

# Using Twitter Network Analysis to Study the Impact of the Covid-19 Pandemic on Schools in Asian and African Regions

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## Abstract

The impacts of the Covid-19 outbreak have been significant to many sectors, including schools, students, and teachers. This article is designed to study the impact of the Covid-19 pandemic on schools in Asian and African regions by using Twitter network analysis. NodeXL Pro software was applied to collect tweets related to the issues in any order somewhere in a tweet sent on selected days. The findings showed that the Covid-19 pandemic had caused some detrimental effects on schools and students' learning in Asia and Africa. The conclusion presents some implications and some crucial recommendations that can be implemented to alleviate the current crisis and pave the way for more effective measures to provide affected students with access to better learning experiences in the near future.

## Keywords:

Twitter, Social Network Analysis, Covid-19 Pandemic, School, Student, Learning

## Introduction

Schools in Asia may look different during post Covid-19 pandemic depending on how they cope with the challenges and opportunities brought about by the crisis. The impact of Covid-19 on schools in Asia has been severe and diverse. A news report by World Bank also warns that Covid 19's impact on South Asia's youth could last generations as they face lower earnings potential, lower productivity and lower human capital accumulation (Republica, 2023).

According to a situation analysis by UNICEF (United Nations Children's Fund, 2021), Covid-19 has caused some detrimental impacts. Most notably, there are 760 million children across

Asia estimated to be affected by school closures at the pandemic's peak, with varying degrees of access to remote learning options. Consequently, school closures increased the risk of dropout among certain cohorts, especially for girls, children with disabilities, children who are ethnic minorities, and children who are living in poverty or remote areas. Other than increasing the risk of dropout rate, school closures also greatly affected children's nutrition, health, protection and well-being, as they relied on school feeding programs, health services, and safe spaces provided by the government.

The Covid-19 pandemic has changed the education landscape in many ways, such as accelerating digital transformation, increasing inequality gaps, highlighting new skills and competencies, and reshaping learning environments (Bernard et al., 2020; Human Right Watch, 2020; Reddy, 2022). The impact of the Covid-19 pandemic the school in Africa has also been severe and varied across different countries, levels and groups of students. To illustrate, a study by Human Rights Watch (2020) also found that the Covid-19 pandemic exacerbated existing inequalities and discrimination in African education systems. Some of the negative impacts are reported by some sources (Businessstech, 2021; Reddy, 2022). It is estimated that more than 250 million children across Africa were affected by school closures at the pandemic's peak, with many having limited or no access to remote learning options. With the nationwide school closures, the risk of dropout, especially for girls, children with disabilities, refugees and those living in conflict-affected areas, has significantly surged. Other than the risks mentioned, school closures also affected children's nutrition, health, protection, and well-being, as many relied on school feeding programs, health services and safe spaces. Due to the devastating situation, many challenges are ahead of the school reopening, such as a lack of resources, safety protocols, teacher training, and psychosocial support.

## **Theoretical Framework of the Study**

According to Structural Hole Theory, individuals who span structural holes have access to more diverse and novel information and more bargaining power and control over the flow of information. Structural hole theory can be connected with social network analysis, which studies the patterns and properties of social relations among actors. Social network analysis can help identify structural holes and measure their effects on various outcomes, such as innovation, performance, reputation, or influence. Researchers can gain insights into how network structures shape individual and collective behaviours and outcomes by applying structural hole theory to social network analysis.

## **Research Methodology**

Social network analysis (SNA) is the process of investigating social structures through networks and graph theory. It characterises networked structures in terms of *nodes* (individual actors, people, or things within the network) and the *ties, edges, or links* (relationships or interactions) that connect them." A social network graph contains points and lines connecting those points— similar to a connect-the-dot puzzle. The points represent the actors, and the lines represent the relationships. Centrality refers to a group of metrics that aim to quantify the "importance" or "influence" (in a variety of senses) of a particular node (or group) within a network. One of the examples of common methods of measuring "centrality" is betweenness centrality.

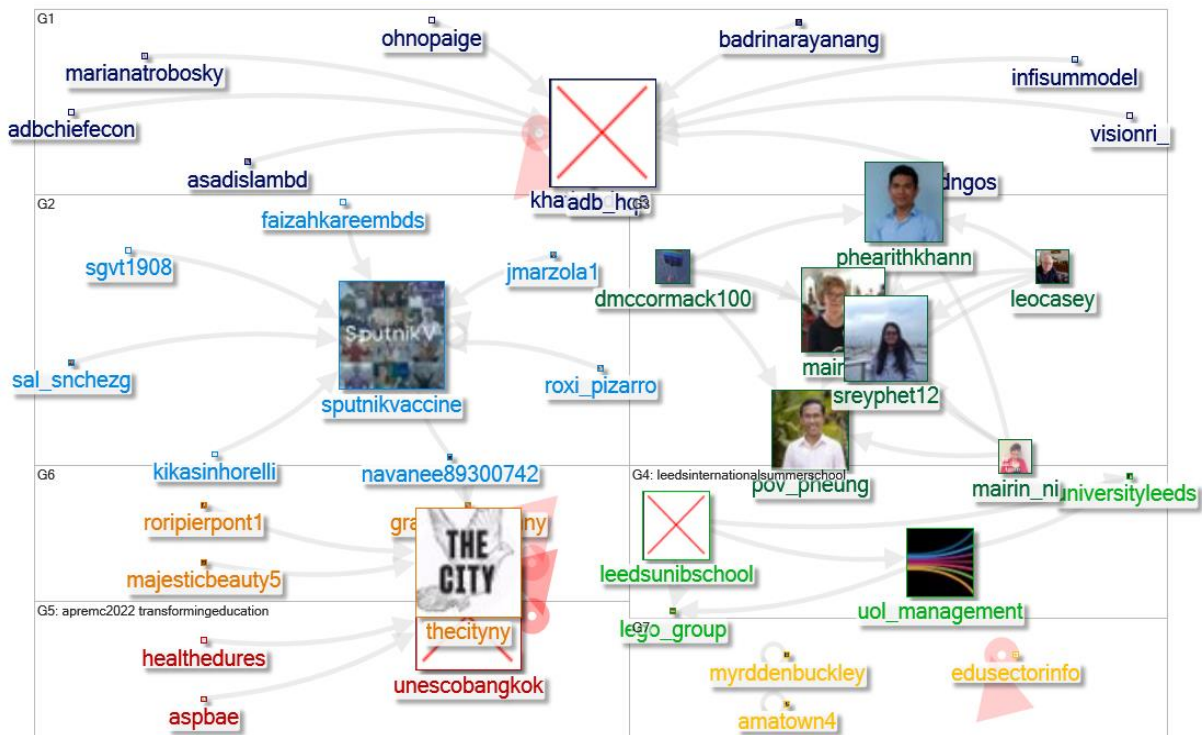
This study has used Twitter data for the purpose of conducting Social Network Analysis. Twitter can be thought of as a conversational microblog. Like bloggers, Twitter users post messages in the streams of all the people who subscribe to them. Twitter's infrastructure, in this way, mirrors the functionality of simple syndication (RSS) feeds. One significant difference between blogs and Twitter is the size of the message—the characteristic that puts the micro in the microblog. Twitter messages are limited to 140 characters. This is because Twitter is designed to be used via SMS (text messages) on mobile phones (SMS messages are limited to 160 characters).

Regarding software selection, NodeXL Pro is one of the most popular open-source templates integrating the most used network metrics and graph layouts. Therefore, the primary data were collected using the built-in Twitter API search tool in NodeXL Pro, which provides live data crawling and social network analysis capabilities. The extraction procedure included identifying and selecting the public usernames to allow for the extraction of their Twitter network edges for further analysis. Once tweets were extracted in raw form, data were cleaned so that groups of networks only contained tweets exclusively about each user. The process eliminated duplicate edges, noisy and redundant data (Smith et al., 2009).

### The Results of Social Network Analysis for the Impact of the Covid-19 Pandemic on Asian Schools

**Figure 1**

*The Network Graph: Asian Schools*



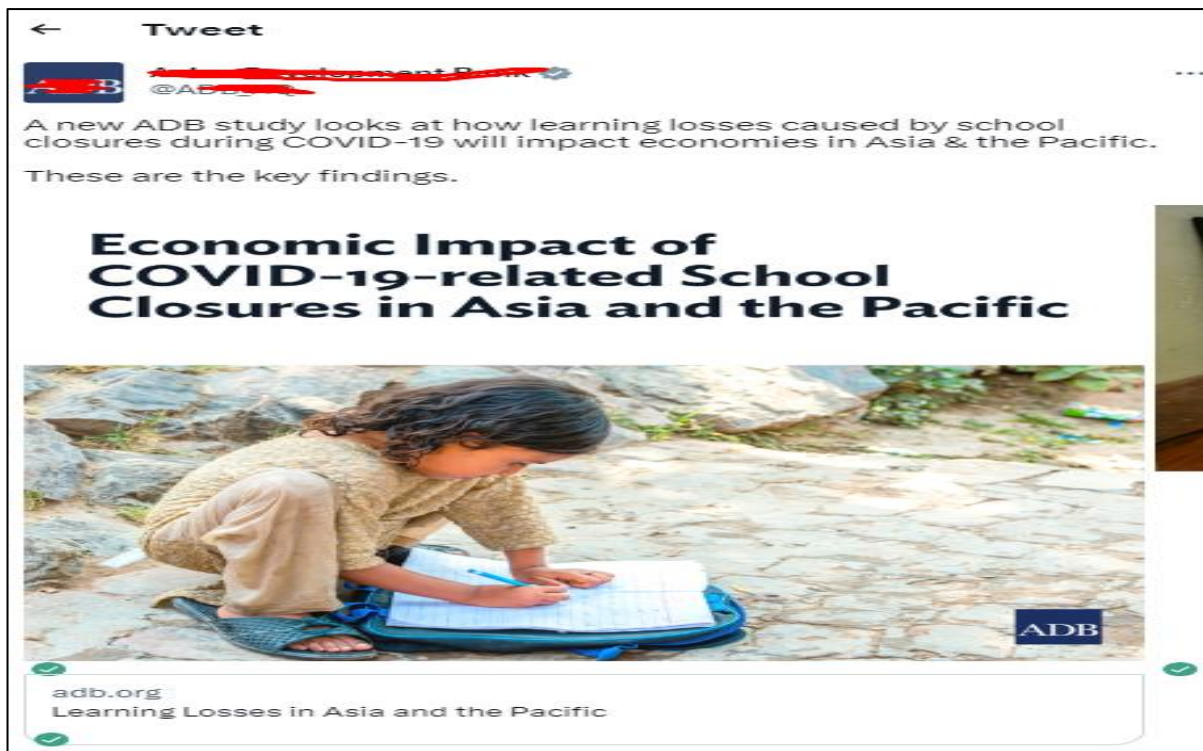
**Table 1**

*Top Twitter User with the Highest Value of Betweenness Centrality: Asian Schools*

Description of the Twitter Account Owner	Value of the Betweenness Centrality
Asia and the Pacific's Climate Bank   Focused on ADB news and development issues	72.00

**Figure 2**

*Excerpt of Tweet from Top Twitter User: Asian Schools*



**Figure 3**

*Top URLs in Tweet in Entire Graph: Asian Schools*

Top URLs in Tweet in Entire Graph	Entire Graph Count
<a href="https://www.reuters.com/world/asia-pacifi">https://www.reuters.com/world/asia-pacifi</a>	9
<a href="https://bangkok.unesco.org/content/gende">https://bangkok.unesco.org/content/gende</a>	8
<a href="https://www.thecity.nyc/queens/2022/7/7/">https://www.thecity.nyc/queens/2022/7/7/</a>	3
<a href="https://www.leeds.ac.uk/leeds-internation">https://www.leeds.ac.uk/leeds-internation</a>	2
<a href="https://www.thecity.nyc/queens/2022/7/7/">https://www.thecity.nyc/queens/2022/7/7/</a>	2
<a href="https://bangkok.unesco.org/index.php/con">https://bangkok.unesco.org/index.php/con</a>	1

Figure 4

Content Screenshot of the Top URLs in Tweet in Entire Graph: Asian Schools

The screenshot shows the UNESCO Bangkok website. The header includes the UNESCO logo and the text 'Multisectoral Regional Office in Bangkok (UNESCO Bangkok)'. Below the header is a navigation menu with categories: About us, Education, Natural Sciences, Social and Human Sciences, Culture, and Commun. The main content area features a breadcrumb trail: Education / IQE / Education for Health and Well-being / Inclusive Education / SDG 4 Education 2030 Coordination and Monitoring in Asia-Pacific / Gendered impacts of COVID-19 school closures... Below the breadcrumb is a large photograph of children in a classroom, all wearing face masks and focused on their work. Underneath the photo is the article title 'Gendered impacts of COVID-19 school closures: how youth in Asia and the Pacific have been affected' with a date of '11 Jul 2022'. There are social media sharing buttons for Facebook, Twitter, and Weibo, along with a 'Print' button. The article text begins with 'A report from the 2<sup>nd</sup> Asia-Pacific Regional Education Minister's Conference (APREMC-II), June 2022' and discusses the impact of school closures on vulnerable groups. A small graphic on the right side of the article is titled 'When schools shut' and shows a globe made of many small photos.

Figure 5

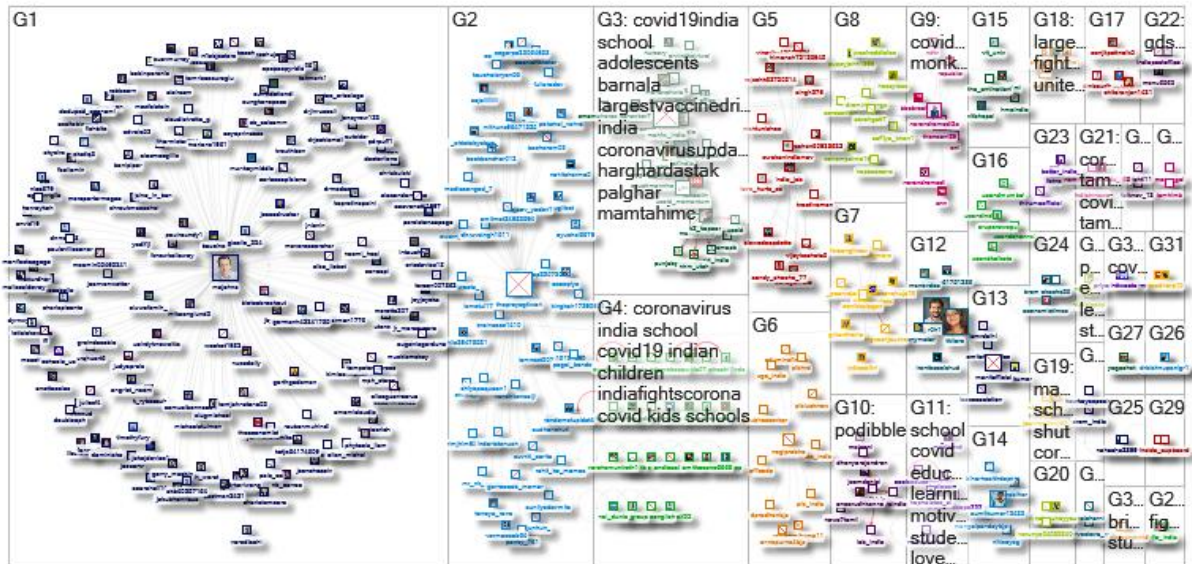
Content Screenshot of the Top URLs in Tweet in Entire Graph: Asian Schools

The screenshot shows a Reuters news article. The top navigation bar includes the Reuters logo and various sections: World, Business, Markets, Breakingviews, Legal, Technology, Investigations, and Sports. Below the navigation is a 'Asia Pacific' filter button. The article is dated '3 minute read - July 14, 2022 6:35 PM GMT+8 - Last Updated 10 months ago'. The main headline is 'Japan warns of COVID surge, Tokyo raises alert level' by Kiyoshi Takenaka and Sakura Murakami. Below the headline is a photograph of a narrow Japanese izakaya alleyway, filled with colorful lanterns and people wearing face masks. The caption for the photo reads: 'People wearing protective masks walk at a Japanese izakaya pub alley, amid the coronavirus disease (COVID-19) outbreak, in Tokyo, Japan July 6, 2022. REUTERS/Issei Kato'. The article text starts with 'TOKYO, July 14 (Reuters) - Japan warned on Thursday that a new wave of COVID infections appeared to be spreading rapidly and urged people to take special care ahead of an approaching long weekend and school summer vacations.' It also mentions 'Tokyo's 16,878 new cases on Wednesday were the highest since February, while the nationwide tally rose above 90,000 in a recent surge of COVID-19 infections to levels'.

# The Results of Social Network Analysis for the Impact of the Covid-19 Pandemic on Asian Regions: India

**Figure 6**

*The Network Graph: India Schools*



**Table 2**

*Top URLs in Tweet in Entire Graph: Indian Schools*

Top URLs in Tweet in Entire Graph	Entire Graph Count
<a href="https://www.economist.com/international/2022/07/07/covid-learning-loss-has-been-a-global-disaster">https://www.economist.com/international/2022/07/07/covid-learning-loss-has-been-a-global-disaster</a>	147
<a href="https://timesofindia.indiatimes.com/city/kolkata/west-bengal-to-jab-students-at-school-aims-to-cover-first-dose-in-1-month/articleshow/88555570.cms">https://timesofindia.indiatimes.com/city/kolkata/west-bengal-to-jab-students-at-school-aims-to-cover-first-dose-in-1-month/articleshow/88555570.cms</a>	14
<a href="https://www.dblpp.org/2021/05/covid-vaccination-camp-at-don-bosco.html?m=1">https://www.dblpp.org/2021/05/covid-vaccination-camp-at-don-bosco.html?m=1</a>	14
<a href="https://www.newsncr.com/career/board-exams-2022-students-will-have-to-take-covid-vaccine-before-board-exam-icse-issued-notice/">https://www.newsncr.com/career/board-exams-2022-students-will-have-to-take-covid-vaccine-before-board-exam-icse-issued-notice/</a>	14
<a href="https://www.thehindu.com/podcast/plummeting-school-test-scores-understanding-the-bigger-problems-beyond-covid-19-lockdowns-data-point-podcast/article65638306.ece">https://www.thehindu.com/podcast/plummeting-school-test-scores-understanding-the-bigger-problems-beyond-covid-19-lockdowns-data-point-podcast/article65638306.ece</a>	13

**Figure 7**

*Content Screenshot of the Top URLs in Tweet in Entire Graph: India Schools*

The screenshot shows a news article from The Economist. The header includes the logo, a menu icon, 'Weekly edition', 'The world in brief', and a search bar. The article is categorized as 'International | Wasted minds'. The main title is 'Covid learning loss has been a global disaster' with a subtitle 'Millions of children are still out of school. The costs are stacking up'. Below the text is a photograph of a young boy sitting at a desk in a cluttered room, looking at a tablet, while a woman stands nearby. The photo is credited to Getty Images. Below the photo, the date 'Jul 7th 2022' and location 'MANILA, MUMBAI AND TUXTLA' are listed, along with a 'Share' button. The main text begins with 'KING NORVIC TARROYO lives with his parents and five siblings in a slum near the sea wall in Manila, the capital of the Philippines. The eight-year-old has not set foot in a school since March 2020, when classrooms closed as a precaution against covid-19. Twenty-seven months later his school, like thousands of others across the country, remains shut. A year ago teachers gave him a tablet computer for remote learning. But his mother says he uses it for only a few hours each day. After that, he pretends to snooze or scampers into alleys near his home. His mum sometimes does his schoolwork for him.' A second paragraph starts with 'The Philippines' response to covid-19 has been terrible for its children. For the first seven months of the pandemic the country's 27m pupils received no classes of any kind. For more than a year children in much of the Philippines were not even supposed to leave their homes. Since the start of 2022 about 80% of government schools have been granted permission to restart some limited face-

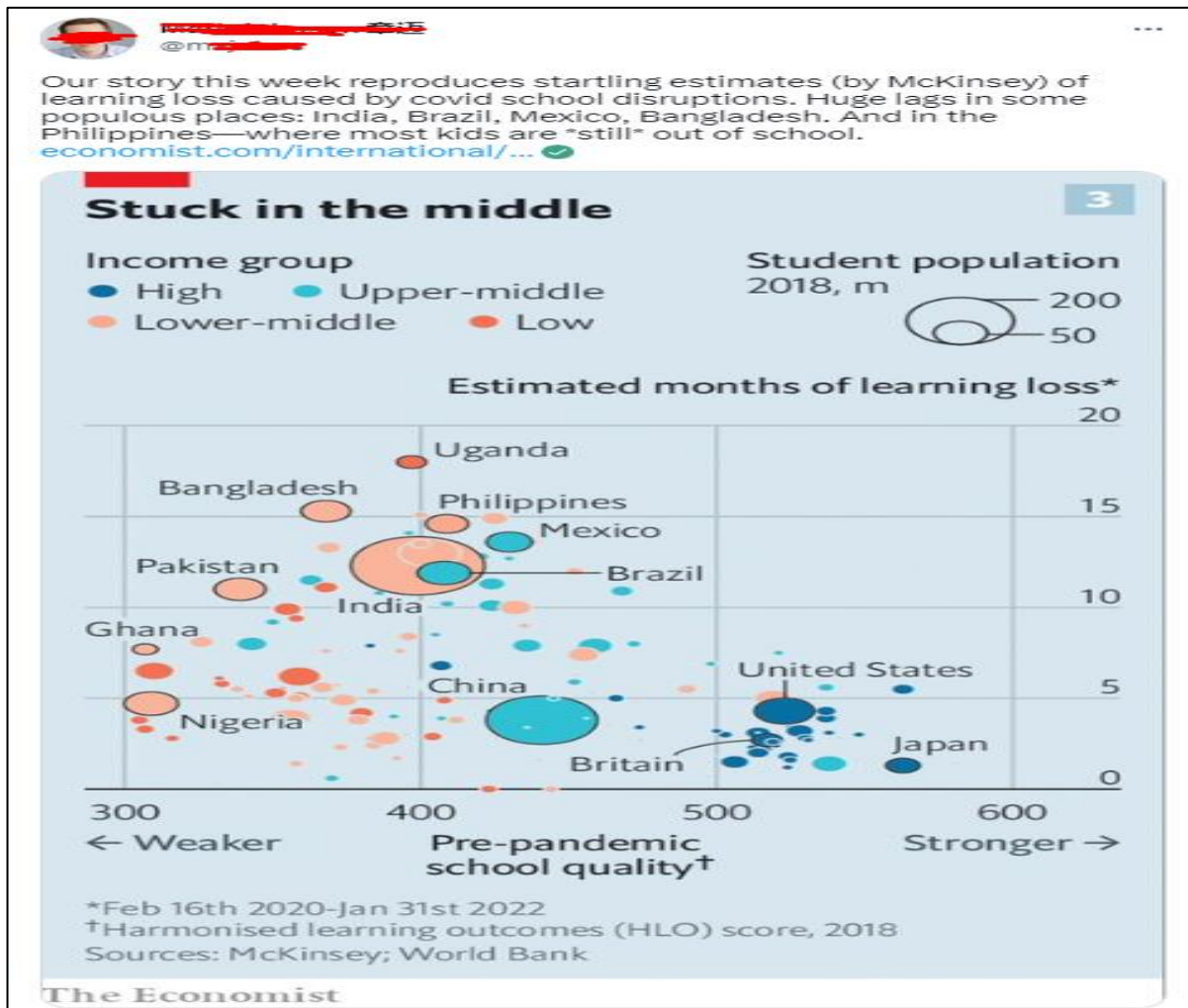
**Table 3**

*Top Twitter User with the Highest Value of Betweenness Centrality: India Schools*

Description of the Twitter Account Owner	Value of the Betweenness Centrality
Education correspondent for The Economist. Before that covered China from Beijing and South-East Asia from Singapore	22620.000

Figure 8

Excerpt of Tweet from Top Twitter User: India Schools





# The Results of Social Network Analysis for the Impact of Covid-19 Pandemic on Asian Regions: Indonesia

Figure 9

The Network Graph: Indonesian School

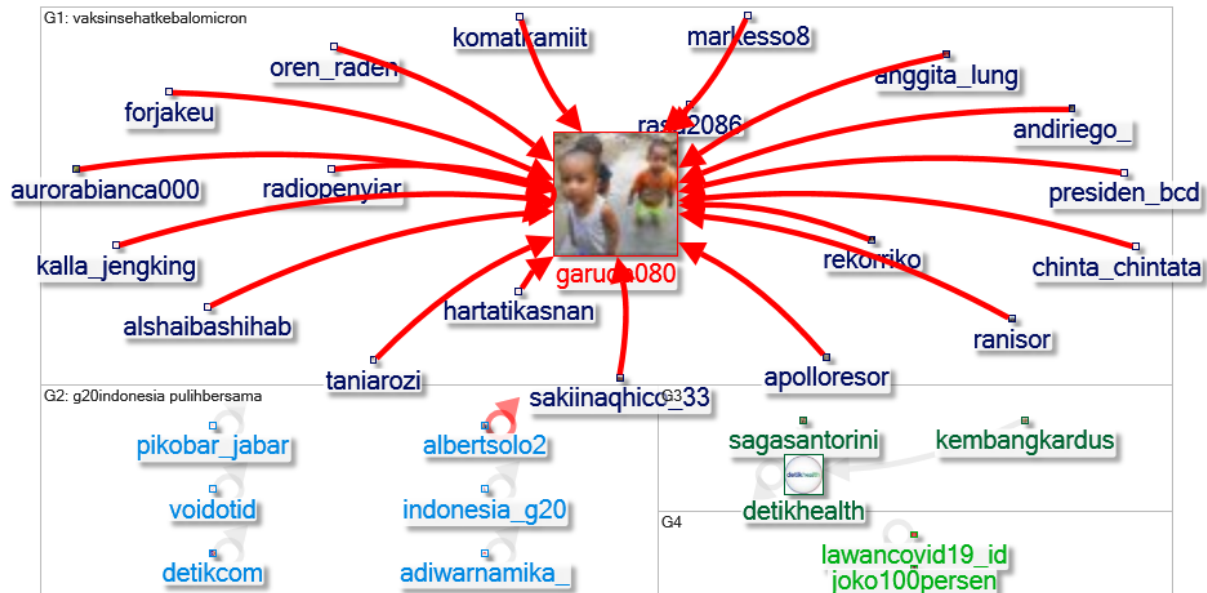


Table 4

Top Twitter User with the Highest Value of Betweenness Centrality: Indonesian Schools

Description of the Twitter Account Owner	Value of the Betweenness Centrality
hanya orang biasa aja penikmat sepi,dari sepi evaluasi dan introspeksi hadir	342.000

Figure 10

Excerpt of Tweet from Top Twitter User: Indonesia



**Figure 11**

*Top URLs in Tweet in Entire Graph: Indonesian Schools*

Top URLs in Tweet in Entire Graph	Entire Graph Cou
<a href="https://health.detik.com/berita-detikhealth/d-6174216/prediksi-punca">https://health.detik.com/berita-detikhealth/d-6174216/prediksi-punca</a>	3
<a href="https://voi.id/berita/190283/cegah-penularan-covid-19-kpai-justro-dor">https://voi.id/berita/190283/cegah-penularan-covid-19-kpai-justro-dor</a>	1
<a href="https://health.detik.com/berita-detikhealth/d-6174216/prediksi-punca">https://health.detik.com/berita-detikhealth/d-6174216/prediksi-punca</a>	1

**Figure 12**


*Content Screenshot of the Top URLs in Tweet in Entire Graph: Indonesian Schools*

detikHealth > Berita Detikhealth

## Prediksi Puncak BA.4-BA.5 Bertepatan Jadwal Sekolah Tatap Muka, Amankah?

Mochammad Fajar Nur - detikHealth

Senin, 11 Jul 2022 20:30 WIB



COVID-19 (Foto: ANTARA FOTO/Irfidz Mubarak A)

**Jakarta** - Kasus COVID-19 di Indonesia saat ini didominasi oleh subvarian Omicron BA.4 dan BA.5 yang diduga menjadi penyebab naiknya angka kasus harian belakangan ini. Sebelumnya, pakar epidemiologi dan pemerintah memprediksi bahwa pertengahan bulan Juli 2022 ini akan menjadi puncak gelombang kasus COVID-19 di Indonesia.

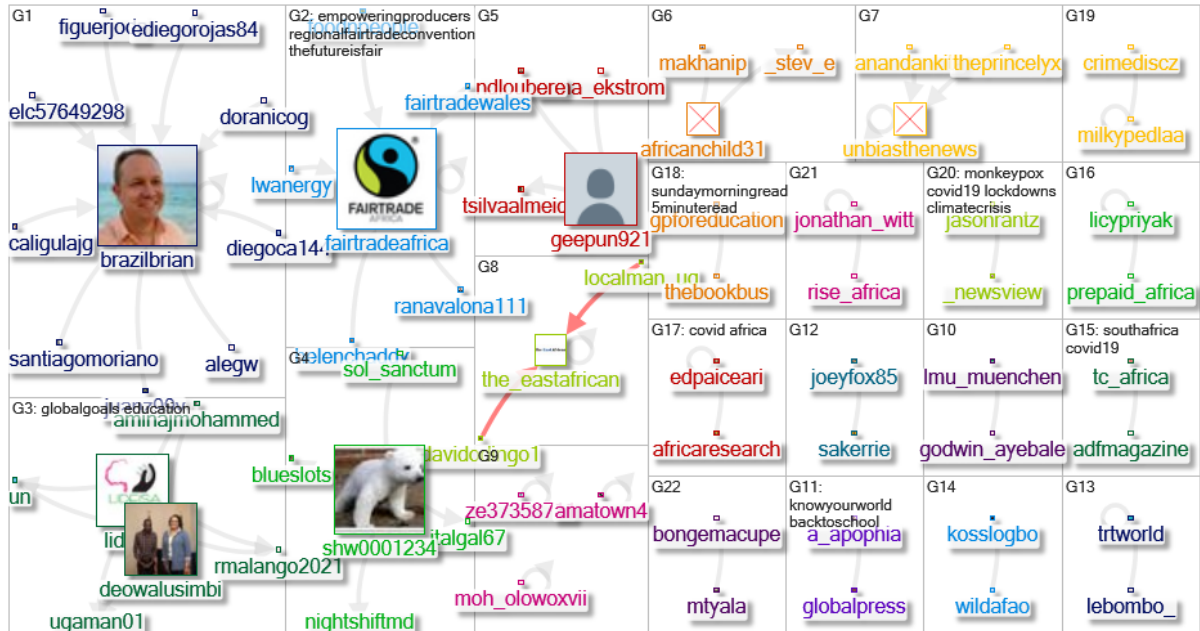
Sementara itu, jika dilihat dari waktunya, gelombang COVID-19 ini juga akan bersamaan dengan jadwal pertemuan tatap muka (PTM) sekolah yang juga dijadwalkan dimulai pada pertengahan Juli.

Menanggapi hal ini, Juru bicara Kementerian Kesehatan RI Mohammad Syahril menyebut prediksi ini belum tentu sepenuhnya sesuai dengan yang diinformasikan. Menurutnya, bisa jadi memang terjadi gelombang puncak namun tidak sampai adanya lonjakan kasus misalnya sampai puluhan ribu kasus COVID-19 sehari.

# The Results of Social Network Analysis for the Impact of the Covid-19 Pandemic on African Schools

**Figure 13**

*The Network Graph: African Schools*



**Table 5**

*Top Twitter User with the Highest Value of Betweenness Centrality: African Schools*

Description of the Twitter Account Owner	Value of the Betweenness Centrality
Editor-in-chief. Latin America political analyst. “O mais brasileiro dos texanos.”	72.00

**Figure 14**

*Excerpt of Tweet from Top Twitter User: African Schools*



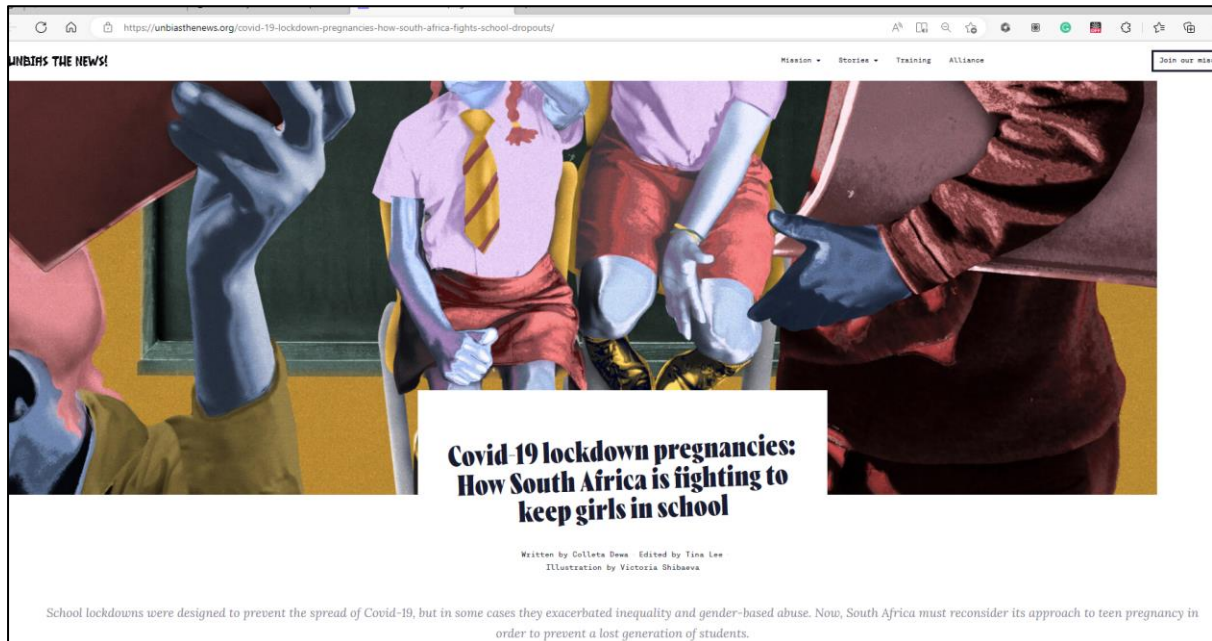
**Figure 15**

*Top URLs in Tweet in Entire Graph: African Schools*

Top URLs in Tweet in Entire Graph	Entire Graph Count
<a href="https://www.nytimes.com/live/2022/06/27/world">https://www.nytimes.com/live/2022/06/27/world</a>	10
<a href="https://unbiasthenews.org/covid-19-lockdown-pr">https://unbiasthenews.org/covid-19-lockdown-pr</a>	3
<a href="http://epaper.nationmedia.com/Kenya">http://epaper.nationmedia.com/Kenya</a>	3
<a href="https://www.youtube.com/watch?v=JzR74wdbok">https://www.youtube.com/watch?v=JzR74wdbok</a>	2
<a href="https://twitter.com/BareReality/status/154576887">https://twitter.com/BareReality/status/154576887</a>	2
<a href="https://globalpressjournal.com/africa/uganda/sto">https://globalpressjournal.com/africa/uganda/sto</a>	1
<a href="https://theconversation.com/south-africas-covid-">https://theconversation.com/south-africas-covid-</a>	1
<a href="https://www.globalpartnership.org/blog/five-less">https://www.globalpartnership.org/blog/five-less</a>	1
<a href="https://www.bbc.co.uk/news/world-africa-595075">https://www.bbc.co.uk/news/world-africa-595075</a>	1
<a href="https://www.forbes.com/sites/carlieporterfield/z">https://www.forbes.com/sites/carlieporterfield/z</a>	1

**Figure 16**

*Content Screenshot of the Top URLs in Tweet in Entire Graph: African Schools*



**Figure 17**

*Content Screenshot of the Top URLs in Tweet in Entire Graph: African Schools*



## Results and Discussion

Undeniably, the findings from the analysis demonstrated that the Covid-19 pandemic caused learning loss in Asian and African regions. Due to the enforced lockdown and school closure, children missed out the opportunity to take part in learning at school. Some children, if fortunate, were forced to undergo remote learning while majority had no choice but to suspend from learning because of various reasons including socio-economic status, insufficient support from the government, poverty, and so on.

In Asian countries, the findings indicated that the impacts of the Covid-19 pandemic on schools have been severe and diverse. Based on the excerpt from the top Twitter user, it explained that the learning losses among students due to school closures during the pandemic crisis would bring negative impacts on economies in Asia. In Indonesia, students and teachers are urged to get vaccinated with the aim of curbing the spread of Covid-19. A report in Jakarta stated that the proposed restoration of face-to-face learning at school scheduled in July 2022 might be reconsidered after looking at the possible spike in thousands of cases a day.

As reported in India, children from lower-middle-income and low-income families encountered the most severe learning loss due to school closure. Hence, their learning progress and development of competencies were greatly affected as remote learning did not provide students with authentic learning opportunities. According to the findings, the COVID-19 pandemic has triggered a new education crisis in India, with the closure of schools since March 2020 (Ministry of Higher Education, 2020) affecting a staggering 320 million students. (BERNAMA, 2023). While the government has suggested transitioning to online teaching, this solution overlooks the significant digital divide in India, which is further compounded by gender and class differences. Consequently, the pandemic has exacerbated the already existing digital education divide in the country. In the top URL in the tweet, the Economist (2022) reported that millions of children still do not have access to school, thus affecting learning progress.

Based on the findings, the researchers revealed that children in Sub-Saharan Africa have faced worse educational outcomes than 80% of children in Latin America. They are now suffering from understanding simple written text. This could be explained by the fact that the 2020 school year was considered a disastrous loss as the Covid-19 pandemic has stopped the schooling of 250 million primary and secondary school pupils in Africa (Matlali, 2020). As a result, the prolonged lockdown will eventually increase the illiteracy among African children. The findings showed that many children suffered from starvation and malnutritional problems due to the school closures because most of them relied on the feed programme implemented by the government for the free provision of daily meals. Meanwhile, Agiresaasi (2022) reported that teachers and parents in Uganda scramble to repair schools severely damaged by animals, humans and rain when left unattended during the Covid-19 restriction. The region has recorded a decrease in student enrollment due to the dreadful condition of the schools. As explained by Teachout and Zipfel (2020), the economic crisis caused by the virus and the associated containment measures such as lockdown will likely take a heavy toll on the livelihoods of all generations in sub-Saharan at risk.

## Conclusion

This article discussed the impacts of the Covid-19 pandemic on schools in Asian and African regions. Indeed, the effects of the Covid-19 pandemic have been dreadful to the education sector across the countries. Probably, most African countries will face an unavoidable recession even when the pandemic is over. The findings imply that the outbreak has exposed the high vulnerability of African societies to encountering health hazards. The education budgets in South Asia seem inadequate to effectively address the ongoing crisis (Khan et al., 2023). This problem reflects the need for considerable investment in order to develop a well-educated, healthy, and productive human capital in the future. The losses could be mitigated through new and more effective ways of assessing learning materials. Various changes can be considered, such as offering more remote learning alternatives, prioritising equity and inclusivity, providing better professional development opportunities for teachers, and fostering greater collaboration among related stakeholders.

In short, the government and related stakeholders must work closely to implement more mitigation measures to improve economies, provide basic benefits to the public, and protect children's welfare for a sustainable future. Policymakers should enforce social policies that unite communities in bad times to reduce social anxiety. Future studies can perhaps shed light on the direct impacts of the Covid-19 pandemic on the performance of financial institutions in Asian and African countries, as the insights can be useful for more effective strategies to restore the economic stability in the countries.

## References

- Agiresaasi, A. (2022, July 13). *Dilapidated Buildings Mar Return to School*. Global Press Journal. <https://globalpressjournal.com/africa/uganda/storms-animals-school-buildings-hit-hard-pandemic/>
- BERNAMA (2023, February 28). *Learning journey' a new area for Malaysia to lure tourist around the world*. <https://bernama.com/en/world/news.php?id=2168729>
- Bernard, J. -M., Coulibaly, B. S., & Winthrop, R. (2020, June 4). *Education is crucial to Africa's COVID-19 response*. Brookings. <https://www.brookings.edu/opinions/education-is-crucial-to-africas-covid-19-response>
- Businesstech. (2021, January 17). *Major problems expected at South African schools due to Covid-19*. <https://businesstech.co.za/news/government/461480/major-problems-expected-at-south-african-schools-due-to-covid-19/>
- Human Right Watch. (2020, August 26). *Impact of Covid-19 on children's education in Africa*. <https://www.hrw.org/news/2020/08/26/impact-covid-19-childrens-education-africa>
- Matlali, L. (2020, October 9). *How can Africa prepare its education system for the post-COVID world?*. <https://www.weforum.org/agenda/2020/10/how-can-africa-pivot-its-education-system-using-enthusiasm-of-covid-reset/>

Ministry of Higher Education. (2020, March 21). *COVID-19 Guidelines and Advice for International Students*. Education Malaysia Global Services.  
<https://educationmalaysia.gov.my/covid-19-guidelines-and-advice-for-international-students>

Reddy, V. (2022, February 22). *COVID learning losses: What South Africa's education system must focus on to recover*. The Conversation.  
<https://theconversation.com/covid-learning-losses-what-south-africas-education-system-must-focus-on-to-recover-176622>

Republica. (2023, February 19). *COVID-19's impact on South Asia's youth could last generations: World bank*. myRepublica.  
<https://myrepublica.nagariknetwork.com/news/covid-19-s-impact-on-south-asia-s-youth-could-last-generations-world-bank/>

Teachout, M., Zipfel, C. (2020). *The economic impact of COVID-19 lockdowns in sub-Saharan Africa* (Policy Brief). International Growth Centre.  
<https://www.theigc.org/sites/default/files/2020/05/Teachout-and-Zipfel-2020-policy-brief.pdf>

The Economist. (2022, July 7). *Covid learning loss has been a global disaster*.  
<https://www.economist.com/international/2022/07/07/covid-learning-loss-has-been-a-global-disaster>

United Nations Children's Fund. (2021). *The future of 800 million children across Asia at risk as their education has been severely affected by the COVID-19 pandemic*.  
<https://www.unicef.org/rosa/press-releases/future-800-million-children-across-asia-risk-their-education-has-been-severely>