Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

CHAPTER ELEVEN

Effect of COVID-19 pandemic on social factors

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1. Introduction

Human beings are social animals. Human beings carry out various activities, such as work, education, ensuring shelter for personal safety, following traditions, and use of social media, to satisfy their wants and desires. However, in the quest to satisfy their desires, human beings affected the environmental quality. A novel coronavirus, SARS-CoV-2, in early 2020 suddenly brought an upheaval to society. COVID-19 (the disease caused by SARS-CoV-2) demanded that humans become isolated and caused immeasurable problems to the social attitude of humans. Suddenly, the disease forced humans to carry out only the activities pertaining to basic needs such as food, cloth, shelter, and safety.[1] This decreased the purchasing behavior of humans, energy consumption, and transportation to a large extent. This has a positive impact on environmental quality in the short term. However, the negative impact of COVID-19 on society is immeasurable.[3]

The social impact of COVID-19 further enhanced the importance of achieving sustainable development goals (SDGs).[4] Governments and organizations realize that social responsibility measures improve society's overall well-being.[5] Responsible organizations are addressing the need to be beneficiary focused and build a community-focused approach.[7] The social performance of organizations is also linked to their economic performance.[8] Further, the social impact of COVID-19 is interlaced with the importance of values and ethics.[9] Many countries and organizations have repurposed resources and workforce to reduce the supply and labor shortage during a crisis. One of the most discussed topics during any crisis is the impact of such disruptions on social well-being. This leads to the topic of the social impact

COVID-19 and the Sustainable Development Goals
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of COVID-19 in this chapter. Broadly, six sectors are identified from the social progress index (SPI)[10] impacted during a crisis. These sectors are employment, education, healthcare, family, social media, and environment quality. The international governing bodies that manage these sectors are World Health Organization (WHO), International Labor Organization (ILO), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC), among others.[11] Each of these sectors is discussed in detail and their inherent characteristics during COVID-19 are understood.

To assess the social impact of COVID-19 on SDGs, the aim is to address portions of SDG 3, SDG 4, SDG 8, and SDG 11 through the study. The focus on good health and well-being of SDG 3 got severely compromised during COVID-19 as a number of essential health services got disrupted. The importance of universal health coverage (UHC) is essential for equitable access to healthcare to the society.[12] SDG 4 focuses on equitable quality education. Again, during COVID-19, education gains of past decades were severely hampered.[13] Lack of regular activities like attending schools and colleges, participating in co-curricular and extracurricular activities, and access to basic infrastructure resulted in reduction in proficiency levels of students. SDG 8 focuses on decent work and economic growth. There has been a loss of 255 million full-time jobs due to the pandemic in 2020.[14] While the impact was across the economy, majority of the workers in informal economy suffered. Finally, SDG 13 focuses on taking urgent actions to combat climate change. During the lockdown due to COVID-19, there was a reduction of pollution across the globe. However, the climate crisis continued in 2020, as the global average temperature remained above the preindustrial baseline. Accessing clean air in a unified world is still a distant dream.[15] The main objective of this study is to incorporate the challenges in the six sectors of the SPI during COVID-19 and highlight their significance with respect to the SDGs. The importance of country-specific requirements for the six sectors is elucidated through examples and cases in the chapter.

2. Employment

ILO has classified employment into three categories based on age: youth (15–24 years), adult (25–54 years), and old (>55 years). Among these categories, COVID-19 has impacted youth employment significantly. Youth are getting disproportionately unemployed since many works in

the informal sector or the gig economy. Seventy-seven percent of youth hold informal jobs, and 126 million are extreme or moderate working poor. Many of the young population are migrants and work in different countries. In 2019, 70% of all international migrants are below 30 years of age, while 38% were below the age of 20 years. Further, youth in the 15–24 age group is 3 times more likely to be unemployed[16] (Fig. 1). In Southern Asia, South-Eastern Asia, and the Pacific, this ratio was more than six times in 2019. Many of these COVID-19-affected countries in South Asia have refugee problems that may affect these people's livelihoods during the crisis.[17]

During the pandemic in early 2020, ILO estimated a 5.3 and 24.7 million increase in the unemployment rate globally from a base level of 188 million in 2019 due to COVID-19.[18] However, the unprecedented scale of COVID-19 spread significantly disrupted the workplace. By the end of 2020, ILO estimated that 8.8% of the global working hours were lost, equivalent to 255 million full-time jobs (Fig. 2). This was roughly four times greater than the global financial crisis of 2009.[14] Further, 33 million full-time employees out of these 255 million were unemployed. Thus social protection is very important for young people who are at higher economic and social risk. However, incorporating the informal sector into social insurance programs is necessary to serve 77% of the youth. Countries need to monitor youth unemployment and underemployment and promote targeted recovery measures like youth innovation and social protection.[19]

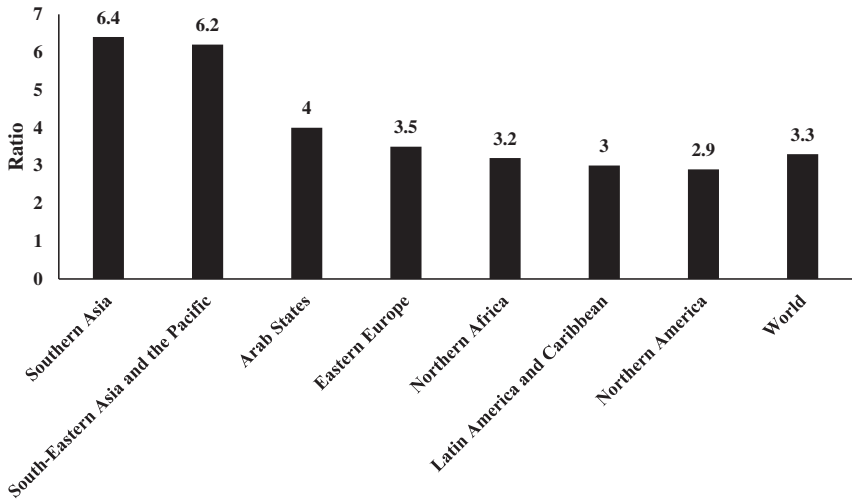

Fig. 1 Ratio of youth to adult unemployment rate in 2019.

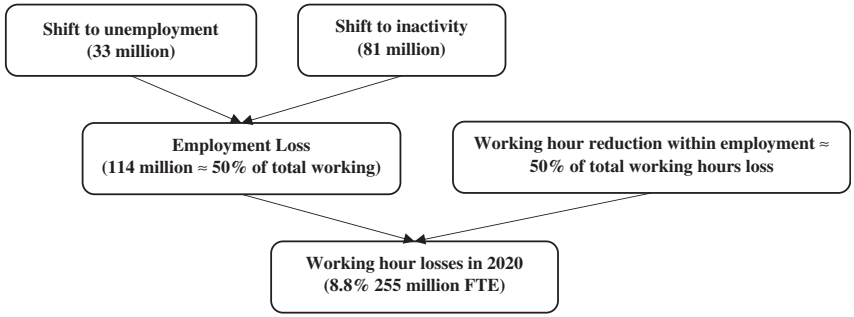

Fig. 2 Estimates of working hours and employment lost in 2020.

Looking into the specifics, the youth unemployment rate was expected to be almost constant in 2020 in the pre-COVID-19 era[18] (Table 1). This rate was expected to be between 13% and 14%. However, the employment-to-population ratio was already expected to decline pre-COVID-19 due to a decrease in labor force participation rates[16] (Table 2). Thus there was already a shortage of jobs for the youth. Similarly, as per the SPI, on average, 48% of people had vulnerable employment in the past decade before COVID-19[20] (Table 3). However, during COVID-19, the labor income lost in 2020 was estimated to be US$3.7 trillion or 4.4% of global GDP. The Americas experienced the largest labor income loss (10.3%) while the Asia Pacific registered the smallest loss (6.6%).[21] Overall, the global income declined by 8.3% in 2020 relative to 2019. The lower middle-income countries suffered the greatest losses in working hours in 2020, at 11.3%, well above the global average of 8.8%[14] (Fig. 3). The global labor force participation rate dropped

Table 1 World youth unemployment rate estimates pre-COVID-19.

Youth total %			Youth male %			Youth female %		
2019	**2020**	**2021**	**2019**	**2020**	**2021**	**2019**	**2020**	**2021**
13.6	13.7	13.8	14	14	14.1	13	13.1	13.2

Source: ILO.

Table 2 World youth employment-to-population ratio (EPR) globally pre-COVID-19.

Youth total %			Youth male %			Youth female %			Adults (%) 25+		
1999	**2019**	**2023**	**1999**	**2019**	**2023**	**1999**	**2019**	**2023**	**1999**	**2019**	**2023**
46.4	35.6	34.6	54.2	42.2	41	38.4	28.5	27.8	66	63.2	62.1

2023 are projections.
Source: ILO.

Table 3 Vulnerable employment in the world.

Year	Vulnerable employment (% of employees)
2020	46.7569
2019	46.8329
2018	47.1184
2017	47.4677
2016	47.8447
2015	48.2871
2014	48.7062
2013	49.0697
2012	49.7689
2011	50.2609

Source: socialprogress.org.

by 2.2%.[14] The working hour losses were majorly due to inactivity across the globe, but reduced working hours and unemployment also crippled the high-income countries (Fig. 4).

However, employment in information and communication, financial, and insurance activities increased in the second and third quarters. Employment also increased in mining, quarrying, and utilities in the third quarter of 2020[22] (Table 4). The magnitude of sectoral patterns varied across countries during the quarter. The construction, manufacturing, transportation, and

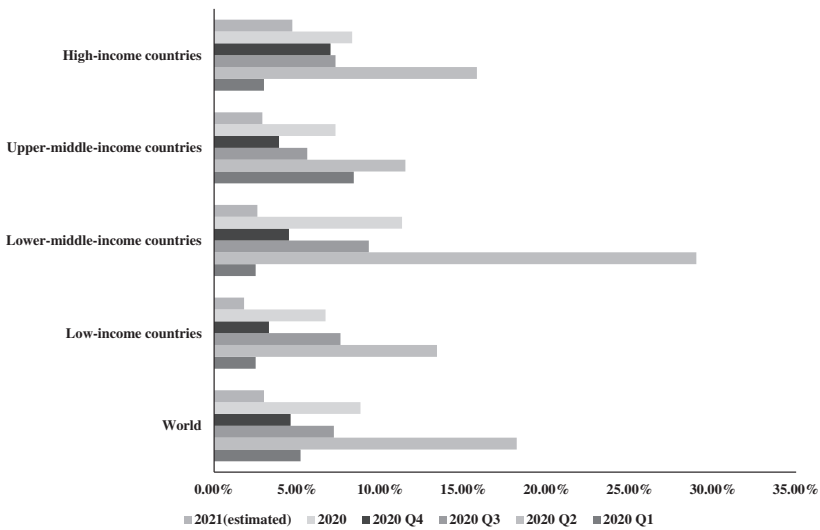

Fig. 3 Working hour losses due to COVID-19.

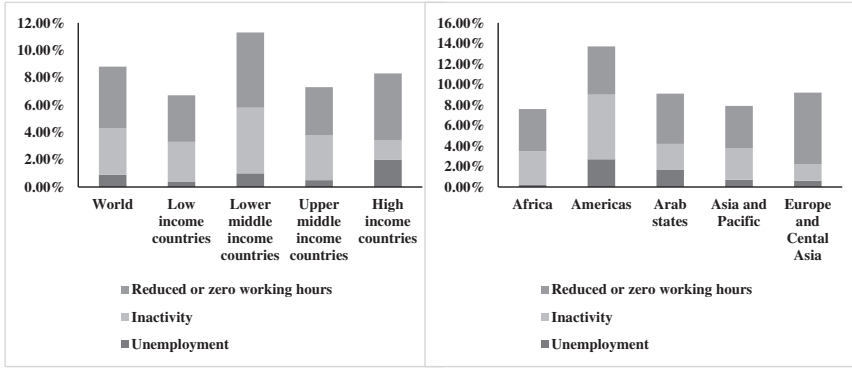

Fig. 4 Decomposition of working hour losses due to COVID-19 in 2020.

Table 4 Sectoral employment growth rates in second and third quarters of 2020.

		Growth of employment (year-on-year)%	
Sector	**At-risk status**	**2020 Quarter 2**	**2020 Quarter 3**
Accommodation and food services	High	−20.3	−13.6
Construction	Medium	−8.4	−2.2
Wholesale and Retail Trade	High	−7.2	−2.8
Manufacturing	High	−5.6	−2.5
Education	Low	−1.4	0.1
Transportation and Storage	Medium–High	−6.2	−6.1
Information and Communication	Low	5	7.3
Utilities	Low	0.1	1.1
Human health and Social work activities	Low	−0.8	0.5
Mining and Quarrying	Medium	3.6	2.8
Financial and Insurance Activities	Medium	3.4	3.5

Source: ILO.

storage sectors, which employ a large number of daily wage workers, continued to suffer over two quarters in 2020. This resulted in a mass exodus of workers from cities to villages in developing countries like India.[22]

ILO developed a policy framework, considering four key pillars to fight COVID-19 (Fig. 5). These pillars have been identified as follows[23]:

1. Stimulating economy and employment
2. Supporting enterprises, jobs, and incomes

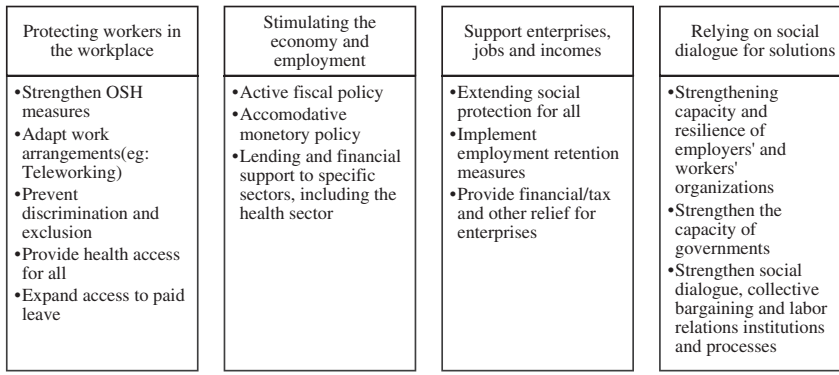

Fig. 5 Policy framework for employment to fight COVID-19.

3. Protecting workers in the workplace
4. Relying on social dialogue for solutions

The broad recovery strategies for employment as identified through the four pillars are mentioned as follows:

2.1 Working arrangements including telework

To promote teleworking, there is a need for simpler procedure, financial support, and IT capability at the national and workplace level. As per the US census bureau, the nonself-employed population of teleworkers has grown by over 102% from 2005 to 2014. This kind of adoption is fundamental during the current pandemic. There are some hazards of telework also which need to be addressed. Buomprisco et al.[24] stated that lack of dedicated working area, unavailability of ergonomic work equipment, and risk of overwork could have potential health implications.

2.2 Expanded access to paid sick leave

Provisions of paid sick leave are mandatory for workplace employees to promote the responsibility of the employers. Paid reduction in working time, employment retention, and unemployment benefits should be expanded to several countries. Social assistance benefits like cash transfers can enhance income security and boost demand. Heymann et al.[5] did their research on 193 UN member states in early 2020 and found that 27% of the countries did not guarantee paid sick leave from the first day of COVID-19 illness. Further, they found that 58% of countries did not have provisions for paid sick leave for self-employed and sharing economy workers.

2.3 Occupational health and safety (OSH) advice

Dedicated hotlines, websites, and information mediums need to be provided to disseminate advice on workplace OSH measures. Godderis and Luyten[25] stated that reduced income would translate to lower living standards, fewer tax resources, stress, and mental health issues. For example, Spain, which spent little on social protection during the economic crisis in the 1990s, had increased suicides and unemployment. Contrary to this, Sweden spent four times on social support programs, thus controlling the suicide rates. The authors reflected that the field of OSH should focus on social support and employment during and after the crisis.

2.4 Prevention of discrimination and exclusion

Many health workers in various countries have faced COVID-19-related harassment and bullying. As the coronavirus started to spread in 2020, Ely and Habibi[26] stated that social distancing might lead to stigmatization of already marginalized groups. Further, they reflected that nonuniversal systems based on legal entitlements of countries enhance the transmission of the virus and aggravate social and economic disruptions. Thus human rights protection cannot be an afterthought in epidemics.

2.5 Active fiscal policy and accommodative monetary policy

Central banks of countries need to cut interest rates, provide social security, and introduce tax breaks and waivers. Further, the deadline for repayment of mortgages needs to be extended. Chen et al.[27] did a cross-country comparative study of countries' fiscal policies during COVID-19. They identified that majority of countries had targeted the healthcare sector, business sector, individuals, or households. They suggested that countries should develop appropriate strategies and fiscal policies depending on the economic condition and severity of the COVID-19 crisis.[27]

2.6 Lending and financial support to some sectors

Financial support and subsidies to sectors making health-related items need to be provided. Sectors like tourism, aviation, and hotels need longer term support. Affected companies can benefit from the postponement of social or tax installments, and tax rebates. Also, expanding special financial support to MSMEs can help save a number of small businesses.[28]

3. Education

This pandemic has negatively impacted children and teenagers, including the closure of schools, isolation owing to government lockdown measures, and the collapse of the world economy. These negative impacts have short- and long-term effects on children, teenagers, families, teachers, and the educational ecosystem. Increased food insecurity and the onset of mental health problems are two more possible side effects.[29]

There was an impact of formal teacher-student and student-student interactions during the course of imparting education due to COVID-19. To mitigate the impact of COVID-19, several governments have stopped providing in-person schooling, which had affected the quality of education (Fig. 6). Initially, school closure was introduced by countries. Postlockdown, some countries resorted to impart online learning, and few countries resumed traditional in-person school teaching.[29]

School closure resulted in stress to parents, as children were spending most of their time using electronic devices. It also resulted in much stress for working women in healthcare, who could not attend their services when required. Finland allowed children whose parents work in essential services to attend preprimary and primary school until the third grade.[13]

The sudden closure of schools replaced in-person teaching with various forms of Information and Communication Technology (ICT)-based remote and distance education. Subsequently, after lifting the lockdown restrictions, many schools in several countries resorted to online learning

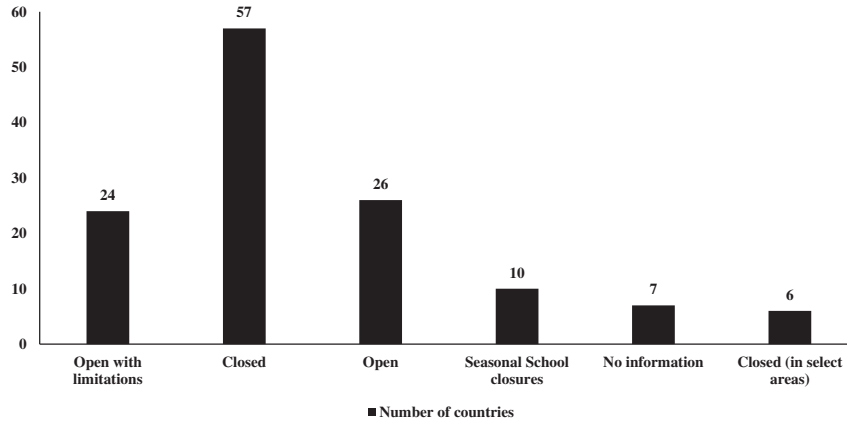

Fig. 6 Status of school closure in various countries due to COVID-19.

or distance education. This created a digital divide in Lower Middle Income and Lower Income countries. Digital Divide is a dynamic concept. It means the disparity between technology-rich and technology-poor. According to Cullen,[30] the digital divide is the disadvantage felt by individuals who are unable or unwilling to use ICT in their daily life. The OECD defined the "digital divide" in 2001 as "the gap between individuals, households, businesses and geographic areas at the different socio-economic levels concerning their opportunities to access ICTs and their use of the Internet." The digital divide has created major barriers such as the continuity of students' learning in urban versus rural areas and the digital readiness of government versus private educational institutions. The impact of the digital divide as shown by researchers is that students do not return for education is high[31] (Fig. 7).

Due to increased unemployment or not having access to digital technologies, an increasing trend of dropouts is observed in African countries.[32]

Teachers are also required to cope up with different platforms of teaching, controlling the students remotely, absenteeism of students, and ensuring proper attention from students. Their teaching skills are under constant watch by the parents and their supervisors. Teachers were made to ask to collect fees from the students, and retention of students was also made one of their responsibilities.[33]

Lack of exploitation of full potential, unfair competitive edge, and decreased productivity among the poor are the disadvantages of online teaching. The advantages include enhancement and convenience in learning due to the availability of reading materials online.[32]

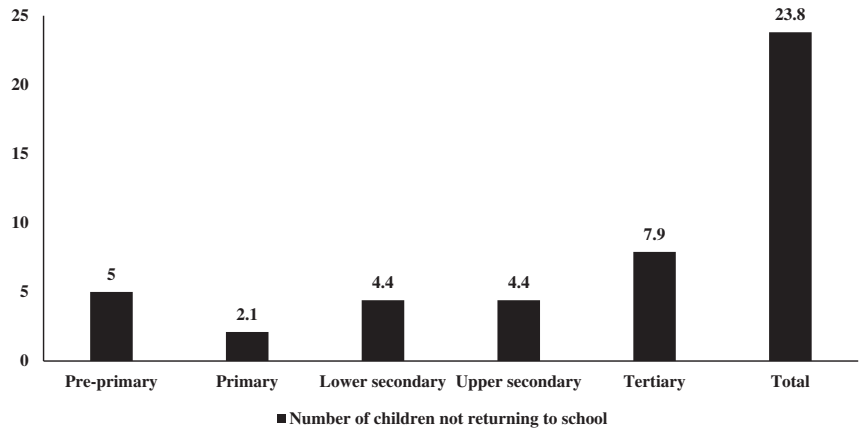

Fig. 7 Estimated students not returning for education. *(Source: Statista.)*

School reopening required the school authorities to take several precautionary measures such as physical distancing (e.g., by reducing class sizes) and other hygiene measures such as handwashing stations or mask wearing.[13] There was a lot of reluctance from the parents to send their children to school in some countries. However, as COVID-19 also impacted children in phase-2, many schools resorted to online education.[13]

COVID-19 ended children's regular activities like attending school, interacting with relatives and friends, playing outside, and experiencing nature and messed up the social and emotional benefits that come with them. Parents spent much more time in the company of their children during the COVID-19 quarantine, observing changes in behavior directly.[29]

Schools serve as safe havens for many children in addition to being places where they learn. Teachers and school staff perform a protective role for children's physical and mental safety by being in daily touch with them. They can warn authorities or parents in the event of violence or abuse.[29]

3.1 Early childhood education

Early childhood, the first 6 years of a child's life, is the most important development. According to neurobiology and cognitive development specialists, 90% of brain growth happens during the first 6 years of life. Center on the Developing Child at Harvard University indicates that mental and physical well-being, ability to be a good social being, and cognitive-linguistic abilities develop in early childhood. All of these skills are required for academic achievement and success in the workplace and community.[34]

Several parents have enrolled their children in online or home-schooling programs to continue their children's education during the COVID-19. Still, many parents experienced anxiety about the social and physical development of their children. There is evidence that excessive screen time can hurt children; however, the effects of zero learning years on a kid's long-term development are more detrimental and may have a multiplication effect.[34]

3.2 Primary education

Coronavirus's impact on primary education has made it more difficult for many students, particularly in developing countries. Many students in developing countries have limited access to the internet or internet-connected devices, making it difficult to keep up. By the age of 10, approximately 53% (2020) of children in low-income countries could not read, compared

to 35% (2019) previously.[35] These children are classified as being in Learning Poverty. The amount of unsupervised time for these children will increase, and unless responsible adults ensure that the children focus on their studies, the percentage of Learning Poverty will rise. Furthermore, in 71 low-income countries, more than 30% of students lack internet access as of 2020.[36]

COVID-19 has affected female primary school enrollment significantly in developing countries. Girls, for example, have less access to digital platforms than boys. This disparity will only serve to increase the dropout rate among young females. Fewer girls in school correlate with an increase in teen pregnancy rates, which causes plenty of household issues. School closures also have a disproportionate impact on mothers. In 31 low-income countries, only 39% of women worked while caring for their children. As a result, women are pushed into the informal economy, earning less money and becoming desperately poor.[36]

3.3 Secondary education

In addition to the problems discussed by students in primary education, secondary students have another problem about their future educational prospects. Secondary students in their final year are concerned about their preparedness for college admission. Several colleges and universities closure have raised their anxiety levels about their plans. They will miss their final opportunity to evaluate their abilities if examinations are not held. There are no felicitations, no chance for demonstrating various leadership skills, no chance to attend Olympiad competition, and most importantly, loss of bonding between friends. Also, being in their teens, their anxiety levels are ever increasing, leading to increased stress levels, in case there are some disturbances in the parents' financial status.[37]

3.4 Tertiary education

Students live and study in the hostels (closed environments) in universities and colleges. They are also thriving cultural hubs, bringing students from all over the world together. Enrollment of international students has decreased as a result of class closures and the transition to an online mode of instruction. The foreign student population is about 5.5% of all the students in the United States, of which Chinese and Indians account for 51%. Although many tertiary education institutions worldwide provide few courses online, shifting all programs online may be extremely difficult. While few colleges

may have well-developed online systems, smaller institutions may have difficulties. University and college administrators and their IT colleagues had to collaborate to bring the courses online. However, tertiary education institutions are well positioned to impart online education.[38]

3.5 Teachers and education systems

The lockdown and the public health situation, in general, had an emotional impact on teachers, professionals, and other adults. Moreover, as teachers have continued to work from home, their workload has increased. This is due to a lack of training in designing and implementing remote learning methodologies and the extra effort required by working from home during emergencies, where they must simultaneously respond to their obligations. Teachers must also maintain their physical and emotional health to work from home or participate in school reopening efforts. This presents educational institutions with another challenge.[39]

A substantial proportion of instructors belong to the age group that is most vulnerable to COVID-19 infection. As a result, even if schools reopen, it is unclear whether all teaching staff will be available to work in the classroom. Furthermore, teachers in various countries have expressed concerns about returning to work because of the risk of infection, resulting in a short-term scarcity of teaching staff. Also, in certain countries, offline teaching is opposed by teachers' unions.

Education funding is imperiled by the economic slowdown and the need for resources from the health and social security sectors. The education sector needs additional funds to expand the classroom, hostel, mess, and sports infrastructure, keeping in view of social distancing norms.[40] Hence, in a situation where government budgetary capacity is constrained, the following five reasons may result in increased financial pressure on educational institutions[41]:

- Reopening educational institutions will necessitate more resources to facilitate the implementation of new regulations.
- If the closure of schools continues, educational institutions are forced to expand and strengthen their remote teaching capabilities, which would require significant investment.
- Due to a shortage of instructors, systems require additional funding to hire new instructors.
- The health crisis will impact teachers' health, necessitating greater resources to cover their medical disabilities.

- In countries where private institutions dominate, parents who decide to transfer their children for financial reasons may demand more public institutions. Several private institutions may be forced to close as a result of this. Governments have to plan for the sustainability of public institutions due to this increased demand.

3.6 Research

University's operating budget is based on the following five important revenue sources: tuition and fees, hospitals and healthcare grants, externally financed research, state appropriations, and endowment. Most of these revenue streams are under jeopardy as a result of the pandemic's effects. Externally sponsored research has proven to be a reliable source of money so far, with no immediate threats to its continuation. Many institutions employed cost-cutting measures, which impacted funded research. However, at the start of the pandemic, governments gave institutions much flexibility in using research funds. Many traditional research activities were put on hold for the most part. Simultaneously, the COVID-19 situation prompted significant innovation in research collaboration and academic communication. Scientists who would never have met otherwise argued and discussed via videoconferences, shared data, ideas, and discoveries, and collaborated to find solutions. Coronavirus and associated research publications were made freely available by a number of publishers. Mendeley and ResearchGate, two scholarly collaboration networks, have created specific services to facilitate sharing and cooperation. The communication gap between professors and researchers has reduced dramatically. There was access to online software through virtual private networks, which otherwise, the IT department of the universities would have never allowed.[42]

However, the vast majority of research institutions have closed or gone virtual, and few are currently operating at lower levels due to social distancing. Another type of challenge has arisen as a result of lab equipment being shared among laboratories and in certain circumstances throughout the university. During the pandemic's peak, many scientific researchers were unable to travel internationally or to isolated locations, resulting in the loss of vital data and, in some cases, whole projects.[41]

4. Healthcare

The healthcare disaster due to COVID-19 has impacted the young and old households, male and female, rich and poor, and literate and illiterate. However, the adverse effects of the disease on older people are

significant. Further, poor people lack the basic amenities like availing of healthcare resources, nutritious food, potable water, etc. Similarly, high levels of illiteracy have resulted in the exclusion or marginalization of those who lack access to technology. Gender also plays an important role. Globally, 70% of the healthcare workforce comprises female health workers.[43] Especially as the health systems get overloaded, the burden of home care largely landed on women and girls. The importance of human health and immunity during the pandemic disruption is discussed in subsequent sections.

4.1 Human health

When people are exposed to SARS-CoV-2, they are at risk of contracting COVID-19. Symptoms may or may not occur in a person who has been infected with this virus. SARS-CoV-2, like other coronaviruses, appears to transmit by respiratory droplets from person to person. Once inside the body, it predominantly affects the lungs. A persistent cough, shortness of breath, pain and tightness in the chest, fever, exhaustion, and a loss of taste and smell may develop over the course of 2–14 days. COVID-19 patients recover in less than 2 weeks in about 80% of cases without requiring special treatment. Some people may have mild flu-like symptoms. COVID-19, in some cases, has a serious effect on the lungs, causing breathing difficulties, low blood oxygen levels, lung damage, pneumonia, and pulmonary edema in certain patients. Experts are yet uncertain how the virus impacts lung cells. Furthermore, it seems that the body's immune response, the virus's impact on cells, and oxygen deprivation are all potentially fatal. People who require hospital treatment require extensive artificial breathing support, which puts them at risk of lung injury.[44]

COVID-19 can harm the blood, kidneys, nervous system, brain, cardiovascular, and gastrointestinal systems. Some people experience minor symptoms initially but eventually develop health issues that last weeks or months. Persistent symptoms include fatigue, shortness of breath, cough, joint discomfort, chest pain, headache, muscular soreness, and a fluctuating fever. Blood clots, brain fog, mood swings, vision problems, kidney damage, and heart palpitations are all possible side effects of COVID-19. There is also a possibility of hormonal, dermatological, and musculoskeletal issues, albeit there is not enough research to back this up yet.[45]

4.2 Human immunity

Boosting the immune system is found to be a useful option for COVID-19 patients. The immune system's processes and mechanisms are an important

precursor to immune system development. The most recent observations on COVID-19 treatment could be the focus of future research. This would be a significant accomplishment if the various hurdles could be overcome.[46]

4.3 Universal health coverage

Countries have understood the importance of basic public health, stronger health systems, and contingency preparedness to bridge the structural inequality in healthcare systems. Accelerated UHC to promote and protect health and well-being should be a common goal for the international diaspora. In the short term, healthcare in countries should work based on the worst-case scenario. The aim should be to minimize morbidity and mortality while continuously maintaining essential health services. Those who are most vulnerable to COVID-19 need special attention. Hence, urgent response should be available for healthcare workers, frontline workers, people who are old, those with comorbidities, and those who are poor and live in crowded settlements. Also, the role of females in decision-making is crucial. Only 25% of the world's health ministers are women, and a similar proportion of women are in senior roles in health institutions. Thus the decision-making table does not reflect the women's role in the pandemic.[44]
The United Nations have affirmed their stance on achieving UHC by 2030, as part of SDGs. The goal of UHC for individuals and communities is threefold[12]:

1. ***Equity in access***: Everyone in need of healthcare should have access irrespective of the income level of the person.
2. ***Sufficient quality***: Health services should provide sufficient quality healthcare to improve the health of the patient.
3. ***No undue financial risk***: Health services should not put anyone at financial risk due to the high cost.

However, during the COVID-19 crisis, UHC has been impacted for three reasons: transmission of the virus causing a large number of morbidity and mortality, the inability of the health systems to provide the essential health services due to resource constraints, and the socioeconomic impact. Countries can prevent healthcare disruptions if they are resilient enough to respond to these requirements.[47]

4.3.1 Transmission of the virus

Stringent public health measures are essential while preserving people's fundamental rights to reduce COVID-19 transmission. As the virus mutates and variants develop, addressing these restrictions across the time horizon is a

tactical decision to be adopted by various governments. Contact tracing, testing, and isolation are critical together with age-specific interventions.[48]

4.3.2 Essential health services

Essential health services during the pandemic disruption are facing severe resource constraints. The requirement for doctors, nurses, and healthcare workers is crucial to sustaining the healthcare ecosystem. Similarly, the resource allocation of critical resources like beds, ventilators, and oxygen is crucial to maintain essential health services.[49]

4.3.3 Socioeconomic impact

The 26 richest people in the world hold wealth equivalent to half of the global population. Similarly, 70% of the world's population is living with wealth inequality. Gender, family, ethnic background, race, and culture also cause inequality. Clean water and sanitation, and nutrition are some of the important areas to improve socioeconomic impact.[50]

4.4 Clean water and sanitation

Inadequate access to clean water and disruptions in supply has also impacted socioeconomic well-being. Clean water for handwashing facilities is crucial to prevent COVID-19 as a nonpharmaceutical intervention. There is 40% of the population in the world who do not have access to clean water and sanitation (2.2 billion people lack access to water and 4.2 billion people lack access to sanitation). Populations living in slums have a higher risk of infection due to a lack of hygiene and sanitation standards.[50]

4.5 Nutrition

Nutrition and good health during COVID-19 are tightly interlinked. Unfortunately, volatility in demand, market tampering, supply disruptions, and stockpiling have impacted food prices. This has had negative effects on the nutrition of the vulnerable population. Further, there is a disruption in the meals of children and young people due to school closures impacting their nutrition. Around 320 million primary schoolchildren in 120 countries are not receiving school meals due to COVID-19. It is important to understand that the nutrition, health, and learning needs of the marginalized and vulnerable children are often interlinked. Policies need to address equitable solutions to address these challenges faced by countries.[50]

5. Family

The human need to feel safe, connected, hopeful, and calm is intensely important during crises and disasters. The importance of social well-being in family centered care revolves around open family presence at the bedside, morale booster of family members, physical presence, and caretaking. However, the principal mitigation strategy for pandemic disruption is isolation, physical distancing, and quarantine to prevent transmission. As highlighted by Hart et al.,[51] restrictions of COVID-19 should not in any way undermine the principles of family centered care. The authors stated that family centered care goals are based on respecting the role of family members as collaborators and care partners. Further, the collaboration of family members and healthcare staff is crucial to maintain the healthcare ecosystem. Thus "visitation" in family centered care should be replaced with "family presence" through nonphysical ways during COVID-19.

Our current generation is lucky to have timely support through technology, computers, mobiles, and broadband internet. Internet inequality has also reduced significantly in the past decade. Therefore technology laden family care strategies should be embedded in the policies of governments while addressing the needs of patients and their family members. Further, the policies need to be built for effective home care remedies through technology. The healthcare system should leverage the advantages of technology to help families during isolation and home care.

Further, access to CCTV cameras in the ICUs of hospitals should be provided to the family members of the patients. Daily videoconferencing and telephone contact are important for encouraging patients' morale and calming the nerves of suffering families.[52] The United States, for example, has permitted the use of technology, even though it is against compliance with HIPAA (Health Insurance Portability and Accountability Act Privacy, Security, and Breach Notification) Rules. Strong emotional contact is paramount to manage such a tragedy. Flexibility and resilience are key in improving the current situation. However, as Lebow[53] reflected, while telepresence is crucial, specific questions need to be asked about the impact of app-mediated prevention programs. It needs to be ensured that the privacy of the members of the family is not compromised. Further, these methods should not suddenly become the predominant methods of practice as family centered care in traditional settings has overarching benefits to the overall ecosystem of healthcare.

Another important concern, as addressed by Luttik et al.,[52] is the vulnerability and risk within the family during the COVID-19 crisis. Long-term care for ill parents, partners, and children during the pandemic requires good nurturing and values within the family. Children requiring specialized care would need guidance for medical nursery, daycare, and education. School closure has further exacerbated the situation. Family members having ill parents also require support and medical treatment. Finally, the partners living in confinement should improve their personal relationships to reduce stress and anxiety during the crisis. Beyond this, COVID-19 has also impacted community inclusiveness, the way traditions and marriages are performed and even limited personal freedom.[52]

6. Social media

Governments worldwide have used ICT to restore economic balance by granting exemptions and enacting legislation to aid in the fight against the pandemic's aftermath. During these times, the ICT industry experienced a rapid shift, with certain technologies finding new uses. Among the technologies that gained popularity were the over-the-top (OTT) services market, video conferencing technology, artificial intelligence (AI), video streaming platforms, team collaboration software, mobile security technology, video on demand (VoD) market, and cloud gaming business.[54]

COVID-19 cases are tracked in real time using AI-based solutions developed to combat the pandemic itself. Because people avoid crowded areas and prefer to shop online, the e-commerce sector has grown dramatically, fueling the proliferation of digital payment methods throughout the pandemic. Furthermore, the Voice over Long-Term Evolution (VoLTE) market has grown rapidly due to the growing adoption of WhatsApp, Messenger, Skype, Hangouts, and other similar platforms due to government regulations that encourage social isolation.[54]

7. Environmental quality

Lockdown has a short-term influence on criteria pollutants, sound pollution, GHG concentrations, overall cleanliness, and the threat to wild and domestic animals. Increased plastic and biomedical waste, decreased recycling, increased organic and inorganic pollutants owing to soap and sanitizer use, higher wastewater, and increased water usage are some of the long-term effects.[55]

7.1 Wildlife

During the lockdown, pollution levels plummeted, public spaces were abandoned, and human contact was restricted, allowing urban wildlife to go outside their regular habitat. In an effort to curb the spread of coronavirus, people have begun to confine themselves to the safety of their homes, and there have been tales of animals venturing into cities all over the world. This global slowdown also allows us to reconsider our relationship with nature and teaches us how to coexist to preserve our urban ecosystem. The fall in wildlife trade is another significant effect of the coronavirus outbreak. The COVID-19 epidemic is thought to have started at a wild animal market in Wuhan, China, putting the global wildlife trade in the limelight. Live animal markets have been recommended to be banned by governments worldwide, as well as illegal wildlife trafficking and poaching. Monkeys, stray dogs, elephants (tourism), and various other wildlife species that have adapted to live in urban areas and are strongly reliant on human-generated food waste to survive have been starved.[56]

7.2 Pollution

The COVID-19 pandemic has established a support system to aid in the cleanup of global air pollution. The cause of pollution in the air has also become evident during the lockdown in the respective countries[57]:

United Kingdom: During the COVID-19 lockdowns, commercial operations and international travel were suspended, resulting in a 20% reduction in electricity and gas use. As countries come out of lockdown, consumption is still 5%–10% lower than before, implying that the industry will not fully recover until the end of 2021 or 2022. COVID-19-induced consumption declines resulted in the highest reduction in greenhouse gas emissions since World War II, with emissions expected to drop by 8.5% in 2020. (Source: Capgemini report, National grid, UK.)

India: In India, the lockdown was imposed in the last week of March 2020 and extended up to May 2nd of 2020. Fig. 8 indicates a steep decrease in energy consumption in these months (Source: POSCO). The pollution levels are indirectly related to the consumption of electricity.

Australia: Victoria's commercial and industrial energy use dropped by 7% and 1%, respectively. Residential load demand increased by 14% in Victoria.[58]

United States: In some parts of the United States, residential energy demand has climbed by 8%. The need for educational and commercial buildings has decreased by 30%. (Source: Statista).

Particulate matter (PM) data levels have been rising in many cities before the lockdown began. However, as a result of the lockdown imposed by

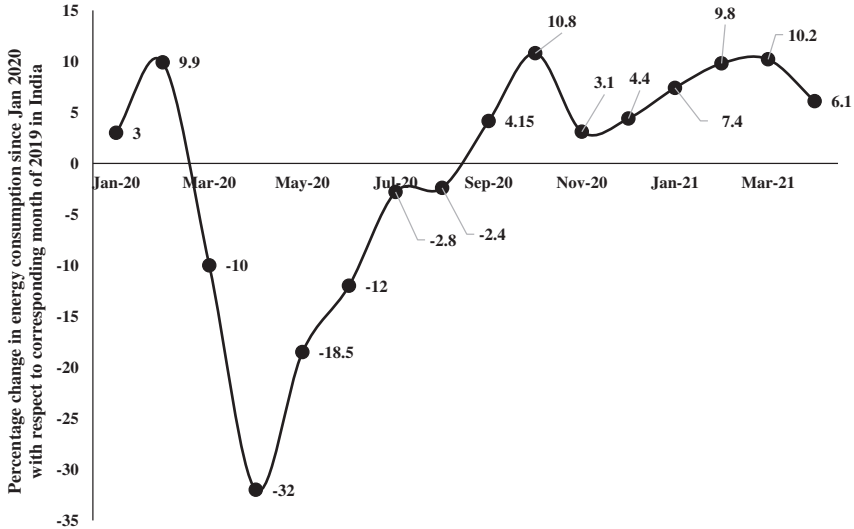

Fig. 8 Energy demand change in 2020 with respect to 2019. *(Source: POSCO.)*

COVID-19, PM data trended downward. It shows that the air quality in these major cities has greatly improved.[43]

As a result of the lockdown, offices, schools, movie theaters, malls, marketplaces, and "nonessential" service providers were all closed, forcing people to stay at home. All public transportation modalities for civilian travel have been stopped, including metro trains, buses, interstate trains, and international and domestic airplanes. As a result of decreasing automobile traffic and aircraft, dangerous nitrogen dioxide (greenhouse gases) and particulate matter produced by cars have dropped. Reduced economic and manufacturing activity also resulted in improvements in localized air quality. A reduction in nitrogen dioxide and methane is also witnessed as a result of a significant reduction in power output and construction activities. The amount of particulate matter in the air has decreased as construction and demolition operations have been reduced. Industry's reduction in energy demand reduced carbon emissions.[59] All these positive effects are short term, and governments should realize the harm caused by the factors discussed earlier and take suitable measures to eradicate them.

7.3 Negative effects

Extensive use of soap, sanitizers, PPE (gloves, masks, and body covers), and mass disinfection resulted in water pollution such as aquatic flora and fauna disturbances, increased wastewater, subsurface contamination, and water

body pollution. The earlier mentioned activities also lead to soil pollution due to deteriorated soil quality and also affected plants. Air disinfectants are also observed due to these activities.[55]

7.4 Precipitation

Temperature and precipitation have been linked to the daily occurrence rate of COVID-19 infections. COVID-19 is positively correlated with maximum and normal temperatures. Precipitation, on the other hand, has a negative correlation.[60]

7.5 Human behavior

COVID-19 being an invisible threat has reduced people's trust in each other, making trust more vital than ever before. The forced move to virtual employment, consumption, and socializing will result in a large shift to virtual activity for everything. People believe they cannot rely on current health systems, which might lead to health being addressed in all parts of life, culminating in creating a healthy economy. People are willing to spend on the home and make at home as a result of self-isolation. Under the influence of travel restrictions, self-isolation, and lockdown required by many governments, a reinvention of authority is likely. It is possible that a greater understanding of the government and corporations' roles in society, as well as the value of collective behavior, will emerge.[61]

8. Conclusion

In this chapter, it is seen that the COVID-19 pandemic is impacting various dimensions of society. Six broad dimensions from the social development index, namely, Employment, Education, Healthcare, Family, Social Media, and Environment Quality, are identified to reflect the role of social impact. These factors are further magnified from the lens of SDGs. The data for the sectors suggests the positives and negatives for achieving the SDGs during COVID-19. The loss of working hours equivalent to 255 million full-time jobs has adversely impacted the SDG 8. However, during this period, people have realized the importance of health and family, thus giving importance to SDG 3. While 70% of the women are working for healthcare, there is a significant need to have gender equality at the leadership positions in healthcare. The importance of social media and education together to

achieve SDG 4 cannot be overstated. The online education has become a challenge for 30% of students who lack internet access. Further, the opportunities for 51% of foreign students from China and India were also severely compromised during the pandemic. Finally, there have been some positives for SDG 13, as there is a highest reduction in GHG emissions since World War II. Overall, the statistics during the pandemic can help the decision-makers to plan better for the society in the future crisis.

Further, there is a need to address that countries may have conflicting goals during normal times versus during crises, while focusing on individual dimensions. Also, each crisis, earthquakes, cyclones, flood, draughts, and pandemic differ in severity and impact. Thus the policymakers should generate necessary scenarios depending on the severity of the crisis. Considering the challenge of inequality on the one hand and the severity of disease on the aging population, the topic will be receiving more attention in the future as well. Future research directions should integrate the role of community and culture, which act as a coherence for these six broad dimensions. While the pandemic disrupted the supply and demand of several businesses, the impact on society raised questions over international labor standards, worker health and safety, ethical sourcing, and corporate social responsibility. Likewise, future research in this area can address the micro level social needs of organizations within countries.

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