


Comment on "A literature review and meta-analysis of the effects of lockdowns on COVID-19 mortality"

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1 Comment on “A literature review and meta-analysis of the effects of
2 lockdowns on COVID-19 mortality”

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10 **Abstract**

11 In a recent working paper, Herby et al.¹ conduct a systematic review and meta-analysis of the
12 effects of lockdowns on COVID-19 mortality. Based on their results, they conclude that “lockdowns
13 have had little to no public health effects” and that “lockdowns should be rejected out of hand as a
14 pandemic policy instrument” (p. 2). These strong conclusions have quickly been taken up by the
15 public media. Here, we would like to comment on the paper by Herby et al., thereby raising concerns
16 regarding the subject and conduct of their meta-analysis. Based on these concerns, we argue that
17 their meta-analysis lacks methodological rigor and should thus not be considered as policy advice.
18 In addition, we point towards more general issues regarding the conduct of meta-analyses on the
19 effects of non-pharmaceutical interventions.

20 **Keywords:** lockdown; non-pharmaceutical interventions; COVID-19; literature review and meta-
21 analysis; research comment

1 Introduction

Non-pharmaceutical interventions, such as school closures or stay-at-home orders, have been implemented around the world to control the spread of SARS-CoV-2. The effects of non-pharmaceutical interventions on health-related outcomes have been the subject of numerous empirical investigations. In a recent working paper, Herby et al.¹ conduct a systematic review and meta-analysis of these investigations, specifically the empirical effects of lockdowns on COVID-19 mortality. Based on their results, they conclude that “lockdowns have had little to no public health effects” and that “lockdowns should be rejected out of hand as a pandemic policy instrument” (p. 2). Their strong conclusions have quickly been taken up by public media²⁻⁶.

According to the conclusions by Herby et al., the majority of worldwide public health response would be ineffective – a strong finding that should be backed up by equally strong evidence. However, as argued in this comment, we are concerned that their review contains several weaknesses that raise serious concerns about its validity. Importantly, the aim of this comment is not to make arguments against or in favor of the authors’ position, but to argue that their systematic review and meta-analysis lack the methodological rigor to be considered in policy advice. Our comments thereby point towards general issues regarding the conduct of meta-analysis of the effects of non-pharmaceutical interventions (NPIs).

2 Lockdown is an unspecific, ill-defined term and thus an inappropriate starting point for meta-analyses

Lockdown is a commonly used term to refer to a broad set of NPIs that governments implemented to control transmission, e. g. school closures, business closures, gathering bans, or shelter-in-place orders (SIPOs). Governments often differed in the specific kinds of NPIs that they implemented as part of their lockdown. As such, people around the world associate lockdowns with different kinds of NPIs. Commonly though, the lockdown is associated with a combination of multiple specific NPIs, most often culminating in the strict order to stay at home for all but essential purposes.

Herby et al. vaguely define the lockdown as “any policy consisting of at least one NPI” (p. 5). This implies that the policies and corresponding NPIs can vary from country to country. Since there was substantial variation in the policies and NPIs between countries, it is unclear how to

50 conduct a meta-analysis when the intervention is not the same across populations and can thus
51 not be compared. If the lockdown can be anything from a single NPI to a combination of multiple
52 NPIs, from wearing face masks to SIPOs, then the effects are hardly comparable across studies
53 investigating different populations and interventions.

54 More generally, we argue that meta-analyses for the effects of lockdowns are misdirected. It
55 would be more reasonable to conduct meta-analyses for specific NPIs as done in related work^{7,8} and
56 in part also by Herby et al. (p. 38, Tbl. 7). The reason is that people have a shared understanding
57 about the meaning of these specific NPIs, so that they can be defined more clearly and are thus
58 also more comparable across populations than the unspecific, ill-defined “lockdown”. In addition, we
59 consider meta-analyses for specific NPIs more helpful for policy makers, who have to choose between
60 specific NPIs and are therefore interested in knowing their varying effectiveness (and costs).

61 **3 If anything, the lockdown effect is *not* the effect of** 62 **single NPIs but the combined effect of multiple NPIs**

63 Without a precise definition of the lockdown, Herby et al. proceed to their meta-analysis. Here,
64 they split the included studies into three groups, each measuring the lockdown effect differently as
65 (1) a change in a stringency index, (2) the implementation of a SIPO, and (3) the implementation of
66 specific NPIs such as school or business closures. The problem with each of these assessments is that
67 the authors associate the lockdown effect with the effect of specific NPIs rather than their combined
68 effect.

69 We think that the most appropriate way to determine the lockdown effect would be to derive
70 it from specific effect estimates of all constituting NPIs. In other words, instead of equaling the
71 effects of lockdowns with the individual effect of school closures, business closures, or SIPOs, it
72 seems more appropriate to combine effect estimates of the individual measures. For instance, Herby
73 et al. include SIPOs in their meta-analysis, which were typically the last NPIs that governments
74 implemented^{9,10}. Based on this, the lockdown could be defined as the set of NPIs culminating in
75 a SIPO. The effect of lockdown could then be expressed as the sum of the effects of specific NPIs
76 culminating in the SIPO. This requires to have estimates of the effects of each single NPI which
77 describe the additional effect on top of all other NPIs, as exactly provided by some model-based

78 approaches⁹⁻¹¹. This is in contrast to the procedure of Herby et al., who provide meta-estimates
79 only for the individual effects of specific NPIs (p. 33, Tbl. 5 and p. 38, Tbl. 7), and not their
80 combined effect.

81 **4 Mortality is not the only relevant and not a conclusive** 82 **measure of NPI effectiveness**

83 Herby et al. analyze the effects of NPIs with population-level mortality as the outcome. They exclude
84 evidence based on other outcomes arguing that “mortality is hierarchically the most important
85 outcome” (p. 8). Nevertheless, the authors arrive at the general conclusion that “[...] the benefits
86 of lockdowns [...] are marginal at best” (p. 43). We believe that such a strong overall conclusion
87 cannot be justified given the limited evidence taken into account by Herby et al.

88 While mortality is an important outcome, it is clearly not the only relevant outcome when
89 evaluating the benefits of NPIs during a pandemic. Interventions that reduce the number of new
90 infections can have downstream effects on various outcomes, including disease-related deaths, cases
91 of severe illness and hospitalizations, cases with long-term health effects after infection, the efficiency
92 of testing and contact tracing, the overall burden on the healthcare system and on health workers,
93 the burden on other public services due to quarantine or isolation of individuals, the probability of
94 emergence of new genetic variants in infected individuals, and potentially many more^{12,13}.

95 Thus, from a public health and infectious disease control perspective, evidence from mortality
96 data cannot be regarded as conclusive with respect to the overall benefits of interventions. This is
97 also because the majority of interventions implemented by governments aimed at either reducing
98 contacts (e. g. through social distancing) or decreasing the probability of transmission upon contact
99 (e. g. through mandatory wearing of face masks). Evaluating the effectiveness of interventions only
100 in terms of mortality is hardly conclusive in this sense because deaths are only distantly related to
101 transmission reduction. In contrast, if for example a negative result regarding the effect of NPIs on
102 transmission – the main causal mechanism by which these interventions are intended to work – was
103 obtained, there would have been more reason to question their overall effectiveness. Unfortunately,
104 studies assessing the effects of interventions on transmission were not included in the meta-analysis
105 by Herby et al., even if they used mortality data to inform their estimates. Finally, the effect

106 of transmission-reducing interventions on the number of avoided deaths directly depends on the
107 state and trend of an epidemic, which varies both over time and between populations. Therefore,
108 synthesizing effect estimates by the number of percentage of avoided deaths has limited meaning,
109 and it would be preferable to measure NPI effects by changes in the growth rate of deaths instead.

110 **5 Highly restrictive eligibility criteria are no replacement** 111 **for rigorous quality assessment**

112 Herby et al. exclude a variety of commonly used study types to assess the effects of NPIs based on
113 their methodological approaches, including synthetic control studies, studies using counterfactual
114 projections and studies using transmission models with parameters representing intervention effects.
115 The authors argue that such studies are inappropriately designed for answering their intended
116 research question. In the subsequent meta-analysis, four criteria were used to assess the quality of
117 the included studies, namely 1) whether the study was peer-reviewed, 2) whether the study used a
118 long enough study period, 3) whether the study did not find an effect in the first 14 days after NPI
119 implementation, and 4) whether the corresponding author is associated with an institute from the
120 social sciences. None of these criteria assess the concrete methods and models used in the study.
121 Overall, it appears that the authors assume to have ensured the quality of studies already in the
122 selection stage and felt that a subsequent rigorous quality assessment would be superfluous.

123 We believe such an approach to be problematic. The highly restrictive study selection by Herby
124 et al. seems to neglect that there is currently no consensus on best practices or an established
125 scientific framework in evaluating the effectiveness of NPIs. At the same time, the novelty of the
126 research question and setting means that practices from other fields should not simply be imposed
127 on the subject by declaring other study designs as inappropriate without substantial evidence for
128 them being systematically flawed. Moreover, restricting the sample of studies to a certain design
129 does not yet ensure sufficient quality, and should thus not replace a thorough quality assessment of
130 methods and models when conducting a meta-analysis.

131 The eligibility criteria used in the present review restrict studies to one specific type, namely
132 those with a “counterfactual difference-in-difference approach” (p. 8) that measure NPI effects in
133 terms of avoided deaths. We see no convincing evidence that this is the only appropriate setup for an

134 analysis of NPI effects, and not even a particularly elaborate or unbiased one. We are thus concerned
135 that the authors have excluded well-recognized, high-quality studies^{9,14-18}, some of which follow a
136 very similar logic, i. e. using panel data to estimate intervention effects by exploiting both variation
137 over time and between populations. Choosing less restrictive eligibility criteria for the study design
138 and conducting a more rigorous quality assessment would have meant more effort but also created
139 the opportunity to assess whether different study designs yield different findings. This could have
140 produced interesting insights also from a methodological perspective and would have avoided the
141 risk of an unbalanced consideration of the available evidence. Interestingly, the authors themselves
142 point to the potential of systematic differences between different methodological approaches when
143 contrasting studies from social sciences with studies from other sciences (Tbl. 4, p. 31).

144 **6 Conclusions**

145 Based on a recent literature review and meta-analysis, Herby et al.¹ conclude that “lockdowns
146 have had little to no public health effects” and that “lockdowns should be rejected out of hand as
147 a pandemic policy instrument” (p. 2). In this comment, we raised several concerns regarding the
148 subject and conduct of their meta-analysis. In particular, we lament their definition of a lockdown
149 and argue that the effects of lockdowns should be measured differently, noting that meta-analyses of
150 the effects of lockdowns are a complicated endeavor in general. We further argue that mortality is
151 not a conclusive measure of lockdown effectiveness and that the highly restrictive eligibility criteria
152 used by the authors exclude valuable evidence without ensuring the quality of the included studies.

153 Our concerns were specific to this meta-analysis, but we also have more general concerns
154 regarding meta-analyses on the effects of non-pharmaceutical interventions (NPIs). Empirical
155 investigations into the effects of NPIs are often based on different sets of populations with different
156 population sizes. It is thus unclear how to weigh the results from these studies in a meta-analysis,
157 especially because many studies widely overlap in the populations and data analyzed. Furthermore,
158 based on a systematic methodology review that we are currently conducting¹⁹, we found substantial
159 methodological variation in empirical studies on the effects of NPIs. Herby et al. evaded this variation
160 by excluding large sets of studies based on their methods, which is problematic. Considering this
161 methodological variation during meta-analysis would have likely presented a great challenge.

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