

# Impact of the Covid-19 pandemic on healthcare facilities around the world

Dr. Gabriel Makuei Deng Makuei<sup>1</sup>, Hetem Dheiu Dau

<sup>1</sup>Corresponding Author:

Dr. Gabriel Makuei Deng Makuei,

Associate Professor,

Dr. John Garang University of Science and Technology, South Sudan.

Email: leek123deng@gmail.com

## Abstract

The paper was aimed to assess the impact of Covid-19 on healthcare systems around the world. The content of 18 papers selected for this review revealed negative impact on healthcare systems due to Covid. The impact was two-fold: directly on Covid care and on care of other patients. Reduced revenues of hospitals and diversion of funds, personnel and other resources for Covid care affecting other healthcare activities were observed. There were psychological problems of anxiety, stress and fear among both Covid and non-Covid patients leading to lower sleep quality and suicidal tendencies.

Countries which implemented appropriate combinations of strategies as soon as the first case was reported or when neighbouring countries were reporting rapid increases in Covid cases, could control spread, reduce mortalities and suppress the disease better than those which delayed the strategic responses till it became serious in the country.

**Keywords:** Covid-19, Pandemic, Healthcare Facilities, Impact, Review

## Introduction

Covid-19 has affected healthcare systems around the world seriously. According to American Hospitals Association (cited by Kaye, et al. (2020)), in USA alone, \$202.6 billion revenue has been lost at an average of \$50.7 billion per month. Thus, it is only the first four months of loss. For the whole year of 2020, the loss would have been around \$610 billion. Apart from the additional cost of facilitation for Covid-19 treatment, there was loss of revenue due to the need for hospitals to free up space by cancelling or postponing many non-Covid medical interventions in almost all countries. Institutions like nursing homes and old age homes were particularly strained by the rising cases of the new pandemic. Among some notable impacts on healthcare facilities across the world were: more than half of Pakistani and Jordanian healthcare workers did not have access to personal protection equipment (PPE). USA had serious shortages of PPEs for various cadres of healthcare workers. There was also a heavy shortage of testing facilities around the world. Most healthcare workers were diverted from other duties to Covid treatment leading to negative impact on other diseases. The slums of low income countries like Pakistan, Bangladesh and Kenya were particularly affected by this as access to healthcare became more difficult for the poor people living in these slums. The financial constraints resulting from postponement or cancellation of nonelective surgeries affected Covid care also. Increased use of telemedicine affected poor people who had no access to internet services to avail such facilities

even during emergencies as social isolation prevented them from going out and seek help. Healthcare and financial impact on different specialities were varied albeit serious.

Thus, the impact of Covid-19 on healthcare systems and facilities had been negative both economically and medically and contributed by many factors. This can be expected to continue for some more time as the pandemic strikes countries in waves repeatedly. However, as more experience is gathered over the waves of the pandemic, the healthcare systems will learn how to manage and minimise the negative impact better. This brief qualitative literature review is aimed to shed light on these aspects. A simple Google and Google Scholar search for papers on the topic yielded 18 papers. The content of papers on the topic of this review are discussed below.

## Review

Utilizing a Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), a pandemic vulnerability index (PVI) was prepared by Shrestha, et al. (2020) as a quantitative measure to rank countries. According to the PVI estimates, South Africa and Egypt were most vulnerable in Africa; Germany, Italy and Russia in Europe; India, Iran, Pakistan, Saudi Arabia and Turkey in Asia and Oceania and Brazil, USA, Mexico, Chile and Peru. There is a mismatch between the regions and countries assigned. The individual components used for estimation of PVI have been discussed by the authors. Total and daily new cases, recoveries, fatality rates, tests per million and many other non-Covid related variables have been considered to estimate the impact on healthcare systems.

The strain of Covid-19 has affected mental health of healthcare workers and patients as well as people of all other sectors. The heavy toll of mental health effects placed burden on mental healthcare facilities as well. A WHO survey on 10 October 2020 (cited by Abbas (2021)) revealed disruption of mental health services, neurological and substance use in most countries. These disruptions were due to Covid-related issues. About 89% of the countries included mental health and psychological support in their national plans for Covid management. Additional resources were utilised for this purpose by 17% of these countries. Family problems related to Covid are leading to increased domestic violence. Closure of educational institutions has affected mental well-being of students. Shifting to work from home added psychological stress of employees as they find personal interactions with their colleagues and bosses missing. These problems were more serious in the case of countries where already limited support and access to mental healthcare facilities have aggravated the mental health problems of populations. Increased workload has caused burnout, depression, stress, trauma, post-traumatic stress disorder (PTSD) and other mental health problems among frontline healthcare workers. Therefore, mental healthcare is also equally stressed and this problem also needs to be addressed in equal manner as the case of Covid. A global perspective of the immediate impact of Covid on mental health of healthcare workers was assessed by Htay, et al. (2020). The heavy workload of healthcare workers due to increasing incidences of Covid all over the world caused various mental health problems to them, thus affecting their care efficiency. In this study of 31 countries, survey responses were collected from 2166 participants of different categories of healthcare workers. Anxiety (60%) and depression (53%) were noted among the participants. It is surprising that such a big research team could collect data only on two of the may mental health problems.

Five domains of nurses' services which positively impact Covid-19 medical interventions were described by Shu-Ching, Yeur-Hur, and Shiow-Luan (2020). The first domain deals with provision of health education, screening services and support for the general public and for

individuals in high-risk categories. The second domain is related to prevention and surveillance of nosocomial infection. Appropriate preparations and precautions in nursing home and long-term care settings are included in the third domain. The fourth domain consists of protection of patients with immune deficits and underlying diseases like chronic obstructive pulmonary disease, chronic illnesses, and cancer. Fifth domain is about providing care of patients affected by Covid-related other illness. It is not certain whether all nurses in all countries are involved in all these services. In performing these services, nurses face any challenges. Closing the gap in practical knowledge, minimising healthcare system's inadequacies, covering up shortages, providing psychological and social support to patients and other healthcare professionals and nurses, researching to enhance knowledge for prevention and cure of Covid are some of them.

Among the healthcare workers in Saudi Arabia, who have already experienced the earlier pandemic of MERS-CoV, a psychological impact of being concerned about transmission of the virus to family and friends was noted from a survey by Temsah, et al. (2020). Interestingly, the survey was done at a time when no case of Covid-19 had been reported in Saudi Arabia till that time. About 40% of the participants had previous exposure to MERS, out of whom, 18% had exposure to MERS infected patients and the remaining 22% had exposure to suspected and then negative MERS patients. Rescheduling work time to avoid contact with covid patients was not preferred by about 85% of participants. Majority were similarly or more worried about covid as MERS. Most participants were mildly or moderately anxious about covid than highly or very highly anxious.

Impact of Covid mitigation and suppression strategies on low and middle income countries were discussed by Walker, et al. (2020). Lower-income countries quickly recognized the potential of negative impact of Covid pandemic from the current status across the world. Quick and early interventions to slow viral transmission could partly explain the low rates observed in these countries so far. Based on the calibration model of Walker et al, some possible future impacts can be predicted. Although there is a potential protective impact of younger generations in these countries now, the closer intergenerational contact, inadequate health care facilities and frequency of comorbidities dictate the need for sustained nonpharmaceutical interventions (NPIs) to prevent the disease from overwhelming health care capacity. Strict NPIs reduced the protective immunity effects; so testing capacity needs to be enhanced. Equitable provision of oxygen and pharmaceutical interventions are critical global priorities.

According to Yang (2020) diversion of funds to Covid treatments and PPE kits and research on covid vaccines by pharmaceutical and medical supplies firms have severely affected research on other fields of medical science.

To determine the ideal frequencies of dynamic NPIs and relaxations, Chowdhury, et al. (2020) used a multivariate model using the data on transmission and clinical parameters of 16 countries spread over the different geographical regions. The dynamic cycles of 50-day mitigation followed by a 30-day relaxation reduced transmission was not effective in lowering ICU hospitalizations below manageable limits. On the other hand, dynamic cycles of 50-day suppression followed by a 30-day relaxation maintained ICU demands below the national capacities. Also, a significant number of new infections and deaths, especially in resource-poor countries, could be averted by practising these dynamic suppression measures in place over an 18-month period. intermittent reductions of R below 1 through a potential combination of suppression interventions and relaxation was an effective control strategy against the COVID-19 pandemic. Using such a schedule of social distancing could be beneficial for sustainability of

interventions in low income countries, where a single prolonged suppression intervention is unsustainable. There is a three-pronged advantage of using this strategy in terms of preventing critical care overload and deaths, gaining time to develop preventive and clinical measures and reducing economic hardship at global level. Looking back, many of the estimates look overestimated compared to real data available now. So, this model may need review.

Based on the Latin American experience and in response to a comment on their earlier paper, Chen, Yen, Yu, & Su (2020) observed that a flexible lockdown integrating healthcare and economic reactivation will be desirable to minimise the impact of Covid both on the healthcare system and on the economic development. In this respect the solution suggested by Aristodemou, Buchhass, and Claringbould (2021) based on studies using an after-action-review (AAR) based on three indices, may be useful. They ranked the EU countries for the preparedness of healthcare systems, strictness of confinement measures and socio-economic effects expected due to the confinement strategies. It was found that stricter confinement measures were implemented by countries with less prepared healthcare systems and higher levels of stringency in the confinement measures were related with stronger, negative, socio-economic impacts. Based on the indices data, the EU countries were identified into three clusters.

The NPIs being implemented in different countries to mitigate the impact of Covid on healthcare and economics can have side effects on the well-being of individuals, especially of vulnerable communities like the homeless, prisoners, indigenous, migrants, those with disabilities and the elderly population. Using terms like 'social distancing' instead of 'spatial' or 'physical' distancing may be misunderstood as targeting certain categories of society. Therefore, it is necessary to stress the collective global community dimension of fighting the pandemic (Vieira, Franco, Restrepo, & Abel, 2020).

Perceptions on psychological impact of Covid as serious, moderate or light mainly due to anxiety and stress have been reported by various Chinese surveys of large sample sizes. Sleep quality was associated with anxiety and stress, which combined to reduce the social capital. Such mental health problems were observed both among patients and healthcare workers. Extreme mental problems can lead to suicidal tendencies. Sleep anomalies can be the single factor for ideation, attempts and death by suicide (Sher, 2020).

Both highlights and shortcomings mitigation, defence and prevention strategies of countries across the world were reviewed by Khanna, Cicinelli, Gilbert, Honavar, and Murthy (2020). A clear indication of delayed strategies being relatively less effective in controlling the pandemic was demonstrated comparing countries which were successful and which were not. On hindsight, the prediction of a devastating second peak by the authors due to highly inadequate attention paid to identification of asymptomatic and mild cases, was proved during the early months of 2021.

Lessons to be learned by the West from the East were discussed by Shokoohi, Osooli, and Stranges (2020). Some possible differences between the two could be infrastructures, epidemiological surveillance, control strategies to mitigate the public health impact of the pandemic, lack of rapid and timely community-centred approaches and weak public health infrastructures. Rapid recognition of the threat and immediate responses were characteristic of the East. Timely responses, sometimes even before the first case was identified, rapid expansion of the diagnostic capacities in the communities, widespread testing and screening programs, along with ongoing and extensive efforts in isolating infected cases and tracing and putting their

contacts in quarantine using advanced information technology, innovative screening tests like drive-through and walk-in screening and testing sites, mass-based strategies, efficient and effective public education and prevention of misinformation of the East were in sharp contrast with delayed strategies at all levels, their eagerness to ensure business continuous as usual. Germany was the only exception to the Western trends.

The impact of 6,068 hierarchically coded NPIs implemented in 79 territories of March-April 2020, on the effective reproduction number,  $R_t$  of COVID-19, was evaluated by Haug, et al. (2020) using a modelling approach. This will enable to inform the extent to which NPIs were effective in mitigating the spread of Covid. The modelling approach consisted of merging four methods: a case-control analysis, a step function approach to LASSO time-series regression (LASSO), random forests (RF) and transformers (TF). The model was validated using two external datasets of 42,151 additional NPIs from 226 countries. The study showed the necessity of a suitable combination of NRIs to curb the virus spread. Country-specific differences in timing of NPIs were noticed. country-specific control strategies as well as the impact of selected country-specific metrics were also evaluated. Change in  $R_t$  of 46 NPIs at L2 were compared. The most effective measures identified were closing and restricting most places where people gather in smaller or larger numbers for extended periods of time like businesses, bars and schools. Sometimes, other less intrusive methods like land border restrictions, governmental support to vulnerable populations and risk-communication strategies, also were effective. The paper does not give a country-wise comparison, which would have been very useful. In a related paper, Flaxman, et al. (2020) observed that in European countries also, current NPIs, especially lockdowns, were found effective. Using a reduced form of econometric methods, Hsiang, et al. (2020) evaluated the extent to which NPIs were able to reduce new Covid infections. Policy packages were found to have achieved large, beneficial and measurable health outcomes by preventing or delaying new infections.

Data on Covid-specific interventions, health outcomes, level of national preparedness and country specific socioeconomic factors were collected for 50 top ranked countries by number of corona cases. Factors associated with Covid mortality and related health outcomes were identified using multivariable negative binomial regression. Case load increases were associated with countries with high obesity and longer time for action since the first reported case. Mortality increases were observed in the case of countries with higher obesity prevalence and higher GDP per capita. Lower income distribution lowered mortality and the number of critical cases. Rapid border closures, full lockdowns and wide-spread testing did not affect COVID-19 mortality per million people. Increased recovery rates were associated with full lockdown and lower vulnerability of the country to biological threats (Chaudhry, Dranitsaris, Mubashir, Bartoszko, & Riazi, 2020).

## Conclusion

This paper was aimed at reviewing the impact of Covid-19 pandemic on healthcare systems across the world. Negative impact of Covid on both healthcare and financial systems have been reported by many workers. The impact on healthcare is two-fold: on inadequacies of healthcare systems to meet the requirements of the rapidly increasing Covid cases and the inability to continue medical interventions of on-Covid patients. Almost the entire medical infrastructure, professionals and funds are forced to be diverted to Covid patients, thus affecting care of other patients. Revenues of hospitals are reduced due to postponement of elective surgeries and

reduced patient intake. Psychological problems due to anxiety, fear and stress leading to lowering of sleep quality and suicide intentions on both Covid patients and others could also be observed.

The effects on healthcare systems were positive with respect to mitigation, prevention of spread and defence against Covid reduce new infections and lowering mortalities in countries, where appropriate combinations of NPIs strategies were in place as soon as the first case was identified. In other countries, delayed action led to confusion and there was either no positive effect or there was delay in achieving them.

## References

- Abbas, J. (2021). Crisis management, transnational healthcare challenges and opportunities: The intersection of COVID-19 pandemic and global mental health. *Research in Globalization*, 3(December), 100037. doi:10.1016/j.resglo.2021.100037
- ACI. (2021, March 25). *Advisory bulletins: The impact of COVID-19 on the airport business and the path to recovery*. Retrieved August 6, 2021, from Airports Council International: <https://aci.aero/news/2021/03/25/the-impact-of-covid-19-on-the-airport-business-and-the-path-to-recovery/>
- Aristodemou, K., Buchhass, L., & Claringbould, D. (2021). The COVID-19 crisis in the EU: the resilience of healthcare systems, government responses and their socio-economic effects. *Eurasian Economic Review*, 11(2), 251-281. doi:10.1007/s40822-020-00162-1
- Chaudhry, R., Dranitsaris, G., Mubashir, T., Bartoszko, J., & Riazi, S. (2020). A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes. *EClinicalMedicine*, 25(August), 100464. doi:10.1016/j.eclinm.2020.100464
- Chen, Y.-T., Yen, Y.-F., Yu, S.-H., & Su, E. C.-Y. (2020). A flexible lockdown by integrating public health and economic reactivation to response the crisis of COVID-19: responses to comments by Alvaro J Idrovo on “An examination on the transmission of COVID-19 and the effect of response strategies: a comparative. *International journal of environmental research and public health*, 17(21), 8068. doi:10.3390/ijerph17218068
- Chowdhury, R., Heng, K., Shawon, M. S., Goh, G., Okonofua, D., Ochoa-Rosales, C., & Gonzalez-Jaramillo, V. e. (2020). Dynamic interventions to control COVID-19 pandemic: a multivariate prediction modelling study comparing 16 worldwide countries. *European journal of epidemiology*, 35(5), 389-399. doi:10.1007/s10654-020-00649-w
- Flaxman, S., Mishra, S., Gandy, A., Unwin, H. J., Mellan, T. A., Coupland, H., & Whittaker, C. e. (2020). Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. *Nature*, 584(7820), 257-261. doi:10.1038/s41586-020-2405-7
- Haug, N., Geyrhofer, L., Londei, A., Dervic, E., Desvars-Larrive, A., Loreto, V., . . . Klimek, P. (2020). Ranking the effectiveness of worldwide COVID-19 government interventions. *Nature human behaviour*, 4(12), 1303-1312. doi:10.1038/s41562-020-01009-0

- Hsiang, S., Allen, D., Annan-Phan, S., Bell, K., Bolliger, I., Chong, T., & Druckenmiller, T. e. (2020). The effect of large-scale anti-contagion policies on the COVID-19 pandemic. *Nature*, 584(7820), 262-267. doi:10.1038/s41586-020-2404-8
- Htay, M. N., Marzo, R. R., AlRifai, A., Kamberi, F., Abdullah El-Abasiri, R., Nyamache, J. M., & Hlaing, H. A. (2020). Immediate impact of COVID-19 on mental health and its associated factors among healthcare workers: a global perspective across 31 countries. *Journal of Global Health*, 10(2), 020381. doi:10.7189/jogh.10.020381
- Kaye, A. D., Okeagu, C. N., Pham, A. D., Silva, R. A., Hurley, J. J., Arron, B. L., & Sarfraz, N. e. (2020). Economic Impact of COVID-19 Pandemic on Health Care Facilities and Systems: International Perspectives. *Best Practice & Research Clinical Anaesthesiology*, In Press. doi:10.1016/j.bpa.2020.11.009
- Khanna, R. C., Cicinelli, M. V., Gilbert, S. S., Honavar, S. G., & Murthy, G. V. (2020). COVID-19 pandemic: Lessons learned and future directions. *Indian Journal of Ophthalmology*, 68(5), 703. doi:10.4103/ijo.IJO\_843\_20
- Roy, S. (2020, July 27). Economic impact of Covid-19 pandemic. *A Preprint*, 1-29. Retrieved August 6, 2021, from [https://www.researchgate.net/profile/Shohini-Roy/publication/343222400\\_ECONOMIC\\_IMPACT\\_OF\\_COVID-19\\_PANDEMIC/links/5fa1e11e92851c14bc036d68/ECONOMIC-IMPACT-OF-COVID-19-PANDEMIC.pdf](https://www.researchgate.net/profile/Shohini-Roy/publication/343222400_ECONOMIC_IMPACT_OF_COVID-19_PANDEMIC/links/5fa1e11e92851c14bc036d68/ECONOMIC-IMPACT-OF-COVID-19-PANDEMIC.pdf)
- Sher, L. (2020). COVID-19, anxiety, sleep disturbances and suicide. *Sleep medicine*, 70, 124-124. doi:10.1016/j.sleep.2020.04.019
- Shokoohi, M., Osooli, M., & Stranges, S. (2020). COVID-19 pandemic: What can the west learn from the east? *International Journal of Health Policy and Management*, 9(10), 436. doi:10.34172/ijhpm.2020.85
- Shrestha, N., Shad, M. Y., Ulvi, O., Khan, M. H., Karamehic-Muratovic, A., Nguyen, U.-S. D., & Baghbanzadeh, M. e. (2020). The impact of COVID-19 on globalization. *One Health*, 11(December), 100180. doi:10.1016/j.onehlt.2020.100180
- Shu-Ching, C., Yeur-Hur, L., & Shiow-Luan, T. (2020). Nursing perspectives on the impacts of COVID-19. *Journal of Nursing Research*. *Journal of Nursing Research*, 28(3), e85. doi:10.1097/jnr.0000000000000389
- Temsah, M.-H., Al-Sohime, F., Alamro, N., Al-Eyadhy, A., Al-Hasan, K., Jamal, A., & Al-Maghlouth, I. e. (2020). The psychological impact of COVID-19 pandemic on health care workers in a MERS-CoV endemic country. *Journal of infection and public health*, 13(6), 877-882. doi:10.1016/j.jiph.2020.05.021
- Vieira, C. M., Franco, O. H., Restrepo, C. G., & Abel, T. (2020). COVID-19: The forgotten priorities of the pandemic. *Maturitas*, 136(June), 38-41. doi:10.1016/j.maturitas.2020.04.004
- Walker, P. G., Whittaker, C., Watson, O. J., Baguelin, M., Winskill, P., Hamlet, A., & Djafaara, B. A. (2020). The impact of COVID-19 and strategies for mitigation and suppression in low-and middle-income countries. *Science*, 369(6502), 413-422. doi:10.1126/science.abc0035

Yang, Y. (2020). Impact of the COVID-19 Pandemic on Biomedical and Clinical Research. *Matter*, 3(4), 970-973. doi:10.1016/j.matt.2020.08.026