. After mid-April 2020 the CFR was just 0.2 percent.

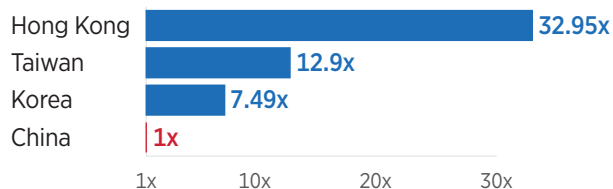
Even this information does not tell the full story. For two years, between April 21, 2020, and April 21, 2022, Chinese authorities reported 111,195 cases of COVID—but just 16 reported deaths. This works out to an impossibly low CFR of 0.01 percent.⁶⁷⁶

This is even more significant than the cross-country disparities in the infection and death rates: The principal claim for China’s zero-COVID policy is the reduction in the number of infections, *not* the reduction in *mortality following infection*. If zero-COVID is assumed to be effective, a lower rate of infection could be deemed a

CHART 5

Observed COVID Fatality Ratios

AS A MULTIPLE OF CHINA’S COVID FATALITY RATIO



NOTE: Data for Hong Kong, Taiwan, and Korea are from January 2020 to July 2023. Data for China are from April 2020 to April 2022.

SOURCE: Johns Hopkins University & Medicine, “Mortality Analyses,” <https://coronavirus.jhu.edu/data/mortality> (accessed November 16, 2023).

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possible outcome—and indeed, some zero-COVID or “elimination” regimes in other countries do show this result, for as long as such regimes are maintained.⁶⁷⁷ However, once an individual is infected, zero-COVID does not impact mortality. The policy does not presume any improvement in the efficacy of treatment for COVID. The Chinese CFR should therefore be roughly similar to the CFR other countries.

This is not what we see. For example, the CFR in Hong Kong (a zero-COVID jurisdiction, with cultural and ethnic characteristics that are the closest to the mainland) is *33 times higher*. The global CFR is 63 times higher.

This is *prima facie* evidence of data tampering. Zero-COVID is aimed at *preventing* the spread of the virus to reduce infection rates: It has nothing to do with *treatment*. In other words, we might expect a lower infection rate—but not a lower CFR. There is no evidence, and indeed no claim, that China has developed superior methods of COVID treatment that would lower the death rate among those who are infected.

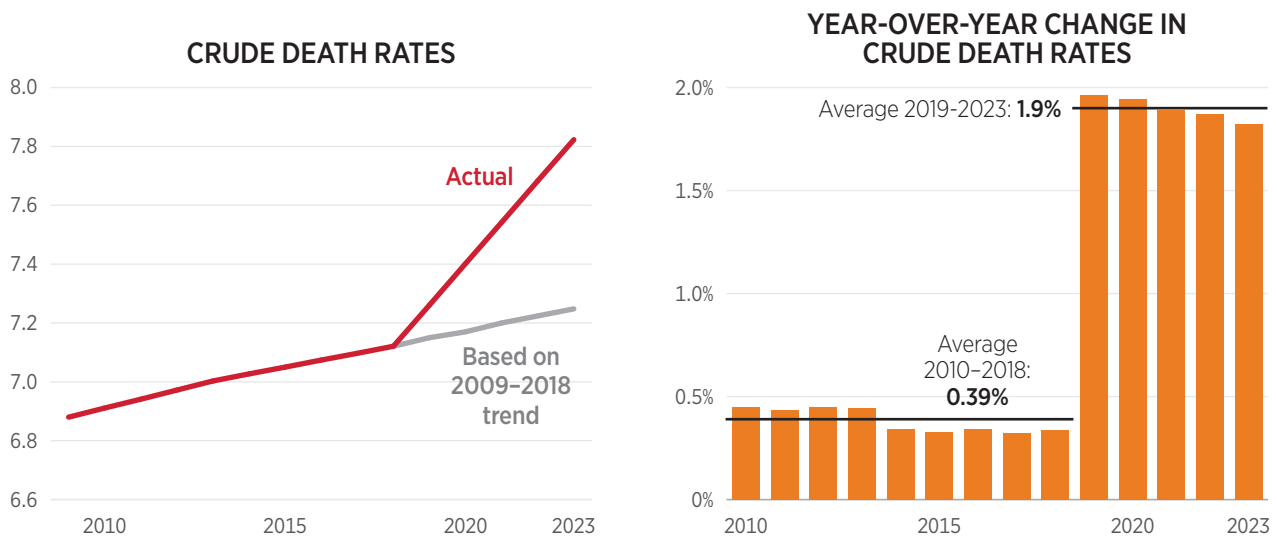
In summary, as *The Economist* declared, “Official statistics are useless.”⁶⁷⁸

Estimating True COVID Mortality in China

Official and unofficial accounts diverge. For instance:

CHART 6

Crude Death Rates in China, 2009–2022



NOTE: Crude death rates are deaths per 1,000 population per year.

SOURCE: Macrotrends, “China Death Rate 1950–2023,”

<https://www.macrotrends.net/countries/CHN/china/death-rate> (accessed November 16, 2023).

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The Politburo Standing Committee said China has “created a miracle in human history” as it has “successfully pulled through a pandemic,” according to a summary published by state-run news agency Xinhua. The summary also said the group claimed that China had kept *the lowest COVID-19 fatality rate in the world*.⁶⁷⁹

And:

Every unofficial indicator suggests that *China is in the grip of a major surge*. Pharmacy shelves have been largely emptied of cold and flu drugs and ibuprofen tablets are being sold individually on government orders, with a limit of six pills per customer. Doctors on social media describe hospitals with staff infection rates of 80%.⁶⁸⁰

What then is the real impact of the pandemic on China? The most basic question is: How many Chinese have actually died?

China’s active suppression of COVID data makes it impossible to answer this question directly. There are many incidental indicia—the sudden and acute shortages of pharmaceutical products, or satellite images of clogged roadways and parking lots near funeral homes and crematoriums in Chinese cities—that suggest the scale of the problem. But these do not easily translate into hard number estimates.

To get at the matter in more quantitative terms, analysts and researchers have used three main approaches to triangulate China’s true COVID situation:

- calculations of “excess mortality”—death counts well above the long-term trend lines;
- extrapolations based on ratios derived from comparable countries; and
- models based on various demographic or economic data that correlate closely enough with COVID outcomes to permit a quantitative calculation.

TABLE 1

Surplus Deaths in China Above Prior Trend Line, 2019–2022

Year	Actual Crude Death Rate	Hypothetical Crude Death Rate as per 2009–2018 Trend Line	Chinese Population	Actual Deaths	Deaths as per 2009–2018 Trend Line	Gross Excess Mortality
2019	7.261	7.148	1,421,864,031	10,324,155	10,163,484	160,671
2020	7.402	7.175	1,424,929,781	10,547,330	10,223,871	323,459
2021	7.542	7.201	1,425,893,465	10,754,089	10,267,859	486,230
2022	7.683	7.224	1,425,887,337	10,955,092	10,300,610	654,482
Four-year total:						1,624,842

NOTE: Crude death rates are deaths per 1,000 population per year.

SOURCE: Macrotrends, “China Death Rate 1950–2023,”

<https://www.macrotrends.net/countries/CHN/china/death-rate> (accessed November 16, 2023).

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Excess Mortality. Death rates are generally very stable. In most countries today, the crude death rate from all causes rises gently as the population ages. “Excess mortality” is defined as a significant upward deviation from the long-term trend.

Beginning in 2019, China experienced a sudden and significant inflection in the crude death rate. The multi-year average rate of annual increase jumps by a factor of five and remains elevated. The total over four years amounts to about 1.6 million excess deaths.

Other models of excess mortality⁶⁸¹ attempt to offset COVID deaths with “lives saved” due to reductions in flu deaths (suppressed by zero-COVID quarantining and masking policies) or reduced traffic deaths (due to less travel during lockdowns). The WHO has even suggested that the COVID pandemic actually *saved* tens of thousands of lives in China, more than offsetting the small official COVID death figures. (It should be clear from the preceding sections that this conclusion cannot be true.)

The Economist magazine has modeled excess mortality extensively and with technical sophistication.⁶⁸² As of July 2023, their model produced estimates of between 560,000 and 3.7 million excess deaths in China, with a central “best estimate” of just under 2 million deaths (roughly in line with my simple estimate provided above).

The most recent assessment of excess mortality comes from an article published in the *Journal of the American Medical Association* on August 24, 2023. An estimated 1.87 million excess deaths occurred among individuals 30 years and older during the first 2 months after the end of China’s zero-COVID policy. Excess deaths predominantly occurred among older individuals and were observed across all provinces in Mainland China.⁶⁸³

In summary, it is clear that COVID struck China hard, starting in 2019, and persisting over the past four years. The crude death rate skyrocketed, reflecting millions of “extra” deaths above what would be expected from the normal long-term trend.

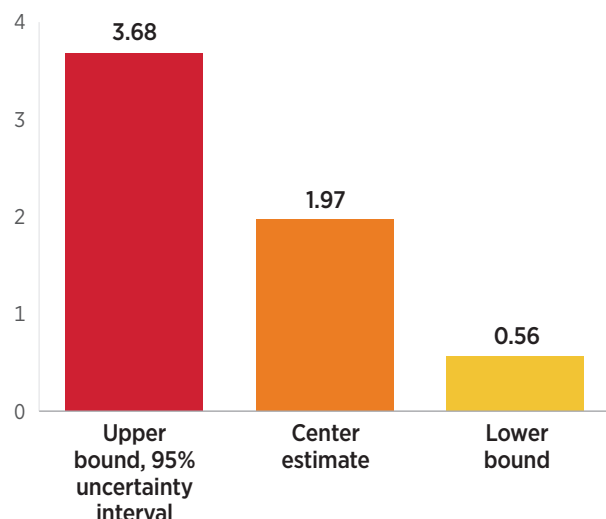
Estimates Based on Comparables. This approach calculates ratios for infection and mortality for other countries (“comparables”) where COVID data is more complete and of higher quality. These ratios are then applied to the Chinese population to derive an estimate of the impact there. The best comparables would combine: (1) similar cultural and ethnic background; (2) similar economic systems; (3) similar zero-COVID regimes; and (4) more reliable data.

Hong Kong is the closest comparable. The city maintained a zero-COVID regime (albeit less stringent than that on the mainland) until February

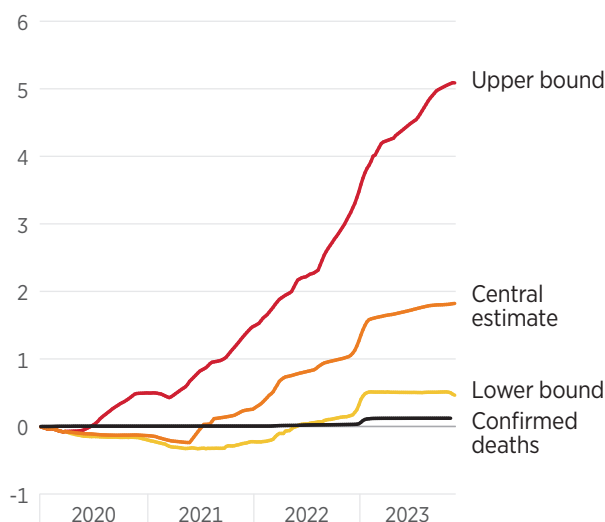
CHART 7

Estimated Cumulative Excess Deaths in China During COVID

TOTALS THROUGH JULY 24, 2023, IN MILLIONS



IN MILLIONS, FOR JANUARY 1, 2020 TO JULY 25, 2023



SOURCES: “The Pandemic’s True Death Toll,” *The Economist*, <https://www.economist.com/graphic-detail/coronavirus-excess-deaths-estimates> (accessed November 16, 2023), and Our World in Data, “Estimated Cumulative Excess Deaths During COVID, China,” <https://ourworldindata.org/grapher/excess-deaths-cumulative-economist> (accessed November 16, 2023).

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2022, when it was overwhelmed by Omicron. By March 2022, the *British Medical Journal* wrote:

Hong Kong [now] reports the world’s highest death rate as the zero COVID strategy failed. Coronavirus infections are surging... Previously a global model for COVID containment, transmission of SARS-CoV-2 has soared as Hong Kong’s zero COVID strategy has failed to contain the more contagious omicron variant.⁶⁸⁴

In the 12 months following the breakdown of Hong Kong’s zero-COVID regime, the cumulative COVID death count in Hong Kong increased by over 6000 percent—from 213 to 13,370. (The increase in the U.S. over the same period was 22 percent.)⁶⁸⁵ This evidence of the extreme impact of Omicron underscores the point that the return-to-zero in China’s reported daily death rate after

March 2023 is epidemiologically impossible. Applying Hong Kong’s mortality rate of 184 COVID deaths per 100,000 population to China’s population of roughly 1.4 billion people would yield an estimate of about 2.5 million deaths, which is in line with the excess mortality figures cited above.

A Stanford University study⁶⁸⁶ modeled China’s death count based on Hong Kong and Korean experiences resulted in lower estimates: “987,455 and 619,549 maximal COVID-19 deaths, respectively, assuming the entire China population was infected.”⁶⁸⁷ Leaked official Chinese reports indicate that infection rates for the Chinese population reached 80 percent to 90 percent within a few weeks after the lifting of zero-COVID in December 2022.⁶⁸⁸

There are important differences, however, between China and even the best of the potential comparables, which potentially point to a more severe impact in China’s case. These include age, vaccine efficacy, and quality of healthcare facilities.

Aggravating Factors. There are important differences, however, between China and even the best of the comparables, which potentially point to a more severe impact in China's case. It is beyond the scope of this essay to go into detail on these factors, but the important ones include:

- **Age:** Significant segments of the elderly population in China have not been fully vaccinated. For example, during the Shanghai outbreak, officials reported that only 38 percent of residents over the age of 60 were “fully vaccinated” by Chinese standards.⁶⁸⁹ This “age risk” is acute.⁶⁹⁰ In a detailed study⁶⁹¹ of Hong Kong COVID mortality patterns, 96 percent of all deaths occurred in people over 60, and the death rate for those over 80 was 867 times the rate for those in their 20s. As of March 2022, there were 36 million elderly Chinese who were completely unvaccinated, including 13 million over 80. As the Stanford study cited above concluded that “[t]he most critical factor that can affect total COVID-19 fatalities in China is the extent to which the elderly can be protected.”⁶⁹²
- **Vaccine Efficacy:** The “immunologically unprepared” or “functionally unvaccinated” status of the main body of the Chinese population, due to less effective Chinese vaccines (compared to those used elsewhere), and diminishing immunity benefits over time are reflected in high rates of infection since the end of zero-COVID (as acknowledged in leaks from official sources there).
- **Healthcare Facilities:** The well-known institutional deficits in the Chinese healthcare system, fewer intensive care units, fewer front-line personnel (especially nurses, and especially in rural areas), would likely translate into higher CFRs (i.e., more sick people would die due to inadequate care). A 2022 study by Chinese and American scientists published in *Nature* summarized the downside considerations and noted: “The level of immunity induced by the vaccination campaign would be insufficient to prevent an Omicron wave that would result in exceeding critical care capacity with a projected intensive care unit peak demand of 15.6 times

the existing capacity and causing approximately 1.55 million deaths.”

Ultimately, estimates based on the “comparables” approach are roughly in line with estimates based on excess mortality, and are five to 30 times higher than the official COVID death count published by the Chinese government.

Models. COVID rates for China can also be estimated from various public data sources that partially and/or indirectly correlate COVID mortality.⁶⁹³ In February 2023, *The New York Times* reported⁶⁹⁴ on the results of a number of different modeling approaches, which converged in an estimate of 1 million to 1.5 million Chinese deaths through the end of 2022, and before the real impact of the lifting of zero-COVID (again in line with the excess mortality calculations described in the previous section.) A Chinese-led study extrapolated from the Shanghai outbreak in Spring 2022 and estimated 1.6 million deaths by mid-2023.⁶⁹⁵

Airfinity,⁶⁹⁶ a health data analytics group, modeled 600,000 deaths *in the first month* after the lifting of zero-COVID—10 times China's official figure during the same time period⁶⁹⁷—and 1.7 million deaths by April 2023.⁶⁹⁸ The Seattle-based Institute for Health Metrics and Evaluation forecast about 300,000 deaths in China from the end of zero-COVID through the first quarter of 2023.⁶⁹⁹ This model has been widely criticized as prone to significant underestimates⁷⁰⁰ for many countries, and updating was “paused” at the end of 2022. Even so, its final forecast was 100 percent higher than the official Chinese figures.

And as noted earlier, *The Economist's* figure for the COVID deaths is about 2 million (central estimate) as of July 2023—*1500 percent higher* than the official death tolls.⁷⁰¹

Conclusions and Questions

China's zero-COVID policy effectively meant *zero reporting* of COVID. The suppression of data began early and instinctively, and became the fixed official policy in April 2020. It did not really change even after zero-COVID was lifted in December 2022. “Zero reporting” continues to this day. The most basic data is apparently no longer even being collected.

Consideration of anomalies in the raw mortality figures, infection rates, and case-fatality rates all show impossibly low figures for China compared to other countries with similar demographic and policy profiles. Hong Kong's infection rate is 143 times higher than the infection rate reported for the Chinese Mainland, and the mortality rate is 30 times higher than the mainland's reported rate.

In particular, the extremely low reported Case-Fatality Rate reported by China—33 times lower than the rate of Hong Kong—is medically inconceivable. The fate of an infected person in Mainland China cannot have been very different from that of a COVID victim in Hong Kong or

anywhere else. In fact, the institutional deficits in China's healthcare system would imply *less* effective treatment of COVID patients compared to Hong Kong or Korea.

The Chinese CFR may be even higher than elsewhere around the world. The number of Chinese killed by COVID is believed to be between 1.5 and 2 million, with estimates ranging up to 3.5 million at the high end, underscoring how the Chinese government's efforts to coverup the virus outbreak and suppress vital information about the disease have imposed terrible costs not just on the rest of the world but its own citizens as well.

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