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Review Article

An exploratory data analysis of COVID-19 impacts on education

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ABSTRACT

The global spread of COVID-19 has significantly impacted in education, leading to the widespread adoption of online learning as face-to-face interactions in schools, colleges, and universities diminished. This article employs an exploratory data analysis (EDA) approach to develop a statistical model that comprehensively assesses the influence of COVID-19 on the world's education system until December 2021. The research delves into the complexities of this impact, examining day-to-day and week-to-week variations in education globally. It also compares the educational effects in different nations, with a specific focus on contrasting India with neighbouring countries and those severely affected by the pandemic. The study analyses immediate effects and addresses implications for the healthcare sector, offering insights for planning in the event of future outbreaks. By exploring data and trends, the article aims to provide valuable insights into the multifaceted impact of COVID-19 on global education, facilitating informed decision-making in the face of unprecedented challenges.

Keywords: COVID-19, EDA technique, Healthcare sector, Educational institutions, Educational system, Statistical model

INTRODUCTION

Recently, a novel infection known as the "coronavirus," or "COVID-19," has emerged as a topic of significant concern. Identified as a member of the SARS-CoV-2 family, this virus can lead to severe health issues in humans.[1] Designated by the world health organization (WHO), the centres for disease control and prevention (CDC), and other organizations as an ongoing global pandemic in the twenty-first century, COVID-19 exhibits diverse infection pathways and symptom severity, with most individuals experiencing moderate symptoms and recovering without hospitalizatio.[3] Despite ongoing efforts to understand and combat the virus, it continues to pose a significant global health threat. Predictive models, discussed by enable medical professionals to estimate COVID-19 cases based on clinical data, aiding in the early identification of complications.[2]

The impact of COVID-19 has reverberated worldwide, affecting education, health, the economy, and overall quality of life. In the realm of education, the pandemic has exposed deficiencies such as a lack of online teaching infrastructure, limited instructor exposure to online teaching, information gaps, non-conducive home study environments, and challenges related to equality and academic excellence in higher education.[4] This essay critically assesses the global impact of the COVID-19 epidemic on teaching and learning processes, outlining both the challenges and opportunities presented by online and continuing education during this crisis and proposing a strategic way forward.[5]

In response to the pandemic, Bhutan implemented measures such as the closure of schools and institutions, along with reduced business hours, starting in the second week of March 2020.[6] A nationwide lockdown was subsequently enforced on August 1, 2020.[7] Meanwhile,

India reported its first COVID-19 case in Kerala on January 30, 2020, with the number of cases escalating rapidly thereafter. Despite the availability of vaccines, their impact on COVID-19 has been limited due to virus mutations, prompting ongoing research primarily focused on treatment.[7] This research examines the current trend of COVID-19 based on specific criteria. EDA, being an illuminating stage in any analysis, provides valuable insights for understanding and responding to the evolving dynamics of the pandemic.

LITERATURE SEARCH

Researchers have employed "Bailey's model" as a tool to analyze and assess the COVID-19 viral propagation data across various nations. Utilizing the Pearson correlation method, the study yielded high correlation coefficients, notably at 91.4% and evaluated determinants at 83.98 to gauge the model's accuracy. The inclusion of the "WHO" daily report, covering 204 nations, highlighted the challenges in accurately predicting the variable influencing the future spread reduction of the pandemic.

Numerous researchers assert that the global efforts to prevent the spread of COVID-19 have led to the closure of schools and universities, affecting more than 1 billion and 575 million students in approximately 188 countries. The reliance on technology as a solution for maintaining educational systems during isolation has been widely recognized in various parts of the world. Despite encountering obstacles in implementation, there are identified benefits in the shift towards remote or online learning. Notably, this transition has presented an opportunity for rapid growth in the field of digital education, a development that would typically require years to achieve.

The impact of the Coronavirus outbreak has significantly disrupted the education landscape, leading to a notable decline in operational activities and the closure of educational institutions. Both parents and national governments are actively working on strategies to safeguard the population in response to this crisis. Moreover, individuals, both children and adults, are facing challenges due to a weakened immune system and a lack of adherence to social distancing norms, making them susceptible to the virus. The global shutdown of educational institutions has affected over 60% of the world's student population. Notably, the mobility of students from China and India plays a crucial role in sustaining the top educational institutions in the United Kingdom, Australia, the United States, and Canada. The imposed restrictions on cross-border and domestic mobility have created significant impediments to financial operations, administrative functions, and the delivery of educational services.

RESEARCH METHOD

The ongoing COVID-19 pandemic has prompted an in-depth EDA using datasets sourced from various reputable platforms such as the WHO, the COVID-19 India website, John Hopkins GitHub repository, the centres for disease control and prevention (CDC), and Wikipedia. This analysis focuses on understanding the impact on education and the prevailing trends of COVID-19 in India, drawing comparisons with neighbouring countries and those most severely affected worldwide.[12] The dataset undergoes normalization, essential columns are selected through meticulous filtering, and additional columns are derived to enhance its analytical value. The processed data is then presented in a graphical format. The methodology employed for data processing and web scraping involves the use of "R Programming," leveraging libraries such as "tidyverse," "dplyr," "psych," "psychTools," "corrplot," "funModeling," and "pastecs" to extract and process information from the dataset. To facilitate better visualization of the results, appropriate graphs are generated using the "ggplot2" and "igraph" libraries within the R Programming environment.[13] This paper utilizes a comprehensive approach to analyse and interpret the complex dynamics of the COVID-19 impact on education, providing valuable insights into the evolving situation in India and its comparative context with neighbouring and highly affected countries globally.

OBSERVATIONS

COVD-19's long-term educational impact

Figure 1 illustrates the impact of COVID-19 on students, with the X-axis representing different countries and the Y-axis indicating the impact on students measured in thousands. The blue dots on the graph depict the "impact rate" for various countries, with China, Macao, and Qatar exhibiting the highest rates of student education impact due to COVID-19, while Switzerland registers the lowest impact. In between these extremes, several countries, including India and the USA, show varying degrees of impact on student education.

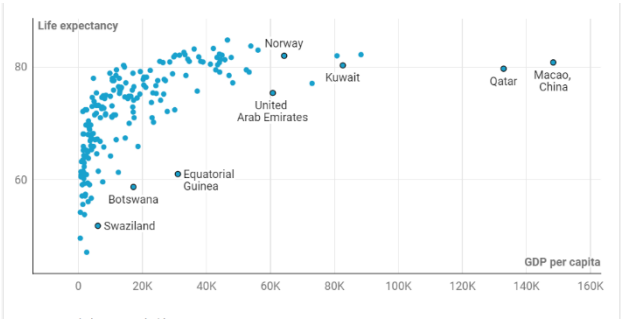

Figure 1: Education impact on various countries due to COVID-19.

Date of education impact as a result of COVID-19

Table 1, as presented in the supplementary materials, provides information on the dates of frequency, total frequency, and cumulative frequency, specifically observing the impact of COVID-19 on schools, colleges, and universities. On the date 18 February, 2020, there is a notable impact, with 100% closure of educational institutions, significantly affecting education societies. The frequency of this impact is one, corresponding to a percentage of 0.01, and the cumulative total reaches 100 percentages. Another significant date is 01 May, 2020, where some schools, colleges, and universities begin to reopen. The impact frequency on this date is two hundred and ten, accounting for a percentage of 1.18, and the cumulative total rises to the 1.18. This Table provides a detailed snapshot of the temporal evolution of the impact on education institutions due to the COVID-19, highlighting key dates as well as the corresponding frequencies.

Table 1: Dates of education impact due to COVID-19 in various countries.

Date	Frequency	Percentage (%)	Cumulative perc
01-05-2020	210	1.18	1.18
01-06-2020	210	1.18	2.36
02-05-2020	210	1.18	3.54
02-06-2020	210	1.18	4.72
03-05-2020	210	1.18	5.9
03-06-2020	210	1.18	7.08
04-05-2020	210	1.18	8.26
04-06-2020	210	1.18	9.44
05-05-2020	210	1.18	10.62
05-06-2020	210	1.18	11.8
06-05-2020	210	1.18	12.98
06-06-2020	210	1.18	14.16
07-05-2020	210	1.18	15.34
07-06-2020	210	1.18	16.52
08-05-2020	210	1.18	17.7
08-06-2020	210	1.18	18.88
09-05-2020	210	1.18	20.06
10-04-2020	210	1.18	21.24
10-05-2020	210	1.18	22.42
11-04-2020	210	1.18	23.6
11-05-2020	210	1.18	24.78
12-04-2020	210	1.18	25.96
12-05-2020	210	1.18	27.14
13-04-2020	210	1.18	28.32
13-05-2020	210	1.18	29.5
14-04-2020	210	1.18	30.68
14-05-2020	210	1.18	31.86
15-04-2020	210	1.18	33.04
15-05-2020	210	1.18	34.22
16-04-2020	210	1.18	35.4
16-05-2020	210	1.18	36.58
17-04-2020	210	1.18	37.76
17-05-2020	210	1.18	38.94
18-04-2020	210	1.18	40.12
18-05-2020	210	1.18	41.3
19-04-2020	210	1.18	42.48
19-05-2020	210	1.18	43.66
20-04-2020	210	1.18	44.84
20-05-2020	210	1.18	46.02
21-04-2020	210	1.18	47.2
21-05-2020	210	1.18	48.38
22-04-2020	210	1.18	49.56
22-05-2020	210	1.18	50.74
23-04-2020	210	1.18	51.92
23-05-2020	210	1.18	53.1

Continued.

Date	Frequency	Percentage (%)	Cumulative perc
24-04-2020	210	1.18	54.28
24-05-2020	210	1.18	55.46
25-04-2020	210	1.18	56.64
25-05-2020	210	1.18	57.82
26-04-2020	210	1.18	59
26-05-2020	210	1.18	60.18
27-04-2020	210	1.18	61.36
27-05-2020	210	1.18	62.54
28-04-2020	210	1.18	63.72
28-05-2020	210	1.18	64.9
29-04-2020	210	1.18	66.08
29-05-2020	210	1.18	67.26
30-04-2020	210	1.18	68.44
30-05-2020	210	1.18	69.62
31-05-2020	210	1.18	70.8
08-04-2020	201	1.13	71.93
09-04-2020	201	1.13	73.06
01-04-2020	200	1.13	74.19
02-04-2020	200	1.13	75.32
03-04-2020	200	1.13	76.45
04-04-2020	200	1.13	77.58
05-04-2020	200	1.13	78.71
06-04-2020	200	1.13	79.84
07-04-2020	200	1.13	80.97
31-03-2020	199	1.12	82.09
30-03-2020	198	1.11	83.2
27-03-2020	192	1.08	84.28
28-03-2020	192	1.08	85.36
29-03-2020	192	1.08	86.44
26-03-2020	190	1.07	87.51
25-03-2020	187	1.05	88.56
24-03-2020	186	1.05	89.61
23-03-2020	180	1.01	90.62
21-03-2020	165	0.93	91.55
22-03-2020	165	0.93	92.48
20-03-2020	164	0.92	93.4
19-03-2020	152	0.86	94.26
18-03-2020	139	0.78	95.04
17-03-2020	130	0.73	95.77
16-03-2020	125	0.7	96.47
15-03-2020	72	0.41	96.88
14-03-2020	68	0.38	97.26
13-03-2020	66	0.37	97.63
12-03-2020	56	0.32	97.95
11-03-2020	45	0.25	98.2
10-03-2020	34	0.19	98.39
09-03-2020	31	0.17	98.56
08-03-2020	30	0.17	98.73
06-03-2020	28	0.16	98.89
07-03-2020	28	0.16	99.05
05-03-2020	26	0.15	99.2
04-03-2020	23	0.13	99.33
03-03-2020	22	0.12	99.45
02-03-2020	18	0.1	99.55

COVID-19 education impact in India versus other countries

Table 2, available in the supplementary materials, outlines the country-wise analysis of the impact of COVID-19 on education, presenting data on frequency, percentage, and cumulative percentage intervals. The key observations inferred from Table 2 are as follows:

Detection initiatives: All countries initiated the assessment of COVID-19 impact on education by the end of January, except for China. This suggests that China, being the epicenter of the virus, began grappling with its educational impact at an earlier stage.

China's impact growth: China demonstrates a significant growth in the impact on education, with a frequency rate of 114, a percentage of 0.64, and a cumulative percentage of 0.64. This indicates a substantial and evolving impact on educational systems in the country.

USA's moderate impact: The United States (USA) shows a relatively moderate impact on education, with a frequency rate of 102, a percentage of 0.57, and a cumulative percentage of 5.93. This suggests a discernible but less pronounced effect on educational institutions in the USA.

Limited impact in India (IND): India (IND) exhibits a comparatively limited impact on education, with a frequency rate of 97, a percentage of 0.55, and a cumulative percentage of 13.17.

This indicates a measured impact on the education sector in India during the analyzed period.

Table 2: India vs other countries education impact due to COVID19.

ISO	Frequency perce	Percentage cu	Cumulative_perc
CHN	114	0.64	0.64
MNG	111	0.62	1.26
ITA	106	0.6	1.86
SMR	106	0.6	2.46
BHR	104	0.59	3.05
IRN	104	0.59	3.64
PAK	103	0.58	4.22
GBR	102	0.57	4.79
IRQ	102	0.57	5.36
USA	102	0.57	5.93
VNM	102	0.57	6.5
KWT	100	0.56	7.06
ARM	99	0.56	7.62
GEO	99	0.56	8.18
JPN	99	0.56	8.74
KOR	99	0.56	9.3
LBN	99	0.56	9.86
PRK	99	0.56	10.42
AFG	98	0.55	10.97
AZE	98	0.55	11.52
DEU	98	0.55	12.07
FRA	98	0.55	12.62
IND	97	0.55	13.17
GRC	96	0.54	13.71
PRT	96	0.54	14.25
PSE	96	0.54	14.79
BTN	95	0.53	15.32
UKR	95	0.53	15.85
ARE	93	0.52	16.37
KHM	93	0.52	16.89
SAU	92	0.52	17.41
PHL	91	0.51	17.92
QAT	91	0.51	18.43
SVK	91	0.51	18.94
ALB	90	0.51	19.45
BIH	90	0.51	19.96
CZE	90	0.51	20.47
ESP	90	0.51	20.98

Continued.

ISO	Frequency perce	Percentage cu	Cumulative_perc
HUN	90	0.51	21.49
MDA	90	0.51	22
MKD	90	0.51	22.51
PRY	90	0.51	23.02
ROU	90	0.51	23.53
RUS	90	0.51	24.04
SLV	90	0.51	24.55
BOL	89	0.5	25.05
BRA	89	0.5	25.55
CHE	89	0.5	26.05
DZA	89	0.5	26.55
HND	89	0.5	27.05
IRL	89	0.5	27.55
ISR	89	0.5	28.05
MDV	89	0.5	28.55
NOR	89	0.5	29.05
PAN	89	0.5	29.55
SJM	89	0.5	30.05
AIA	88	0.5	30.55
ATG	88	0.5	31.05
BEL	88	0.5	31.55
CAN	88	0.5	32.05
CYP	88	0.5	32.55
ECU	88	0.5	33.05
JAM	88	0.5	33.55
LKA	88	0.5	34.05
LVA	88	0.5	34.55
MLT	88	0.5	35.05
CYM	87	0.49	35.54
TTO	87	0.49	36.03
GNQ	86	0.48	36.51
JOR	86	0.48	36.99
OMN	86	0.48	37.47
UZB	86	0.48	37.95
YEM	86	0.48	38.43
ABW	85	0.48	38.91
AND	85	0.48	39.39
ARG	85	0.48	39.87
AUT	85	0.48	40.35
BFA	85	0.48	40.83
BHS	85	0.48	41.31
CHL	85	0.48	41.79
COL	85	0.48	42.27
DNK	85	0.48	42.75
EGY	85	0.48	43.23
EST	85	0.48	43.71
ETH	85	0.48	44.19
FRO	85	0.48	44.67
FSM	85	0.48	45.15
GAB	85	0.48	45.63
GHA	85	0.48	46.11
GRD	85	0.48	46.59
GTM	85	0.48	47.07
GUY	85	0.48	47.55
HRV	85	0.48	48.03
IDN	85	0.48	48.51
ISL	85	0.48	48.99

Continued.

ISO	Frequency perce	Percentage cu	Cumulative_perc
KAZ	85	0.48	49.47
KEN	85	0.48	49.95
KGZ	85	0.48	50.43
LBR	85	0.48	50.91
LBY	85	0.48	51.39
LCA	85	0.48	51.87
LIE	85	0.48	52.35
LTU	85	0.48	52.83
LUX	85	0.48	53.31
MAR	85	0.48	53.79
MCO	85	0.48	54.27
MMR	85	0.48	54.75
MNE	85	0.48	55.23
MRT	85	0.48	55.71
MSR	85	0.48	56.19
NAM	85	0.48	56.67
NLD	85	0.48	57.15
PER	85	0.48	57.63
POL	85	0.48	58.11
RWA	85	0.48	58.59
SDN	85	0.48	59.07
SEN	85	0.48	59.55
SRB	85	0.48	60.03
SUR	85	0.48	60.51
SYC	85	0.48	60.99
SYR	85	0.48	61.47
TUN	85	0.48	61.95
TUR	85	0.48	62.43
URY	85	0.48	62.91
BGD	84	0.47	63.38
CIV	84	0.47	63.85
CRI	84	0.47	64.32
CUW	84	0.47	64.79
GNB	84	0.47	65.26
VEN	84	0.47	65.73
CMR	83	0.47	66.2
FIN	83	0.47	66.67
GMB	83	0.47	67.14
MYS	83	0.47	67.61
SOM	83	0.47	68.08
SWE	83	0.47	68.55
SXM	83	0.47	69.02
THA	83	0.47	69.49
ZAF	83	0.47	69.96
BRB	82	0.46	70.42
COD	82	0.46	70.88
COG	82	0.46	71.34
DOM	82	0.46	71.8
GRL	82	0.46	72.26
LAO	82	0.46	72.72
LSO	82	0.46	73.18
MLI	82	0.46	73.64
MUS	82	0.46	74.1
NPL	82	0.46	74.56
SWZ	82	0.46	75.02
TZA	82	0.46	75.48
VGB	82	0.46	75.94

Continued.

ISO	Frequency perce	Percentage cu	Cumulative_perc
BWA	81	0.46	76.4
COM	81	0.46	76.86
DJI	81	0.46	77.32
HTI	81	0.46	77.78
SSD	81	0.46	78.24
STP	81	0.46	78.7
TCA	81	0.46	79.16
TCD	81	0.46	79.62
TGO	81	0.46	80.08
UGA	81	0.46	80.54
WSM	81	0.46	81
ZMB	81	0.46	81.46
MDG	80	0.45	81.91
BLZ	78	0.44	82.35
BMU	78	0.44	82.79
DMA	78	0.44	83.23
FJI	78	0.44	83.67
GIB	78	0.44	84.11
MEX	78	0.44	84.55
MOZ	78	0.44	84.99
MWI	78	0.44	85.43
NER	78	0.44	85.87
NIU	78	0.44	86.31
PLW	78	0.44	86.75
PNG	78	0.44	87.19
TLS	78	0.44	87.63
VCT	78	0.44	88.07
AGO	77	0.43	88.5
AUS	77	0.43	88.93
COK	77	0.43	89.36
CUB	77	0.43	89.79
NZL	77	0.43	90.22
VUT	77	0.43	90.65
ZWE	77	0.43	91.08
GIN	76	0.43	91.51
BGR	75	0.42	91.93
NGA	75	0.42	92.35
SVN	75	0.42	92.77
ERI	74	0.42	93.19
TON	74	0.42	93.61
BEN	71	0.4	94.01
BRN	71	0.4	94.41
CAF	71	0.4	94.81
KIR	71	0.4	95.21
MHL	71	0.4	95.61
SLB	71	0.4	96.01
KNA	70	0.39	96.4

Country-wise analysis of COVID-19

On January 30, the state of Kerala reported the initial coronavirus case in India, involving a student returning from Wuhan.

Subsequently, two more students tested positive by February 3, marking the early stages of the COVID-19 education impact in India.

Figure 2 visually represents the situation across numerous nations, highlighting the confirmed cases and the consequential impact on education for the students.

Notably, Timbango and the Guinea emerge as the countries experiencing the most significant influence on education, whereas the Central Africa appears to have encountered the least impact, as depicted in the Figure below.

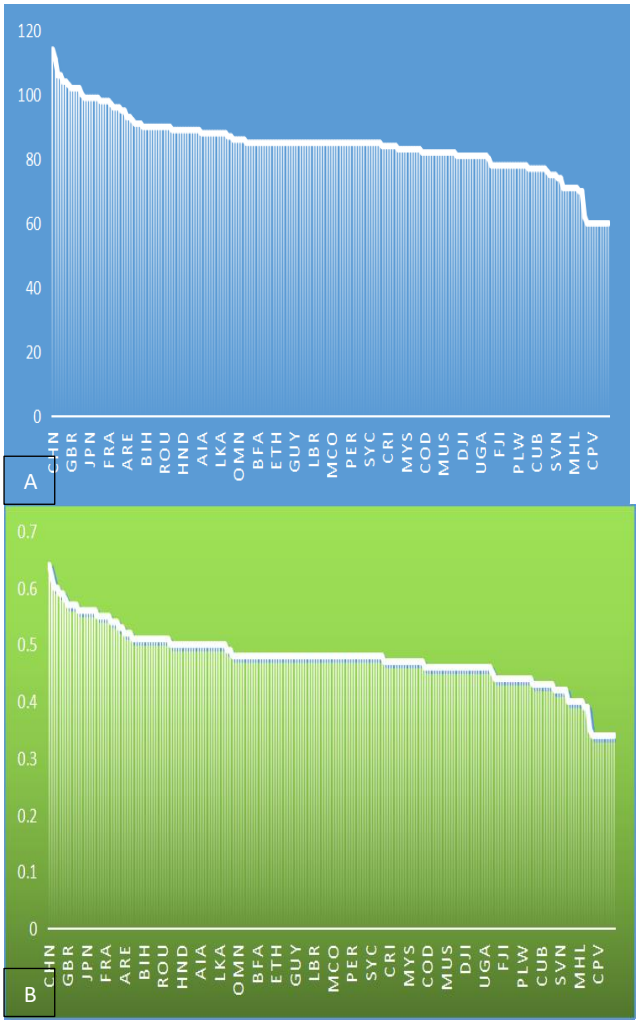

Figure 2 (A and B): Rate of frequency in countries wise, and rate of percentage at countries-wise education impact due to COVID-19.

E statistical analysis of education impact due to COVID-19

Statistical analysis involves exploring trends, patterns, and relationships within quantitative data. The examination reveals that in the third month of 2020, there was a significant trend of widespread closures of schools, colleges, and universities, with the impact on education intensifying towards the end of that month (refer to Figure 3). Notably, countries spanning from SPG to TUV experienced substantial challenges in the education sector, as depicted in Figure 4. The analytical process employed various software tools, including R Programming and Data Wrapper, enhancing the robustness of the findings. These results are immensely valuable for promptly identifying countries severely affected in terms of education, facilitating targeted assistance. Moreover, the insights gained from this analysis lay a foundation for future studies that may delve deeper into the intricacies of the educational impact, enabling more comprehensive investigations.

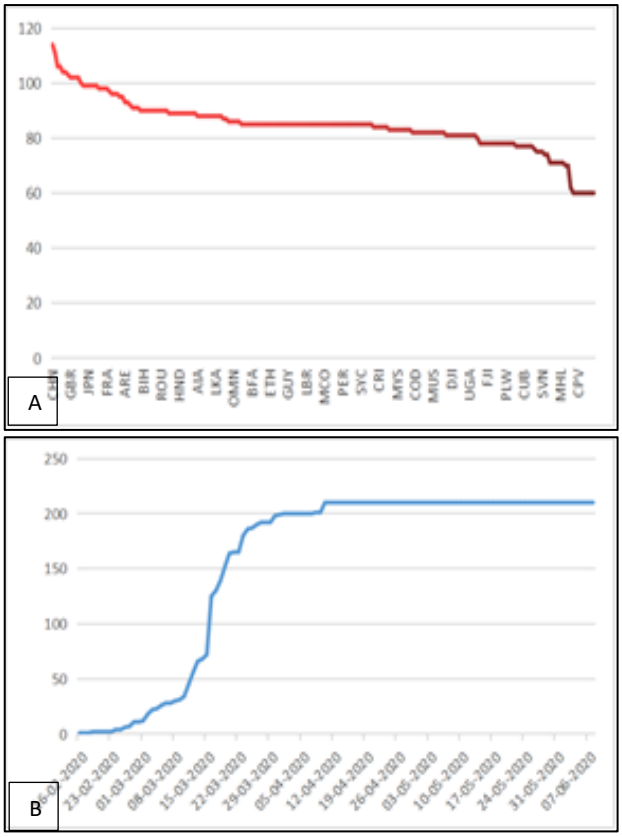

Figure 3: Statistical analysis of education impact of COVID-19.

CONCLUSION

The primary objective of this article is to thoroughly investigate and evaluate the global impact of COVID-19 on education. The aim is to discern patterns in the influence of COVID-19 on education worldwide and gain insights into the challenges faced by national and local authorities in managing the pandemic's educational ramifications. Additionally, the study seeks to analyse the correlation between GDP rate and Life Expectancy in relation to the observed impact rate. The article provides a country-wise breakdown of the educational impact of COVID-19, detailing the impact frequency, percentage, and cumulative total. Special attention is given to comparing India with other nations to draw meaningful insights.

Looking ahead, there is potential for expanding this research to a more advanced level. A proposed future direction involves the development of a predictive model for COVID-19 utilizing machine learning methods. The outcomes derived from each graph presented in the article could serve as distinct criteria for the machine learning algorithm. Furthermore, the scope of the study may extend to a future forecast analysis, contributing to a more precise prediction of the total number of cases in India. This expansion would enhance our understanding of the evolving dynamics of the pandemic and aid in

devising more effective strategies for mitigating its impact on education and public health.

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REFERENCES

1. Maier BF, Brockmann D. Effective containment explains sub-exponential growth in confirmed cases of recent COVID-19 outbreak in Mainland China. medRxiv. 2020.
2. Alimadadi A, Sachin A, Ishan M, Patricia BM, Bina J, Xi C. Artificial intelligence and machine learning to fight COVID-19. American Physiological Society, Bethesda. 2020;52(4):200-2.
3. Amar LA, Taha AA, Mohamed MY. Prediction of the fnal size for COVID-19 epidemic using machine learning: a case studyof Egypt. Infect Dis Model. 2020;5:62234.
4. Anastasopoulos C, Thomas W, Shan Y, Ahmed A, Lena S, Claudia B et al. Development and clinical implementation of tailored image analysis tools for COVID-19 in the midst of the pandemic: the synergetic effect of an open, clinically embedded software development platform and machine learning. Eur J Radiol. 2020;131:109233.
5. Arvind V, Jun SK, Brian HC, Eric G, Samuel KC. Development of a machine learning algorithm to predict intubation among hospitalized patients with COVID-19. J Crit Care. 2020;62:250.
6. Pokhrel S, Chhetri R. A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning. Higher Education for Future. 2021;8(1):133-41.
7. Hyseni DZ, Hoxha L. The impact of COVID-19 on education and on the well-being of teachers, parents, and students: Challenges related to remote (online) learning and opportunities for advancing the quality of education. ResearchGate. 2020.
8. Kuensel. First confirmed coronavirus case in Bhutan. Kuensel. Available at: https://kuenselonline.com/ first-confirmed-coronavirus-case-in-Bhutan. 2020. Accessed on 12 September, 2023.
9. Palden T. Women test COVID-19 positive after five tests locking down entire country. Kuensel. 2020;1.
10. Mittal S. An Exploratory Data Analysis of COVID-19 in India. Int J Engineering Techn Res. 2020;9(4):580.
11. United Nations Educational, Scientific and Cultural Organization. COVID-19 impact on education data. COVID-19 education disruption and response. Paris, France: The United Nations Educational, Scientific and Cultural Organization, UNESCO. 2020. Available at: https://unesdoc.unesco.org/ark:/ 48223/pf0000380398. Accessed on 12 September, 2023.
12. United Nations Educational, Scientific and Cultural Organization. (Producer). COVID-19 Webinar: A new world for teachers, education's frontline workers. 2020. Available at: https://en.unesco. org/news/covid-19-webinar-new-world-teachers-educations-frontline-workers. Accessed on 12 September, 2023.
13. Van Lancker W, Parolin Z. COVID-19, school closures, and child poverty: a social crisis in the making. Lancet Publ Heal. 2020;5(5):e243-44.
14. Effects of COVID-19 Period on Educational Systems and Institutions, Süt, Hüsne Mehtap; Öznaçar, Behçet. Int J Curriculum Instruction. 2021;13(1):537-51.
15. Gondauri D, Mikautadze E, Batiashvili M. Research on COVID-19 virus spreading statistics based on the examples of the cases from different countries, Electron J Gen Med. 2020;17(4):em(209).

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