CORRESPONDENCE

# Open Schools, Covid-19, and Child and Teacher Morbidity in Sweden

**TO THE EDITOR:** Ludvigsson et al. (Feb. 18 issue) reported on open schools and child and teacher morbidity in Sweden during the coronavirus 2019 (Covid-19) pandemic.[1] Sweden allowed Covid-19 to spread in the hope that the population would develop "herd immunity." The younger the patients, the fewer deaths due to Covid-19 are reported.[1] Data reported in Statista showing the distribution of deaths according to age group[2] indicate that the older the patients, the more deaths were reported. So, should we recommend this type of herd immunity policy against Covid-19?

Sweden has a total population of 10.3 million and had 10,185 deaths due to Covid-19 as of January 14, 2021. In contrast, Taiwan implemented a robust "digital fence," using mandatory coronavirus apps to isolate asymptomatic and presymptomatic carriers of the severe acute respiratory syndrome 2 (SARS-CoV-2) and to prevent contact with uninfected persons. Infection testing plays a key role in identifying infected persons. Taiwan has a total population of 23.8 million and had only 7 deaths due to Covid-19 as of January 14, 2021.

Health policy should be immediately updated on the basis of the consequences of policy scores or outcomes. The number of daily deaths due to Covid-19 can be used to score the performance of individual policies in preventing deaths.

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No potential conflict of interest relevant to this letter was reported.

This letter was published on March 1, 2021, at NEJM.org.

1. Ludvigsson JF, Engerström L, Nordenhäll C, Larsson E. Open schools, Covid-19, and child and teacher morbidity in Sweden. N Engl J Med 2021;384:669-71.
2. Statista. Number of coronavirus (COVID-19) deaths in Sweden, by age groups. 2021 (https://www.statista.com/statistics/1107913/number-of-coronavirus-deaths-in-sweden-by-age-groups/).

DOI: 10.1056/NEJMc2101280

**TO THE EDITOR:** We would argue that the focus on morbidity in the correspondence from Ludvigsson et al. is of limited relevance as a means to analyze the effects of school closure on Covid-19 transmission. Children are as susceptible to Covid-19 as adults and have a similar likelihood of transmitting it.[1] Decisions to close schools were made in an attempt to limit the spread of the virus.[2] Consequently, to investigate the efficiency of these measures, the focus of an analysis should logically be on outbreaks or on household transmission and should allow assessment of the direct or indirect effects of schools on the outcome. However, household transmission is mentioned only as a limitation of the analysis. Outbreaks, on the other hand, are not discussed, despite recent data from the Swedish Public Health Agency for weeks 46 through 50 of 2020, reporting a total of 467 outbreaks in schools (high schools excluded), which corresponds to 48% of the 967 outbreaks reported during this period.[3] This directly contradicts the authors' findings and should be discussed, along with other recent contradictory findings (e.g., see Hyde[1]).

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No potential conflict of interest relevant to this letter was reported.

This letter was published on March 1, 2021, at NEJM.org.

1. Hyde Z. COVID-19, children and schools: overlooked and at risk. Med J Aust 2020;213(10):444-446.e1.
2. COVID-19 in children and adolescents: a knowledge summary — version 2. Public Health Agency of Sweden, 2020 (https://www.folkhalsomyndigheten.se/contentassets/1e5e09395b9a4f498ff635cdd2b1a888/covid-19-children-adolescents.pdf).

3. Veckorapport om covid-19, vecka 50. Public Health Agency of Sweden, 2020 (https://www.folkhalsomyndigheten.se/globalassets/statistik-uppfoljning/smittsamma-sjukdomar/veckorapporter-covid-19/2020/veckorapport-covid-19-v50-final.pdf).

DOI: 10.1056/NEJMc2101280

**THE AUTHOR REPLIES:** My colleagues and I thank Drs. Takefuji and Besançon, Steadson, and Flahault for their comments on our peer-reviewed research letter. Sweden's early strategy (corresponding to the study period of our report) had several components and aims.[1] One was to use mitigation rather than suppression to minimize transmission of Covid-19 and reduce the number of people who would become ill simultaneously. Another involved protecting those most at risk for death (people 70 years of age or older and certain other risk groups). A third concerned safeguarding other health outcomes and health determinants, including keeping elementary schools open. Avoiding a health care collapse was a fourth component. Another component aimed to ensure that society could continue to function normally. Sweden currently ranks 20th in deaths per capita among 48 European countries and territories.[2]

We agree with Dr. Takefuji that infection testing plays a key role and that health policies need to be continuously updated. According to the Blavatnik School of Government at Oxford University,[3] Sweden had a lockdown index of 69.44 (maximum score, 100, with higher numbers indicating more stringent lockdown measures) as of January 19, 2021. The index score was 64.81 in Norway, 71.76 in the United States, and 63.89 in France.

We agree that household transmission and school outbreaks are relevant, but they were beyond the scope of our report. A recent meta-analysis estimated the mean household secondary attack rate from adults as 15.2%, as compared with an attack rate of 7.9% from children.[4] Although numbers were small and the findings were not statistically significant, we believe these data indicate that there has been less transmission from children than from adults. It is notable that Swedish schools have allowed children to attend only if they are without Covid-19 symptoms; accordingly, most cases among schoolchildren are likely to be asymptomatic. The recent meta-analysis estimated that persons with asymptomatic infection have a secondary attack rate 24 times lower than that for persons with symptomatic infection.[4]

During a 1-month period in 2020 (weeks 46 through 50), Sweden reported 467 outbreaks in schools or kindergartens. Of these outbreaks, 330 occurred in Sweden's 4800 elementary schools. Elementary schools have a mean of 200 pupils (plus teachers); an outbreak was defined as two or more simultaneous cases of Covid-19. Schools are likely to account for a high proportion of outbreaks because Swedish authorities do not register household outbreaks.

I would also like to provide additional information on mortality. During the 4 months of pandemic exposure in Sweden (March through June 2020), there were 69 deaths among children 1 to 16 years of age. During the same 4 months in 2019, there were 55 deaths in that age group, and during the 4 months before the pandemic began (November 2019 through February 2020), there were 65 deaths. For children 1 to 6 years of age, the numbers were 18, 24, and 29 deaths, respectively, and for children 7 to 16 years of age, the numbers were 51, 31, and 36. During March through June 2020, none of the deaths among children 1 to 16 years old were reported as deaths from Covid-19 (Linder R, National Board of Health and Welfare: personal communication). The Supplementary Appendix of our published letter (available at NEJM.org) has been updated with additional mortality data.

We stand by our conclusion that severe Covid-19 in children is rare in Sweden despite schools being open.

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Since publication of his letter, the author reports no further potential conflict of interest.

This letter was published on March 1, 2021, at NEJM.org.

1. Ludvigsson JF. The first eight months of Sweden's COVID-19 strategy and the key actions and actors that were involved. Acta Paediatr 2020;109:2459-71.
2. Coronavirus (https://www.worldometers.info/coronavirus/).
3. Coronavirus Government Response Tracker. Blavatnik School of Government and University of Oxford (https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker).
4. Madewell ZJ, Yang Y, Longini IM Jr, Halloran ME, Dean NE. Household transmission of SARS-CoV-2: a systematic review and meta-analysis. JAMA Netw Open 2020;3(12):e2031756.

DOI: 10.1056/NEJMc2101280