What We've Learned About So-Called 'Lockdowns' and the COVID-19 Pandemic

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SciCheck Digest

Plenty of peer-reviewed studies have found government restrictions early in the pandemic, such as business closures and physical distancing measures, reduced COVID-19 cases and/or mortality, compared with what would have happened without those measures. But conservative news outlets and commentators have seized on a much-criticized, unpublished working paper that concluded "lockdowns" had only a small impact on mortality as definitive evidence the restrictions don't work.

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In the early months of the COVID-19 pandemic in 2020, as the virus spread around the globe, many countries implemented restrictions on movement and social gatherings in an effort to flatten the curve — or reduce sharp spikes in caseloads to avoid overwhelming health care facilities. Without vaccines or evidence-based treatments, these non-pharmaceutical interventions, or NPIs, were the only public health measures available for months to combat the pandemic.

The more extreme measures — widespread business closures and stay-at-home orders, generally called "lockdowns," though there's no set definition — clearly came with economic and social costs, as the World Health Organization says. But the WHO "recognizes that at certain points, some countries have had no choice but to issue stay-at-home orders and other measures, to buy time."

There have been a lot of studies assessing whether and to what extent so-called "lockdowns" and various NPIs have been effective, and plenty of research that has concluded these measures can limit transmission, or reduce cases and deaths. For instance, a study published in *Nature* in June 2020 found that "major non-pharmaceutical interventions—and lockdowns in particular—have had a large effect on reducing transmission" in 11 European countries. It estimated what would have happened if the transmission of the virus hadn't been reduced, finding that 3.1 million deaths "have been averted owing to interventions since the beginning of the epidemic." The estimate doesn't account for behavior changes or the impact of overwhelmed health systems.

In May 2020, the same journal published a study that estimated the number of cases in mainland China would have been "67-fold higher" by the end of February 2020 without a combination of non-pharmaceutical interventions.

But one working paper posted online in January — and not peer-reviewed — has gotten a lot of attention in conservative circles for its conclusion that "lockdowns have had little to no effect on COVID-19 mortality." The paper, which is an analysis of other studies, has been touted as a "Johns Hopkins University study," but it's not a product of the university's Bloomberg School of Public Health, whose vice dean — among other public health experts — has criticized the paper.

"The working paper is not a peer-reviewed scientific study," Dr. Joshua Sharfstein, vice dean of the Johns Hopkins Bloomberg School of Public Health, said in a Feb. 8 statement sent to us in an email. "To reach their conclusion that 'lockdowns' had a small effect on mortality, the authors redefined the term 'lockdown' and disregarded many peer-reviewed studies. The working paper did not include new data, and serious questions have already been raised about its methodology."

Sharfstein said that early on "when so little was known about COVID-19, stay-at-home policies kept the virus from infecting people and saved many lives. Thankfully, these policies are no longer needed, as a result of vaccines, masks, testing, and other tools that protect against life-threatening COVID-19 infections."

The authors of the working paper are economists: Steve H. Hanke, a senior fellow at the libertarian Cato Institute and founder and co-director of the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise; Jonas Herby, a special adviser at the Center for Political Studies in Copenhagen, Denmark; and Lars Jonung, a professor emeritus at Sweden's Lund University.

Fox News published a Feb. 4 story questioning why other mainstream media outlets hadn't written stories about the working paper, saying there had been "a full-on media blackout," and "Fox & Friends" co-host Brian Kilmeade asked in a Facebook post, "Will some people get an apology after this?" On Feb. 21, former Republican vice presidential nominee Sarah Palin posted a video to Facebook highlighting the working paper and asking if lockdowns were about "power," not "safety."

But the non-peer-reviewed paper isn't the definitive or final word on lockdowns, and the attention it has received has, in turn, sparked criticism of the paper's analysis.

Criticisms of the Working Paper

The working paper was a literature review and meta-analysis, meaning it searched the available scientific literature and identified studies that met certain criteria, and then combined similar studies statistically to reach a conclusion. It identified 24 papers, published or posted as of early July 2021, that met its criteria for the meta-analysis — 17 of which were peer-reviewed. Among the criticisms: The paper excluded many relevant studies, broadly defined "lockdown," and overwhelmingly based one of its headline figures on a study whose conclusions it rejected. That study also didn't estimate the delayed effect of government restrictions on death rates a few weeks later, according to experts we consulted. Instead, it only assessed the effect of current death rates on current policies.

Excluded research. One of the criticisms is that the working paper excluded a lot of relevant research. The paper said it considered "difference-in-difference" studies, which would compare outcomes in areas or populations that were subject to a restriction with those that were not, and limited its analysis to the impact on mortality. The paper excluded studies that use modeling on mortality, that compare before and after a "lockdown" and that consider the timing of restrictions. Gideon Meyerowitz-Katz, an epidemiologist working on his Ph.D. at the University of Wollongong in Australia, said in a long Twitter thread: "Many of the most robust papers on the impact of lockdowns are, by definition, excluded."

He called the working paper "a very weak review that doesn't really show much, if anything." It excluded "modelled counterfactuals," which would compare what happened with what would have happened without the intervention. "Because this is the most common method used in infectious disease assessments, this has the practical impact of excluding most epidemiological research from the review," Meyerowitz-Katz said.

Hanke told us: "Models are fine if they are based on empirical observations," meaning from experience, "rather than assumptions. In those circumstances, models are able to reliably forecast the real world. But the models used during the pandemic have been inaccurate, as they, for the most part, have not been based on empirical observations but assumptions," he said in an email. "A prime example of modelers gone astray is the Imperial College London study of March 16, 2020."

That March 2020 report, early in the pandemic, estimated that 2.2 million lives would be lost in the U.S. in "the (unlikely) absence of any control measures or spontaneous changes in individual behaviour." As we've written before, it wasn't intended to be a practical estimate, as doing absolutely nothing was, in the author's words, "unlikely."

One of the authors of that report has been critical of Hanke's working paper. Neil Ferguson, director of the MRC Centre for Global Infectious Disease Analysis, Jameel Institute, Imperial College London, said in a statement that the working paper "does not significantly advance our understanding of the relative effectiveness of the plethora of public health measures adopted by different countries to limit COVID-19 transmission."

Ferguson said that NPIs "are intended to reduce contact rates between individuals in a population, so their primary impact, if effective, is on transmission rates. Impacts on hospitalisation and mortality are delayed, in some cases by several weeks. In addition, such measures were generally introduced (or intensified) during periods where governments saw rapidly growing hospitalisations and deaths. Hence mortality immediately following the introduction of lockdowns is generally substantially higher than before. Neither is lockdown a single event as some of the studies feeding into this meta-analysis assume; the duration of the intervention needs to be accounted for when assessing its impact."

Ferguson said because NPIs affect transmission rates, "the appropriate outcome measures to consider are growth rates (of cases or deaths) over time, with appropriate time lags – not total cases or deaths."

Definition of "lockdown." The working paper also had a very broad definition of "lockdown": "Lockdowns are defined as the imposition of at least one compulsory, non-pharmaceutical intervention (NPI)," it said. "NPIs are any government mandate that directly restrict peoples' possibilities, such as policies that limit internal movement, close schools and businesses, and ban international travel."

The paper did not examine the impact of voluntary behavior or recommendations, as opposed to mandates. "Our definition does *not* include governmental recommendations, governmental information campaigns, access to mass testing, voluntary social distancing, etc., but *do* include mandated interventions such as closing schools or businesses, mandated face masks etc."

The paper then divided the 24 studies it considered into three groups: studies using a stringency index for restrictions, studies on shelter-in-place orders and those looking at specific NPIs. The last category included 11 studies on various measures, including face mask policies and limits on gatherings.

Stringency index studies. The authors examined seven studies on the impact of more severe restrictions, calculating from those studies that, compared with a policy of recommendations, "lockdowns in Europe and the United States only reduced COVID-19 mortality by 0.2% on average" — the figure that conservatives have cited. But six of the seven studies concluded that lockdown policies helped reduce mortality, and the 0.2% figure is overwhelmingly based on one study that mistakenly estimated the wrong effect, according to economists we consulted.

The studies in this group used the Oxford COVID-19 Government Response Tracker, which looked at government responses worldwide to the pandemic and created a stringency index, measuring how strict the measures were over time. The index is from 0 to 100, with 100 being the most stringent restrictions. For instance, the OxCGRT heat map shows that many countries around the world had stringency levels above 70 in April 2020.

The working paper calculates mortality impact estimates for each of the seven studies aiming to show the effect of the average mandated restrictions in Europe and the United States early in the pandemic compared with a policy of only recommendations. The paper then calculates a weighted average, giving more weight to studies that said their findings were more precise.

Nearly all of the weight — 91.8% — goes to one study, even though the working paper rejects the conclusions of that study.

That study — coauthored by Carolyn Chisadza, a senior lecturer in economics at the University of Pretoria, and published on March 10, 2021, in the journal *Sustainability* — looked at a sample of countries between March and September 2020 and concluded: "Less stringent interventions increase the number of deaths, whereas more severe responses to the pandemic can lower fatalities."

The working paper claims the researchers' conclusion is incorrect — but it uses the study's estimates, saying the figures show an increase in mortality due to "lockdowns."

Chisadza told us in an email that the study showed: "Stricter lockdowns will reduce the rate of deaths than would have occurred without lockdown or too lenient of restrictions." But Hanke said the data from Chisadza and her colleagues only show that "stricter lockdowns will reduce mortality" relative to "the worst possible lockdown," meaning a more lenient lockdown that, under the study, was associated with the highest rate of deaths.

We reached out to a third party about this disagreement. Victor Chernozhukov, a professor in the Massachusetts Institute of Technology's Department of Economics and the Statistics and Data Science Center, along with Professor Hiroyuki Kasahara and Associate Professor Paul Schrimpf, both with the Vancouver School of Economics at the University of British Columbia — the authors of another study that was included in the working paper — looked at the Chisadza study and provided FactCheck.org with a peer review of it. They found the Chisadza study only measured the correlation between current death growth rates and current policies. It did not show the lagged effect of more stringent policies, implemented three weeks prior, on current death growth rates, which is what one would want to look at to evaluate the effectiveness of "lockdowns."

In an email and in a phone interview, Chernozhukov told us the Chisadza study made an "honest mistake." He said the working paper is "deeply flawed" partly because it relies heavily on a study that "estimates *the wrong effect* very precisely."

In their review, Chernozhukov, Kasahara and Schrimpf write that the Chisadza et al. study "should be interpreted as saying that the countries currently experiencing high death rates (or death growth rates) are more likely to implement more stringent current policy. That is the only conclusion we can draw from [the study], because the current policy can not possibly influence the current deaths," given the several weeks of delay between new infections and deaths.

The effect that should be examined for the meta-analysis is "the effect of the previous (e.g., 3 week lagged) policy stringency index on the current death growth rates."

Chernozhukov, Kasahara and Schrimpf conducted a "quick reanalysis of similar data" to the Chisadza study, finding results that "suggest that more stringent policies in the past predict lower death growth rates." Chernozhukov said much more analysis would be needed to further characterize this effect, but that it is "actually quite substantial."

If the Chisadza study were removed from the working paper, according to one of the paper's footnotes, the result would be a weighted average reduction in mortality of 3.5%, which Hanke said doesn't change the "overall conclusions." He said it "simply demonstrates the obvious fact that the conclusions contained in our meta-analysis are robust."

But experts have pointed out other issues with the meta-analysis. Chernozhukov also said the paper "excluded a whole bunch of studies," including synthetic control method studies, which evaluate treatment effects. He also questioned the utility of looking at a policy index that considers the U.S. as a whole, lumping all the states together. He said the meta-analysis is "not credible at all."

Among the other six stringency index studies included in the meta-analysis, only one concluded that its findings suggested "lockdowns" had zero effect on mortality. In a review of 24 European countries' weekly mortality rates for the first six months of 2017-2020, the study, published in *CESifo Economic Studies*, found "no clear association between lockdown policies and mortality development." The author and Herby, one of the authors of the working paper, have written for the American Institute for Economic Research, which facilitated the controversial Great Barrington Declaration, an October 2020 statement advocating those at low risk of dying from COVID-19 "live their lives normally to build up immunity to the virus through natural infection," while those at "highest risk" are protected.

The other studies found lockdown policies helped COVID-19 health outcomes. For instance, a CDC study published in the agency's *Morbidity and Mortality Weekly Report* in January 2021, on the experience of 37 European countries from Jan. 23 to June 30, 2020, concluded that "countries that implemented more stringent mitigation policies earlier in their outbreak response tended to report fewer COVID-19 deaths through the end of June 2020. These countries might have saved several thousand lives relative to countries that implemented similar policies, but later."

A working paper from Harvard University's Center for International Development, which looked at 152 countries from the beginning of the pandemic until Dec. 31, 2020, found that "lockdowns tend to significantly reduce the spread of the virus and the number of related deaths." But the effect fades over time, so lengthy (after four months) or second-phase "lockdowns" don't have the same impact.

A study published in *World Medical & Health Policy* in November 2020 — that looked at whether 24 European countries responded quickly enough — found that the fluctuating containment measures, from country to country and over time, "prohibited a clear association with the mortality rate." But it said "the implementation speed of these containment measures in response to the coronavirus had a strong effect on the successful mitigation of fatalities."

Many studies found restrictions worked. Meyerowitz-Katz noted that the working paper authors disagreed with the conclusions of other studies included in the review, pointing to one included in the group of shelter-in-place orders. Meyerowitz-Katz said that study "found that significant restrictions were effective, but is included in this review as estimating a 13.1% INCREASE in fatalities."

That study, by Yale School of Management researchers, published by *The Review of Financial Studies* in June 2021, developed "a time-series database" on several types of restrictions for every U.S. county from March to December 2020. The authors concluded: "We find strong evidence consistent with the idea that employee mask policies, mask mandates for the general population, restaurant and bar closures, gym closures, and high-risk business closures reduce future fatality growth. Other business restrictions, such as second-round closures of low- to medium-risk businesses and personal care/spa services, did not generate consistent evidence of lowered fatality growth and may have been counterproductive." The authors said the study's "findings lie somewhere in the middle of the existing results on how NPIs influenced the spread of COVID-19."

In terms of hard figures on fatality reductions, the study said the estimates suggest a county with a mandatory mask policy would see 15.3% fewer new deaths per 10,000 residents on average six weeks later, compared with a county without a mandatory mask policy. The impact for restaurant closures would be a decrease of 36.4%. But the estimates suggest other measures, including limits on gatherings of 100 people or more, appeared to increase deaths. The authors said one possible explanation of such effects could be that the public is substituting other activities that actually increase transmission of the virus — such as hosting weddings with 99 people in attendance, just under the 100-person limitation.

Another study in the shelter-in-place group is the study by Chernozhukov, Kasahara and Schrimpf, published in the *Journal of Econometrics* in January 2021. It looked at the policies in U.S. states and found that "nationally mandating face masks for employees early in the pandemic … could have led to as much as 19 to 47 percent less deaths nationally by the end of May, which roughly translates into 19 to 47 thousand saved lives." It found cases would have been 6% to 63% higher without stay-at-home orders and found "considerable uncertainty" over the impact of closing schools. It also found "substantial declines in growth rates are attributable to private behavioral response, but policies played an important role as well."

The working paper considered 13 studies that evaluated stay-in-place orders, either alone or in combination with other NPIs. The estimated effect on total fatalities for each study calculated by the authors varied quite widely, from a decrease of 40.8% to an increase of 13.1% (the study above mentioned by Meyerowitz-Katz). The authors then combined the studies into a weighted average showing a 2.9% decrease in mortality from these studies on shelter-in-place orders.

Sizable impact from some NPIs. The working paper actually found a sizable decrease in deaths related to closing nonessential businesses: a 10.6% weighted average reduction in mortality. The authors said this "is likely to be related to the closure of bars." It also calculated a 21.2% weighted average reduction in deaths due to mask requirements, but notes "this conclusion is based on only two studies."

As with the shelter-in-place group, the calculated effects in the specific NPIs group varied widely – from a 50% reduction in mortality due to business closures to a 36% increase due to border closures. The paper said "differences in the choice of NPIs and in the number of NPIs make it challenging to create an overview of the results."

"The review itself does refer to other papers that reported that the lockdowns had a significant impact in preventing deaths," Dr. Lee Riley, chair of the Division of Infectious Disease and Vaccinology at the University of California, Berkeley School of Public Health, told us when we asked for his thoughts on the working paper. "The pandemic has now been occurring long enough that it's not surprising to begin to see many more reports that now contradict each other. As we all know, the US and Europe went through several periods when they relaxed their lockdowns, which was followed by a resurgence of the cases."

Riley said that "many of the studies that this review included may suffer from the classic 'chicken-or-egg' bias. Whenever there was an increase in cases of deaths, lockdowns got instituted so it's not surprising that some of the studies showed no impact of the lockdowns. If there was no surge of cases or deaths, most places in the US did not impose restrictions."

Meyerowitz-Katz noted on Twitter that "the impact of 'lockdowns' is very hard to assess, if for no other reason than we have no good definition of 'lockdown' in the first place. … In most cases, it seems the authors have taken estimates for stay-at-home orders as their practical definition of 'lockdown' (this is pretty common) And honestly, I'd agree that the evidence for marginal benefit from stay-at-home orders once you've already implemented dozens of restrictions is probably quite weak."

But, "if we consider 'lockdown' to be any compulsory restriction at all, the reality is that virtually all research shows a (short-term) mortality benefit from at least some restrictions."

Additional Studies

We've already mentioned two studies beyond those in the working paper: the *Nature* June 2020 study by Imperial College London researchers that estimated interventions in 11 countries in Europe in the first few months of the pandemic reduced transmission and averted 3.1 million deaths; and the *Nature* May 2020 study that estimated cases in mainland China would have been 67-fold greater without several NPIs by the end of February.

There are many more that aimed to evaluate the effectiveness of various mitigation strategies, not included in the working paper's analysis.

- A 2020 unpublished observational study — cited in the working paper as the basis for the Oxford stringency index but not included in the analysis — found that more stringent restrictions implemented more quickly led to fewer deaths. "A lower degree of government stringency and slower response times were associated with more deaths from COVID-19. These findings highlight the importance of non-pharmaceutical responses to COVID-19 as more robust testing, treatment, and vaccination measures are developed." In considering nine NPIs, the authors said the average daily growth rates in deaths were affected by each additional stringency index point and each day that a country delayed reaching an index of 40 on the stringency scale. "These daily differences in growth rates lead to large cumulative differences in total deaths. For example, a week delay in enacting policy measures to [a stringency index of 40] would lead to 1.7 times as many deaths overall," they wrote.

- A more up-to-date study by many of the same authors, posted July 9, 2021, by the journal *Plos One*, looked at data for 186 countries from Jan. 1, 2020, to March 11, 2021, a period over which 10 countries experienced three waves of the pandemic. In the first wave in those countries, 10 additional points on the stringency index — in other words more stringent restrictions — "resulted in lower average daily deaths by 21 percentage points" and by 28 percentage points in the third wave. "Moreover, interaction effects show that government policies were effective in reducing deaths in all waves in all groups of countries," the authors said.
- A Dec. 15, 2020, study in *Science* used data from 41 countries to model which NPIs were most effective at reducing transmission. "Limiting gatherings to fewer than 10 people, closing high-exposure businesses, and closing schools and universities were each more effective than stay-at-home orders, which were of modest effect in slowing transmission," the authors said. "When these interventions were already in place, issuing a stay-at-home order had only a small additional effect. These results indicate that, by using effective interventions, some countries could control the epidemic while avoiding stay-at-home orders." The study, like many others, looked at the impact on the reproduction number of SARS-CoV-2, or the average number of people each person with COVID-19 infects at a given time. It notes that a reduction in this number would affect COVID-19 mortality, and that the impact of NPIs can depend on other factors, including when and for how long they are implemented, and how much the public adhered to them.
- A study in *Nature Human Behaviour* on Nov. 16, 2020, considered the impact on the reproduction number of COVID-19 by 6,068 NPIs in 79 territories, finding that a combination of less intrusive measures could be as effective as a national lockdown. "The most effective NPIs include curfews, lockdowns and closing and restricting places where people gather in smaller or large numbers for an extended period of time. This includes small gathering cancellations (closures of shops, restaurants, gatherings of 50 persons or fewer, mandatory home working and so on) and closure of educational institutions." The authors said this doesn't mean an early national lockdown isn't effective in reducing transmission but that "a suitable combination (sequence and time of implementation) of a smaller package of such measures can substitute for a full lockdown in terms of effectiveness, while reducing adverse impacts on society, the economy, the humanitarian response system and the environment." They found that "risk-communication strategies" were highly effective, meaning government education and communication efforts that would encourage voluntary behavior. "Surprisingly, communicating on the importance of social distancing has been only marginally less effective than imposing distancing measures by law."
- Another study in *Nature* in June 2020 looked at 1,700 NPIs in six countries, including the United States. "We estimate that across these 6 countries, interventions prevented or delayed on the order of 61 million confirmed cases, corresponding to averting approximately 495 million total infections," the authors concluded. "Without these policies employed, we would have lived through a very different April and May" in 2020, Solomon Hsiang, the lead researcher and director of the Global Policy Laboratory at the University of California at Berkeley, told reporters. The study didn't estimate how many lives were saved, but Hsiang said the benefits of the lockdown are in a sense invisible because they reflect "infections that never occurred and deaths that did not happen."

- A more recently published study in *Nature Communications* in October, by U.K. and European researchers, found that closures of businesses and educational institutions, as well as gathering bans, reduced transmission during the second wave of COVID-19 in Europe — but by less than in the first wave. “This difference is likely due to organisational safety measures and individual protective behaviours—such as distancing—which made various areas of public life safer and thereby reduced the effect of closing them,” the authors said. The 17 NPIs considered by the study led to median reductions in the reproduction number of 77% to 82% in the first wave and 66% in the second wave.
- A February 2021 study in *Chaos: An Interdisciplinary Journal of Nonlinear Science* estimated large reductions in infections (by 72%) and deaths (by 76%) in New York City in 2020, based on numerical experiments in a model. “Among all the NPIs, social distancing for the entire population and protection for the elderly in public facilities is the most effective control measure in reducing severe infections and deceased cases. School closure policy may not work as effectively as one might expect in terms of reducing the number of deceased cases,” the authors said.

Near the end of his lengthy Twitter thread on the working paper, Meyerowitz-Katz said he agrees that “a lot of people originally underestimated the impact of voluntary behaviour change on COVID-19 death rates – it’s probably not wrong to argue that lockdowns weren’t as effective as we initially thought.” He pointed to the *Nature Communications* study mentioned above, showing less of an impact from NPIs in a second wave of COVID-19 and positing individual safety behaviors were playing more of a role in that second wave.

“HOWEVER, this runs both ways,” Meyerowitz-Katz said. “[I]t is also quite likely that lockdowns did not have the NEGATIVE impact most people propose, because some behaviour changes were voluntary!”

He and others examined whether lockdowns were more harmful than the pandemic itself in a 2021 commentary piece in *BMJ Global Health*. They concluded that “government interventions, even more restrictive ones such as stay-at-home orders, are beneficial in some circumstances and unlikely to be causing harms more extreme than the pandemic itself.” Analyzing excess mortality suggested that “lockdowns are not associated with large numbers of deaths in places that avoided large COVID-19 epidemics,” such as Australia and New Zealand, they wrote.

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