






Review Article

Urgent need to strengthen school health in Asia and the Pacific islands

Jun Kobayashi,^{1,2,3}  Rie Takeuchi,^{1,2,4}  Yuko Toyama,⁵ Ernesto R. Gregorio Jr.,³ Hamsu Kadriyan,⁶ Crystal Amiel M. Estrada,³  Makoto Motomura,⁷ Norie Wake,⁵ Kyoko Yamada,⁸ Ryuji Ishikawa⁹ and Minoru Takakura¹⁰
Departments of ¹Global Health, ¹⁰Health Promotion & Development, Graduate School of Health Sciences, ⁵Faculty of Medicine, School of Health Sciences, ⁷Faculty of Humanities and Social Sciences, ⁸Global Education Institute, ⁹Faculty of Global and Regional Studies, University of the Ryukyus, ²Japanese Consortium for Global School Health and Research, Nakagami-gun, ⁴JICA Okinawa, Urasoe City, Okinawa, Japan, ³College of Public Health, University of the Philippines Manila, Manila, Philippines, ⁶Faculty of Medicine, Mataram University, Kota Mataram, Indonesia

Abstract In Asia and the Pacific island region, strengthening of school health activities and measures is urgently recommended to deal with the impact of the increasing risk of potential school closures due to continuation of the coronavirus disease 2019 (COVID-19) pandemic in 2021. As the incidence of COVID-19 in 2020 was relatively low in these regions, many of the countries were able to avoid prolonged school closures. However, even if vaccination is expanded in the future and the pandemic tends to come to an end, the risk of SARS-CoV-2 variants spreading among children will also increase, and the possibility of having to close schools again will also increase.

Key words Asia, COVID-19, Pacific island, school closure, school health.

Experience in minimizing school closures

Many countries in East Asia, Southeast Asia, and the Pacific island region either did not close schools or, if they did, they succeeded in doing so quickly and only for a very short time due to the coronavirus disease 2019 (COVID-19) pandemic. For example, in Japan, schools were closed during the first wave of the pandemic at the beginning of 2020 but not during the second wave after July or the third wave at the end of 2020. The infection rate was kept low without school closures, possibly because the children were not the primary carriers of the virus but also as a result of the effectiveness of infection control in the schools following the strengthening of school health capacity over the years in these regions. In Okinawa Prefecture, Japan, with a population of 1 million, the number of COVID-19 clusters reported in 2020 was 86, but only five clusters occurred in educational institutions,¹ and only 3.5% of the estimated infection sources were located in schools or nursery centers.² The Ministry of Education, Culture, Sports, Science, and Technology of Japan reported that, among the children who were infected with COVID-19, 79% of primary school children and 63% of secondary school children were estimated to have been infected by their family members, whereas 4% and 8%, respectively, of these children were

estimated to have been infected in schools. This pattern was not observed among high school students, in whom the main estimated infection sources were schools (25%), family members (33%), and from unknown sources (34%).³

Most of the Pacific island countries closed schools for 2–4 weeks at the beginning of the pandemic and then re-opened them. According to data from the United Nations Children's Fund (UNICEF), between 11 March 2020 and 2 February 2021, schools were not closed on any days in Nauru and Tokelau and were closed 5–6 days in the Marshall Islands and Niue; 11–21 days in Tuvalu, Tonga, Vanuatu, Kiribati, Cook Islands, Singapore, Solomon Islands, and Samoa; and 30 days in Papua New Guinea (PNG).⁴ For example, school closures in PNG started on 6 April 2020, and the government reopened the schools on 4 May 2020,⁵ whereas in Taiwan, the government decided to extend the winter holiday for another two weeks.⁶

In terms of COVID-19 prevention in schools, Taiwan and some Pacific island countries, such as the Marshall Islands, Micronesia, Samoa, and the Solomon Islands, declared, planned, and implemented several measures, e.g. hygiene and sanitation, social distancing, and ventilation,^{7–12} whereas PNG pointed out their lack of resources for implementing hygiene and sanitation measures.⁵ Taiwan also set the conditions for school closure when a student is infected with COVID-19.¹³ The Ministry of Education in Taiwan has a website specific to COVID-19 in which it mentions children's mental health.¹⁴ Similarly, the Ministry of Education, Culture, Sports, Science, and Technology in Japan issued a manual for COVID-19 preventive measures in schools that also mentioned the need for

Correspondence: Jun Kobayashi, MD PhD, Department of Global Health, Graduate School of Health Sciences, University of the Ryukyus, 207 Uehara, Nishihara-cho, Nakagami-gun, Okinawa 903-0215, Japan. Email: junkoba@med.u-ryukyu.ac.jp

Received 27 May 2021; revised 28 June 2021; accepted 12 July 2021.

attention to the mental health of both teachers and the children.¹⁵ However, no specific details on addressing the mental health needs of either group were provided.

Impact of school closures

School closure is an efficient way to contain infectious diseases, and in Japan it is enshrined in Article 20 of the School Health and Safety Act. In the case of localized outbreaks of influenza infection, short-term school closures have effectively controlled the spread of the virus.¹⁶ In the Spanish flu pandemic of 1918, a correlation between early and sufficient long-term school closure and reduced mortality has been estimated.¹⁷ Nationwide school closures have not been experienced in many countries since then. In the current COVID-19 pandemic, school closure was one of several proactive measures taken in many European countries and the USA.

However, school closures caused more negative effects than positive impacts in containing the spread of COVID-19. Despite the short closure period, several review articles have been rapidly published examining health-rated behaviors and mental health conditions as health outcomes. These studies found that the COVID-19 restrictions, including school closure, have had adverse effects on health outcomes in young people.^{18–21} Focusing on individual studies, a study in the USA reported that sedentary behavior increased, and physical activity decreased among children aged 5–13 years during the school closure period. School children engaged in about 90 min of school-related sitting activities and over 8 h of leisure-related sitting activities per day.²² Consequently, the prevalence of overweight among children will increase,²³ whereas children who depend on free meals in schools might experience undernutrition.²⁴ In addition, a Chinese study reported that the prevalence of myopia in elementary school children in 2020 was higher than that before the COVID-19 pandemic, probably due to decreased outdoor activities and increased computer screen time at home.²⁵ Other studies in China showed that the prevalence of behavioral problems among school-aged children increased²⁶ and that anxiety, depression, and stress were the most prevalent symptoms.²⁷ Moreover, life satisfaction among adolescents in Norway decreased compared to that before the COVID-19 pandemic.²⁸ A negative impact of school closure on university students has also been reported in the USA. Alcohol consumption by students increased as time progressed, and those with depression and anxiety increased their alcohol consumption compared to other students.²⁹ In Japan, the negative influence of school closure on suicide was a concern. However, the suicide rate among children and adolescents during the period of school closure did not change;³⁰ rather, suicide cases seemed to increase after reopening of the schools (Fig. 1). Moreover, in research that compared the students' mental health between a school closure group and school reopening group, sleep rhythms, eating habits, and physical activity worsened in the school closure group. However, time spent with family and sleeping were longer in the school closure group.³¹

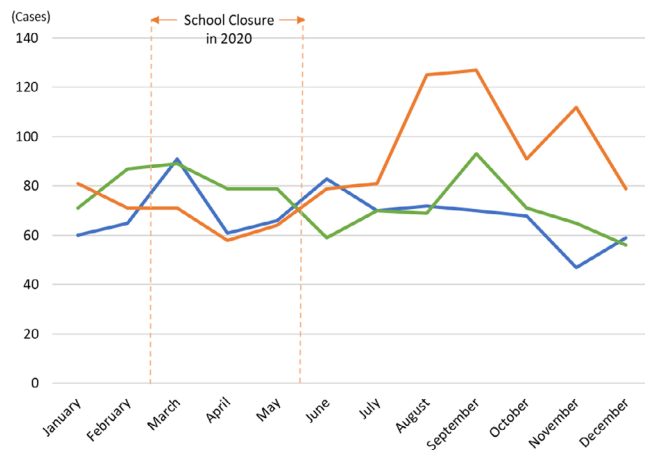


Fig. 1 Number of suicides among students (primary schools, secondary schools, high schools, and universities) by month during 2018–2020. Data from Ministry of Health, Labour and Welfare, Japan. Blue line: 2018; green line: 2019; orange line: 2020. The period between the orange dotted lines indicates the duration of school closure due to the COVID-19 pandemic in 2020 (March to May 2020).

Other issues related to child welfare were also observed during school closures. In the USA, reported cases of child maltreatment decreased during the period of school closure because the interactions between the child and school personnel who usually report maltreatment allegations were removed.³² An increase in parental stress during school closure was also reported in Japan.³³

Need to address the spread of sars-cov-2 variants

The current influx of SARS-CoV-2 variants into the region will make it more challenging for schools to respond. The SARS-CoV-2 VOC20212/01 B.1.1.7 variant, which was first reported in the UK in December 2020 and is currently circulating in Asian countries, is reported to be more transmissible.³⁴ In May 2021, more than 80% of the positive cases in the metropolitan areas of Tokyo and Osaka in Japan were due to infection with this mutated strain. Furthermore, infections and severe illnesses among the young age cohorts have been reported in Japan,³⁵ and the spread of the infection from elementary schools to universities is a potential fear. A double-mutant variant that is causing the rapid spread of infection and a large spike in deaths in India was also detected in Japan, Australia, and Malaysia in May 2020.³⁶ In India, this mutated strain is spreading throughout the country, and it was announced that cases of infection and deaths among young adults might be increasing.³⁷ Although changes in the pathogenicity of this variant have been confirmed, it is assumed that its transmissibility has increased; thus, countries in the Asia-Pacific island region should be on high alert.

In the islands of Asia and the Pacific, it will be necessary to strengthen infection control urgently through school health

activities and the response to adverse effects during school closures. The fact that Japan, Taiwan, and Indonesia have been able to avoid or limit school closures is not simply because there were fewer infections among children but was also due to the effectiveness of strengthening school health activities. In Japan, the education sector developed its action guidelines and made sure that hand washing and infection control during school lunches were thoroughly implemented.

In Okinawa, the number of infections among children has increased since early May 2021, leading to the closure of schools. In Japan, the Ministry of Health, Labour and Welfare has requested an expert committee to discuss changing the vaccination target from 16 years old and above to 12 years old and above as a measure to cope with this situation.³⁸ This is mentioned on the basis of the safety of the Pfizer-BioNTech vaccine,³⁹ which is currently the primary vaccine used in Japan. In Asia and the Pacific islands, it will be necessary to consider lowering the target age for vaccination after confirming the evidence on the safety of vaccination and the incidence of adverse effects in children.

Considering the further influx and spread of mutant strains in the future, it will be necessary not only to expand the vaccination program to children but also to continue to strengthen these activities and to prepare to deal with the impact of additional school closures. Along with the use of distance education, its unintended effects such as Internet addiction will also need to be addressed. We also suggest that there should be more cooperation with the social welfare sector to prevent violence against children. In terms of travel, unlike Japan, Taiwan, Indonesia, the Philippines, and Guam, the Pacific island nations of Micronesia and Melanesia have long had strict restrictions on entry. Although vaccination programs will be promoted and borders might be open for visitors, the possibility of an epidemic due to an influx of variants cannot be ignored. We suggest that, along with strengthening health-care services, we should also begin to strengthen the school health services in these countries. It has also been speculated that SARS-CoV-2 will become a recurrent seasonal infection while continuing to cause some degree of social damage.⁴⁰ To be prepared for this scenario, school health programs must be strengthened with an emphasis on close coordination with the local government units where the schools are located. The basis for the school health system has been promoted in these areas since 2000,⁴¹ and we recommend that the system be further strengthened to continue to manage the effects of the COVID-19 pandemic on schools in this region.

Acknowledgment

This research was funded by a University of the Ryukyus Research Project toward Post-COVID Society grant and the EDU-Port Japan Project as "2021 Research Project" under Ministry of Education, Culture, Sports, Science and Technology, Japan.

Disclosure

This study was supported by a University of the Ryukyus Research Project toward Post-COVID Society grant and the EDU-Port Japan Project as "2021 Research Project" under Ministry of Education, Culture, Sports, Science and Technology, Japan. The sponsor did not play any role in this study.

Authors' contributions

J.K. conceived the present idea. J.K., R.T., and M.T. wrote the manuscript in consultation with Y.T., E.R.G., and H.K. C.M.E., M.M., N.W., K.Y., and R.I. contributed to the collection of the information. All of the authors read and approved the final manuscript.

References

- 1 Okinawatimes.co.jp [homepage on the internet]. Okinawa Times; Article on 9 January 2021. [Cited 2021 May 6]. Available from: <https://www.okinawatimes.co.jp/articles/-/690135>. [in Japanese]
- 2 Pref.okinawa.jp [homepage on the internet]. Okinawa Prefectural Government; COVID-19 situation in Okinawa between July 2020 and 4th February 2021. [Cited 2021 May 6]. Available from: <https://www.pref.okinawa.jp/site/chijiko/kohokoryu/documents/0701covid.pdf>. [in Japanese]
- 3 Mhlw.go.jp [homepage on the internet]. The Ministry of Education, Culture, Sports, Science and Technology, Japan; Press release 31 March 2021: The situation of COVID-19 infection in schools. [Cited 2021 May 6]. Available from: <https://www.mhlw.go.jp/content/10900000/000774320.pdf>. [in Japanese]
- 4 Unicef.org. [homepage on the internet]. UNICEF COVID-19 and School Closures. [Cited 2021 April 20]. Available from: <https://data.unicef.org/resources/one-year-of-covid-19-and-school-closures/>
- 5 Education.gov.pg [homepage on the internet]. Department of Education, Papua New Guinea; COVID-19 Education Emergency Response and Recovery Plan as of 4th of May 2020. [Cited 2021 April 28]. Available from: [https://www.education.gov.pg/documents/PNG-COVID-19-Education-Response-and-Recovery-Plan-\(Final-Draft-04-05-2020\).pdf](https://www.education.gov.pg/documents/PNG-COVID-19-Education-Response-and-Recovery-Plan-(Final-Draft-04-05-2020).pdf)
- 6 Cpd.moe.gov.tw [homepage on the internet]. Ministry of Education, Taiwan; Important notification No. 1090011636A. [Cited 2021 April 28]. Available from: https://cpd.moe.gov.tw/page_two.php?id=34054. [in Chinese]
- 7 Mtshc.com [homepage on the internet]. Republic of the Marshall Islands; Proclamation Declaring State of Health Emergency due to the Global Public Health Emergency of International Concern on the 2019 Novel Coronavirus. [Cited 2021 April 28]. Available from: <http://mtshc.com/rmihealth/attachments/article/205/Proclamation%20Declaring%20State%20of%20Emergency%20due%20to%20the%20nCoV.PDF>
- 8 Hsa.gov.fm [homepage on the internet]. Federated States of Micronesia, Department of Health and Social Affairs; FSM National Taskforce on COVID-19. Second Update on the Implementation of the FSM COVID-19 Framework. [Cited 2021 April 28]. Available from: https://hsa.gov.fm/wp-content/uploads/2020/09/2nd-FSM-COVID-19-Update-V3-_final-002.pdf
- 9 Cpd.moe.gov.tw [homepage on the internet]. Ministry of Education, Taiwan; Important notification No. 1090015836. [Cited 2021 April 28]. Available from: https://cpd.moe.gov.tw/page_two.php?id=33939. [in Chinese]

- 10 Cpd.moe.gov.tw [homepage on the internet]. Ministry of Education, Taiwan; Important notification No. 1090015863. [Cited 2021 April 28]. Available from: https://cpd.moe.gov.tw/page_two.php?id=33943. [in Chinese]
- 11 Iresource.gov.sb [homepage on the internet]. Solomon Islands iResource, Educational Resources from the Ministry of Education and Human Resources Development; Covid 19 Information for Schools, Information for School Leaders, School Leadership during COVID-19. [Cited 2021 June 24]. Available from: <http://www.iresource.gov.sb/2020/10/14/covid-19-information-for-schools/>
- 12 Mesc.gov.ws. [homepage on the internet]. Government of Samoa, Ministry of Education, Sports, and Culture; Samoa Education Sector COVID Response Plan. [Cited 2021 June 24]. Available from: <https://www.mesc.gov.ws/wp-content/uploads/2020/10/Samoa-Education-Sector-COVID-Response-Plan.pdf>
- 13 Cpd.moe.gov.tw [homepage on the internet]. Ministry of Education, Taiwan; Important notification No. 1090019261. [Cited 2021 April 28]. Available from: https://cpd.moe.gov.tw/page_two.php?id=33943. [in Chinese]
- 14 Cpd.moe.gov.tw [homepage on the internet]. Ministry of Education, Taiwan; COVID-19 special site. [Cited 2021 April 28]. Available from: https://cpd.moe.gov.tw/index_new.php?guid=BD28807E-9D44-A1D4-D795-3408DA587793. [in Chinese]
- 15 Mext.go.jp [homepage on the internet]. The Ministry of Education, Culture, Sports, Science and Technology, Japan; Hygiene management manual for COVID-19 prevention in schools – New lifestyle in schools – ver.6. [Cited 2021 April 28]. Available from: https://www.mext.go.jp/content/20210428-mxt_kouhou01-000004520_1.pdf. [in Japanese]
- 16 Uchida M, Kaneko M, Yamamoto H, Honda T, Kawa S. Effects of school closure during influenza A/H1N1 pandemic in 2009 in Japan. *Nihon Eiseigaku Zasshi*. 2013; **68**(2): 103–17. [in Japanese].
- 17 Hatchett RJ, Mecher CE, Lipsitch M. Public health interventions and epidemic intensity during the 1918 influenza pandemic. *Proc. Natl. Acad. Sci. USA* 2007; **104**(18): 7582–7.
- 18 Cachón-Zagalaz J, Sánchez-Zafra M, Sanabrias-Moreno D, González-Valero G, Lara-Sánchez AJ, Zagalaz-Sánchez ML. Systematic review of the literature about the effects of the COVID-19 pandemic on the lives of school children. *Front. Psychol.* 2020; **11**: 569348. <https://doi.org/10.3389/fpsyg.2020.569348>
- 19 Panda PK, Gupta J, Chowdhury SR *et al.* Psychological and behavioral impact of lockdown and quarantine measures for COVID-19 pandemic on children, adolescents and caregivers: a systematic review and meta-analysis. *J. Trop. Pediatr.* 2021; **67**(1): fmaa122. <https://doi.org/10.1093/tropej/fmaa122>.
- 20 López-Bueno R, López-Sánchez GF, Casajús JA, Calatayud J, Tully MA, Smith L. Potential health-related behaviors for pre-school and school-aged children during COVID-19 lockdown: a narrative review. *Prev. Med.* 2021; **143**: 106349. <https://doi.org/10.1016/j.ypmed.2020.106349>
- 21 Stockwell S, Trott M, Tully M *et al.* Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review. *BMJ Open Sport Exerc Med.* 2021; **7**: e000960. <https://doi.org/10.1136/bmjsem-2020-000960>
- 22 Dunton GF, Do B, Wang SD. Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the U.S. *BMC Public Health* 2020; **20**(1): 1351. <https://doi.org/10.1186/s12889-020-09429-3>
- 23 Rundle AG, Park Y, Herbstman JB, Kinsey EW, Wang YC. COVID-19-related school closings and risk of weight gain among children. *Obesity* 2020; **28**(6): 1008–9. <https://doi.org/10.1002/oby.22813>
- 24 The Lancet Diabetes Endocrinology. Food for thought during school closures. *Lancet Diabetes Endocrinol.* 2020; **8**(11): 869. [https://doi.org/10.1016/S2213-8587\(20\)30346-6](https://doi.org/10.1016/S2213-8587(20)30346-6)
- 25 Wang J, Li Y, Musch DC *et al.* Progression of myopia in school-aged children after COVID-19 home confinement. *JAMA Ophthalmol.* 2021; **139**(3): 293–300. <https://doi.org/10.1001/jamaophthmol>
- 26 Liu Q, Zhou Y, Xie X *et al.* The prevalence of behavioral problems among school-aged children in home quarantine during the COVID-19 pandemic in China. *J. Affect. Disord.* 2021; **279**: 412–6. <https://doi.org/10.1016/j.jad.2020.10.008>
- 27 Tang S, Xiang M, Cheung T, Xiang YT. Mental health and its correlates among children and adolescents during COVID-19 school closure: the importance of parent-child discussion. *J. Affect. Disord.* 2021; **279**: 353–60. <https://doi.org/10.1016/j.jad.2020.10.016>
- 28 Soest TV, Bakken A, Pedersen W, Sletten MA. Life satisfaction among adolescents before and during the COVID-19 pandemic. *Tidsskr Nor Laegeforen.* 2020; **140**(10). <https://doi.org/10.4045/tidsskr.20.0437>
- 29 Lechner WV, Laurene KR, Patel S, Anderson M, Grega C, Kenne DR. Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings. *Addict. Behav.* 2020; **110**: 106527. <https://doi.org/10.1016/j.addbeh.2020.106527>
- 30 Isumi A, Doi S, Yamaoka Y, Takahashi K, Fujiwara T. Do suicide rates in children and adolescents change during school closure in Japan? The acute effect of the first wave of COVID-19 pandemic on child and adolescent mental health. *Child Abuse Negl.* 2020; **110**(Pt 2): 104680. <https://doi.org/10.1016/j.chiabu.2020.104680>
- 31 Saito M, Kikuchi Y, Lefor AK, Hoshina M. Mental health in Japanese children during school closures due to the COVID-19. *Pediatr. Int.* 2021. <https://doi.org/10.1111/ped.14718>
- 32 Baron EJ, Goldstein EG, Wallace CT. Suffering in silence: how COVID-19 school closures inhibit the reporting of child maltreatment. *J. Public Econ.* 2020; **190**: 104258. <https://doi.org/10.1016/j.jpubeco.2020.104258>
- 33 Hiraoka D, Tomoda A. Relationship between parenting stress and school closures due to the COVID-19 pandemic. *Psychiatry Clin. Neurosci.* 2020; **74**(9): 497–8. <https://doi.org/10.1111/pcn.13088>
- 34 Leung K, Shum MH, Leung GM, Lam TT, Wu JT. Early transmissibility assessment of the N501Y mutant strains of SARS-CoV-2 in the United Kingdom, October to November 2020. *Euro. Surveill.* 2021; **26**(1): 2002106. <https://doi.org/10.2807/1560-7917.ES.2020.26.1.2002106>
- 35 Mhlw.go.jp [homepage on the internet]. The Ministry of Health, Labour and Welfare, Japan; 33rd Advisory Board on COVID-19 Control on 6 May 2021. Analysis and evaluation of latest COVID-19 infection situation. [Cited 2021 May 13]. Available from: <https://www.mhlw.go.jp/content/10900000/00077387.pdf>. [in Japanese]
- 36 Outbreak.info. [homepage on the internet]. India Mutation Report. [Cited 2021 May 12]. Available from: <https://outbreak.info/location-reports?loc=IND>
- 37 Thiagarajan K. Why is India having a covid-19 surge? *BMJ* 2021; **373**: n1124. <https://doi.org/10.1136/bmj.n1124>
- 38 Mhlw.go.jp [homepage on the internet]. The Ministry of Health, Labour and Welfare, Japan; The 22nd Meeting of the Subcommittee on Immunization and Vaccination of the Health Sciences Council. [Cited 2021 June 24]. Available from: <https://www.mhlw.go.jp/content/10601000/000786347.pdf>. [in Japanese]

- 39 Cdc.gov. [homepage on the internet]. Centers for Disease Control and Prevention; Pfizer-BioNTech COVID-19 Vaccine Overview and Safety. [Cited 2021 June 24]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/Pfizer-BioNTech.html>
- 40 Murray CJL, Piot P. The potential future of the COVID-19 pandemic: will SARS-CoV-2 become a recurrent seasonal infection? *JAMA* 2021; **325**(13): 1249–50. <https://doi.org/10.1001/jama.2021.2828>
- 41 Estrada CAM, Gregorio ER Jr, Kanyasan K *et al.* School health promotion in Southeast Asia by Japan and partners. *Pediatr. Int.* 2020; **62**(9): 1029–38.