The COVID-19 Pandemic not only Puts Challenges but also Opens Opportunities for Sustainable Transformation

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Key Points:

- The COVID-19 pandemic has negative impacts on most Sustainable Development Goals, which may subside in the medium and long terms.
- Key impending factors causing the negative impacts include lockdowns, unemployment, and diluted focus for non-COVID issues.
- The pandemic has also opened a window of opportunity for sustainable transformation, which is short-lived and will get narrow over time.

Abstract

The COVID-19 pandemic has affected humankind worldwide, slowing down and even reversing the progress made in achieving Sustainable Development Goals (SDGs). It has negatively impacted most SDGs but with positive impacts on a few. We discuss some initial impacts observed and explores potential impacts on the achievement of SDGs for Nepal. The study followed a knowledge co-creation process with experts from various professional backgrounds, involving five steps: online survey, online workshop, assessment of expert's opinions, review and validation, and revision and synthesis. The pandemic has restricting impacts on the progress of most SDGs. However, it has also opened a window of opportunity for sustainable transformation. Many of the negative impacts may subside in the medium and long terms. The negative impacts on SDGs resulted from factors linked to the pandemic or the measures taken to control it. The key five impending factors are lockdowns, underemployment and unemployment, closure of institutions and facilities, diluted focus and funds for non-COVID-19 issues, and anticipated reduced support from development partners. The generated transformative opportunities are lessons learned for planning and actions, socio-economic recovery plan, use of information and communication technologies and impetus to the digital economy, reverse migration and 'brain gain,' and local governments' exercising authorities. For sustainable transformation, the window to grasp these opportunities is short-lived and will get narrow over time, i.e., before rebounds occur following the past trajectories.

Plain Language Summary (200 words)

The current pandemic has impacts on social, economic, and environmental systems, including Sustainable Development Goals (SDGs). SDGs consist of 17 interlinked goals that aim to achieve a better and more sustainable future for all. We studied the pandemic's impacts on SDGs for Nepal by following a knowledge co-creation process. For this, we conducted online surveys and workshops with experts from various professional backgrounds. Afterward, we assessed expert's opinions articulated in the surveys and workshops. The experts reviewed and validated our assessment. Then, we revised and synthesized the assessment. Our study highlights that the pandemic has negative impacts on most SDGs. These negative impacts may subside in the medium and long terms. The key factors behind the negative impacts are: lockdowns, underemployment and unemployment, closure of facilities, diluted focus and funds for non-pandemic issues, and anticipated reduced development support. The pandemic has also opened a window of opportunity for sustainable transformation, which is short-lived and will get narrow over time. The transformative opportunities consist of lessons learned for planning and actions, socio-economic recovery plan, use of information and communication technologies and impetus to the digital economy, reverse migration and 'brain gain,' and local governments' exercising authorities.

1 Introduction

In 2015, the United Nations Member States adopted the 2030 Agenda for Sustainable Development that consists of 17 Sustainable Development Goals (SDGs) with 169 targets, to be achieved by 2030, for transforming our world. Progress made on SDGs in the last five years shows that it is less likely to achieve them in many countries with the current trends (Editorials, 2020; Sachs et al., 2019). Hence, the SDG summit in 2019 called for a Decade of Action, pledging to mobilize resources and enhance national implementation to achieve SDGs in stipulated time.

At the beginning of this decade of action, the COVID-19 pandemic (from now on referred to as pandemic) hit the world, affecting all three sustainability pillars - society, economy, and environment (Diffenbaugh et al., 2020). For example, measures taken to control the pandemic have impacted existing workforces, closed schools, affected healthcare systems, and decreased manufacturing activities. These impacts led to various negative socio-economic repercussions (Nicola et al., 2020). However, these measures also have a few positive impacts on the environment, e.g., reduced air pollutants and greenhouse gas emissions (Chen et al., 2020; Le Quéré et al., 2020). Most past studies have investigated the pandemic's social, economic, and environmental impacts separately or have only focused on a few SDGs (Adhikari et al., 2021; Filho et al., 2020; Fleetwood, 2020; UN, 2020). Comprehensive studies on the impacts of the pandemic (both restricting and promoting) are still lacking, especially in the context of developing countries.

For achieving the 2030 Agenda, there is a need to understand the impacts of the pandemic on SDGs thoroughly so that policymakers can develop interventions to address the negative impacts. This holistic understanding is crucial because SDGs is considered a system of interacting components rather than a sum-up of goals, indicators, and targets (Pradhan, 2019). However, it might be too early to understand the pandemic's full impacts, including the potential structural transformation, because they are still unfolding. Additionally, inadequate and lack of information and data in the developing countries make a proper estimation of the impacts difficult.

Based on a participatory approach to the knowledge co-creation process, this study, which is the first of its kind, investigates the pandemic's potential impacts on SDGs' achievement. We consider Nepal as a case study for our assessment. Nepal is one of the developing countries that made remarkable progress in achieving many Millennium Development Goals (United Nations, 2015), putting a similar expectation for SDGs' achievement. It has made progress in many SDGs in the last five years (NPC, 2020). However, the country still faces challenges in achieving most of them (Sachs et al., 2020). This research's findings are expected to substantially enhance our understanding and help formulate or refine relevant policies and management decisions to minimize the pandemic's impacts in Nepal and other developing countries.

2 Methods

We based this study on the co-creation of knowledge involving experts with various professional backgrounds from academia, civil society organizations, governments, grassroots initiatives, national and international organizations, and the private sector. We identified key experts in each SDG through our networks and snowball sampling. To facilitate mutual learning and evidence-based reasoning, we took a participatory approach to the knowledge co-creating process, encouraging the experts to participate as equal partners (Chambers, 1994). This study did not include SDG 14 (Life below water), which the Government of Nepal (GoN) has excluded being a land-locked country. While most experts participated in only one SDG, some contributed to multiple SDGs based on their primary expertise. The process involved the following five steps (Figure 1).

First, we conducted an online survey among the selected experts to familiarize them with our approach and collect their initial perception of the pandemic's impacts. The survey included questionnaires on each target of SDGs where experts would evaluate impacts of the pandemic in

the short term (current year), medium term (within five years), and long term (by 2030) using a seven-point scale: -3 (strongly restricting), -2 (moderately restricting), -1 (weakly restricting), 0 (no influence), +1 (weakly promoting), +2 (moderately promoting), and +3 (strongly promoting). We adapted the seven-point scale framework developed by Nilsson et al. (2016) to understand SDG interactions. Other studies have also applied this framework for a similar purpose, e.g., to investigate the impact of food systems innovation on SDGs (Herrero et al., 2020). Besides providing scores on the seven-point scale, experts could also describe in the survey the rationale and mechanisms behind the impacts. We received a total of 410 responses from 365 experts with an average of 23 and a minimum of 10 responses per SDG (see Figure S1).

Second, we organized 20 online workshops, with at least one workshop for each SDG (more than one for SDG 4 and SDG 17), to offer the experts a platform for a multilateral discussion on the impacts. For SDG 4, we conducted four workshops to discuss the pandemic's impacts on four education domains: primary education, secondary education and training, higher education, and policy. Similarly, we organized two workshops for SDG 17 due to its large number of targets. Altogether, 302 experts participated in these workshops (some experts joined more than one workshop). Each workshop had an average of 19 (minimum 11) expert participants (see Figure S1). In the workshops, we shared the survey results. We encouraged participants to explain the discrepancies among the scores they had provided. This process helped build a consensus on mechanisms and scores of the impacts. We conducted the workshops between 17th July and 30th August 2020.

Third, we assessed the experts' scores and opinions collected through the survey and workshops. The authors tasked with individual SDGs supplemented the assessment to fill the information gap based on their expertise. This supplement was mainly instrumental in a few cases where the pandemic's arguments were not captured well either due to time constraints or deviations from the workshop's core discussion. We drafted a report for each SDG based on this assessment, tabulating the impact scores for short, medium, and long terms at the target level and corresponding descriptive reasonings.

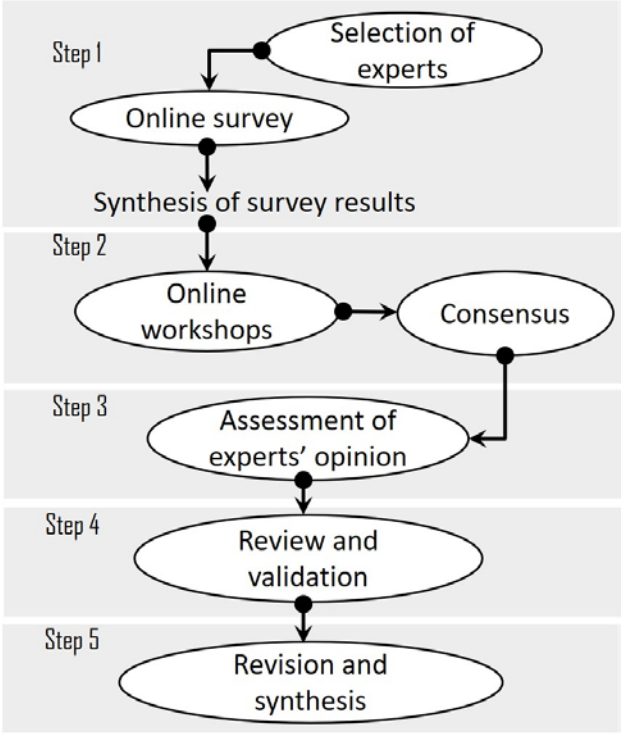

Figure 1. The methodological framework of the study consisting of five steps: (i) online survey, (ii) online workshop, (iii) assessment of expert's opinions, (iv) review and validation, and (v) revision and synthesis.

Fourth, we offered a final opportunity to the respective experts to review and validate our assessment reports. The experts either agreed to the reports or provided additional suggestions on the impact scores and mechanisms behind the impacts.

Finally, we prepared the final reports by incorporating, when needed, experts' feedback collected in step four of the review and validation process. We then analyzed the revised and finalized reports to identify key impeding factors of the pandemic on SDGs and the transformative opportunities it offers to achieve them.

3 Results

The pandemic has and may have weakly to moderately restricting impacts on most SDGs in the short term (Figure 2 and Table S1), particularly on targets of SDG 1, 4, 5, 8, 9, 10, 11, 13, and 16, bringing new challenges in achieving those SDGs by 2030. In the short term, a few targets, mainly of SDG 2, 3, 6, and 11, could also have weakly promoting impacts of the pandemic, mainly due to an increased focus on health care systems, information and communication technologies (ICTs), and digital economy (Figure S2). In the medium and long terms, many of the negative impacts may subside, resulting in no influence or even up to moderately promoting impacts on most SDG targets. Nevertheless, restricting impacts would persist on few targets, such as SDG 3, 5, 8, and 10, in the medium and long terms, reflecting a massive time needed to recover from the pandemic fully. The experts expected the positive impacts, assuming that the GoN would utilize the generated transformative opportunities. The pandemic has opened a window of opportunity for sustainable transformation, i.e., to make

progress in achieving SDGs. However, we expect it to narrow over time. We have distilled and described below the key impeding factors and the transformative opportunities offered by the pandemic for achieving the SDGs based on the described rationale and mechanisms behind the impacts by the experts. Table S1 consists of the detailed rationale and mechanisms of the impacts and respective impact scores.

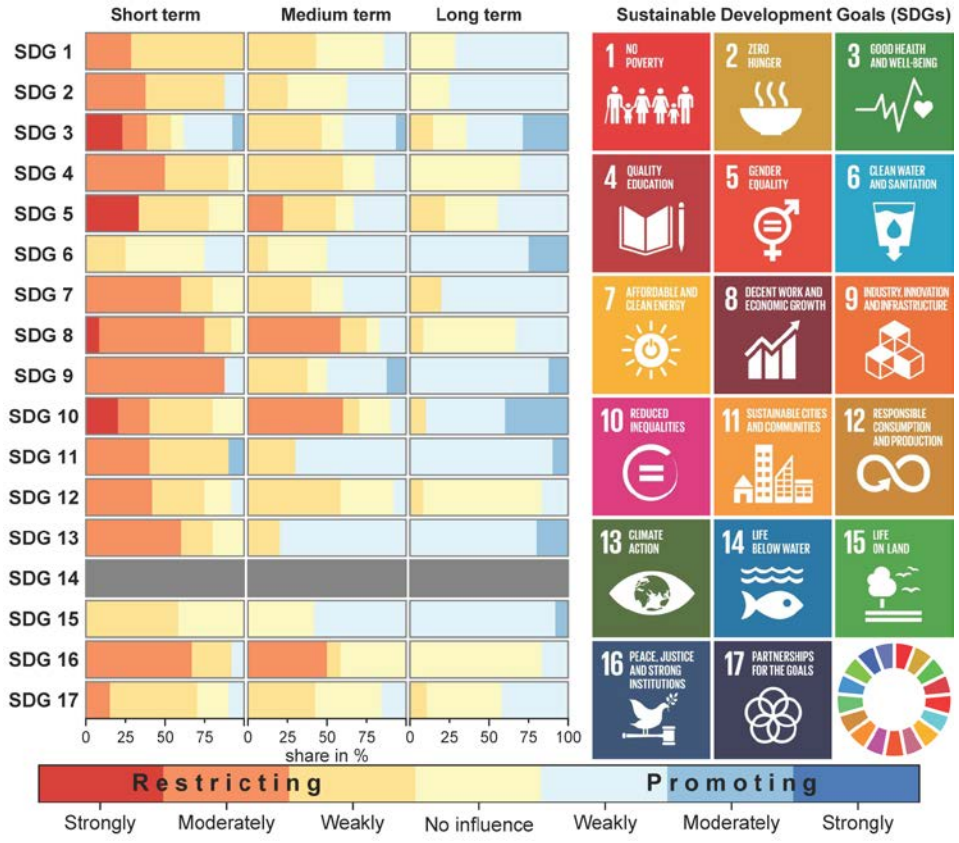

Figure 2. Impact of the COVID-19 pandemic on Sustainable Development Goals (SDGs) in Nepal for short term (within a year), medium term (within next five years), and long term (by 2030). The color bars represent the shares of impacts from strongly promoting to strongly restricting at the goal level. We derived the shares from the impact scores at the target level (see Figure S2). The impact scores are co-created, involving 302 experts with various professional backgrounds (see Figure S1) based on surveys and workshops. The gray bar depicts no data because our study does not include SDG 14.

3.1 Key impending factors

The pandemic's negative impacts arise from various factors, directly or indirectly linked to it, or repercussions of the measures put in place by the government to control it. Most of these impending factors would exist for a short term, which might subside after controlling the pandemic, as reflected in Figure 2. However, several factors, putting challenges on SDGs' achievement, persist until medium or long terms. Here, we present the five key impending factors together with their cascading impacts.

Lockdowns: The GoN imposed lockdowns and restrictions on movements in two phases to contain the pandemic: the first phase from 24th March 2020 for 17 weeks and the second phase from 18th August 2020 for five weeks. This measure had negatively impacted many SDGs. We highlight two significant repercussions (underemployment and unemployment, and closure of various institutions) as key impeding factors below. Our discussion here mainly focuses on other restricting impacts led by this measure.

The lockdowns have disrupted supply chains, manufacturing, production, and markets, impacting many SDGs negatively, mostly in the short term. For example, disrupted food and agriculture supply chains exacerbated food insecurity and decreased agricultural productivity (SDG 2), and increased food losses (SDG 12) (Adhikari et al., 2021). Disrupted material supply chains have hindered activities associated with clean water and sanitation (SDG 6), construction of energy infrastructures (SDG 7), and industrial production and infrastructural development (SDG 9). Overall, Nepal's economy (SDG 8), including government revenue (SDG 17), has slowed down because of disrupted supply chains and exports/imports. Nepal's projected economic growth rate is reduced from 7.3% to 2.7% for the fiscal year 2020 due to pandemic (ADB, 2020).

At least for the short term, the restriction on movement postponed several plans and programs. The list of postponed plans and programs include National Vaccination Program, Vitamin A Program (SDG 2), Visit Nepal 2020 tourism promotion campaign (SDG 8 and 12), the first *Sagarmatha Sambaad* - the global dialogue forum with a focus on climate change and sustainability (SDG 13 and 17). It also hindered the existing services, e.g., maternal health (SDG 3) and judicial (SDG 16) services. For example, by the end of lockdowns, childbirth at medical facilities was reduced by 52.4% compared to the preceding year (KC et al., 2020). The negative impacts on SDG 3 are also related to anxiety, isolation, fear, and stigma associated with the pandemic both at the service receiver and provider sides. Additionally, restriction on movement increased mental health problems both in adults and children, resulting in negative impacts on SDG 3, 4, and 16. During the lockdowns, domestic violence incidences, mainly against children and women, have also increased (SDG 5 and 16). During the lockdowns, over twice women violence cases are being reported (Sharma, 2020). Although such violence might subside with lifting the lockdowns, its subsequent impacts would remain in the medium or long terms. During the lockdowns, women and girls are also more engaged in household and unpaid care work than male members, resulting in increased gender inequalities (SDG 5). Restriction on movements nationally and internationally also goes against a target of SDG 10 on responsible and well-managed migration policies. The lockdowns have also disrupted cultural activities, including various festivals (e.g., *Rato Machhindranath Jatra* - the longest chariot festival in Nepal), public transport systems, and rural-urban linkages (SDG 11). Weakened law enforcement due to the staff's restricted mobility and unemployment also led to increased illegal extractions of forest products and wildlife poaching (SDG 15).

Temporarily, the lockdowns have also positively impacted a few SDG targets. Consequently, reduced traffic and industrial activities led to decreased air and water pollution (SDG 6 and 11). For example, the Kathmandu Valley's air quality, which suffers from severe air pollution almost throughout the year, improved visibly and substantially. The monthly PM2.5 concentration decreased from around 150 $\mu g/m^3$ a month before the first lockdown to around 100 $\mu g/m^3$ a month into the first lockdown (Shrestha et al., 2020). Clear blue sky and the unprecedented view of Mt. Everest from the Kathmandu Valley and elsewhere in Nepal for the

first time in decades were evident from improved air quality and visibility. This restriction also limited human trafficking (SDG 5 and 16), the movement of invasive species (SDG 15), illegal wildlife trade (SDG 15), and illicit financial flow (SDG 16) temporarily. For example, Nepal observed an increase in remittance despite many Nepali migrants losing their jobs in countries where they were employed (NRB, 2020). A reason for this increased remittance is a decline in illicit financial flow, commonly known as *hundi*. The majority of Nepali migrants widely practice *hundi* to remit money back home at a cheaper fee (Seddon et al., 2002).

Underemployment and unemployment: As a result of shrinking domestic and international labor markets due to the pandemic, many workers (three out of five) in formal and informal economies lost their jobs (UNDP, 2020). Informal sectors mostly suffered from unemployment, while underemployment is an issue in the formal sectors. Around two-thirds of Nepal's workforce is employed in informal sectors (MOLE, 2018). Nepal has issued over 4 million labor permits to migrant workers in the last decade, mainly for the Gulf countries and Malaysia (MOLESS, 2020). Remittance contributes to 25.4% of Nepal's gross domestic product (NRB, 2019).

Increased underemployment and unemployment are a setback to Nepal's progress in poverty reduction (SDG 1) and economic growth (SDG 8). Subsequently, underemployment and unemployment also have cascading impacts on other SDGs. With reduced income, households have limited access to various essential goods and services, e.g., nutritious food (SDG 2), health care (SDG 3), education (SDG 4), in the short and medium terms. Additionally, poverty and reduced incomes could lead to unsustainable agricultural practices on marginal lands (SDG 2), abuse of drugs and alcohol (SDG 3), and an increase in school dropout rates (SDG 4), mainly of girls (SDG 5). Even in the pre-COVID-19 situation, 3.0-4.8 % of students leave primary schools every year in Nepal, with a higher dropout rate for girls than boys (DOE, 2018). The pandemic has also exacerbated gender discrimination in terms of unemployment (SDG 5). Around 90 % of women in employment are in informal sectors in Nepal (CBS, 2019). Self-employed, domestic workers, female-headed households, and those in casual or temporary agency employees are at particular risk of losing the job (UNICEF, 2020). In addition to jobs lost, female household members are also subjected to increased gender-based violence (SDG 5), resulting from stresses at homes due to underemployment and unemployment. In the absence of recovery plans to support the poor and vulnerable population, underemployment and unemployment could increase modern slavery and child labor, restrict labor rights (SDG 8), widen the gaps between rich and poor (SDG 10), and push more people into informal settlements (SDG 11). Increased poverty would put additional pressure on natural resources, mainly on the forest for timber and non-timber products (SDG 15), as a traditional livelihood alternative. Reduced livelihood options will also put women and children at risk of trafficking (SDG 5 and 16) in the short and medium terms. A similar risk of human trafficking was evident after Nepal Earthquake 2015 (Gyawali et al., 2017). Unemployment would also increase illicit arms flow due to a growth in criminal activities in the medium and long terms (SDG 16).

Closure of institutions and facilities: The GoN closed or limited the opening of various institutions and facilities, including schools, universities, public transports, government offices, international borders, and industries. The closure of educational institutions has negative impacts on various aspects of students' growth and learning at different levels (primary, secondary, tertiary, and vocational education) due to hindrance in activities associated with education, teaching, training, and regular examinations (SDG 4). Although face-to-face education would

resume after controlling the pandemic, these hindrances in educational activities would limit the country's economic development in the medium and long terms (SDG 8). Additionally, confinement at home could raise the risk of violence against children and disruption in their social networks (SDG 16). ICTs have been increasingly used as an alternative learning and teaching tool to overcome the impacts of educational institutions' closure. However, it has revealed and resulted in a digital divide between boys and girls within a household (SDG 5), between rich and poor (SDG 10), and between urban and rural areas (SDG 11). That means this alternative approach also has a negative impact on the overall agenda "leave no one behind." In contrast, SDG implementations prioritizing women, younger, and rural populations, i.e., leaving no one behind, can leverage SDGs' achievements (Warchold et al., 2020).

Limited opening of various institutions also reduced training, skill enhancement, and internship possibilities for students (SDG 4). Similarly, the limited opening of judicial facilities has discouraged the reporting of cases, e.g., on violence against women (SDG 5 and 16). Additionally, the closure of major industries and markets resulted in unemployment and underemployment with negative impacts on SDG 9 and an increase in inequalities (SDG 10). Many temples, including the famous and sacred Hindu temple - *Pashupatinath*, are closed due to the pandemic, hindering cultural activities (SDG 11). Additionally, the limited opening of government offices has also resulted in weak law enforcement, illicit extraction of natural resources [e.g., deforestation (SDG 15)], and a delay in services [e.g., for providing vital registration (SDG 16)]. Closure of international borders and travel limitations have restricted international collaboration, capacity building activities, and trade (SDG 17).

Closure or limited opening of institutions and facilities also has a few positive impacts. Some of these impacts, e.g., enhanced ICTs in education (SDG 4) and digitalization in vital registration (SDG 16), could facilitate achieving SDGs in the long term. However, other impacts would be temporary, e.g., reduced food waste from restaurants and businesses (SDG 12) and improved water and air quality (SDG 6 and 11).

Diluted focus and funds on non-COVID-related issues: The GoN has currently mobilized its resources to control the pandemic. Concentrated efforts are a prerequisite to deal with the pandemic. However, they would also dilute the government's focus and funds on other issues, mainly on implementing SDGs, in the short term. All SDGs would have negative impacts due to diluted focus and funds. For example, sectoral budgets have been reduced during the pandemic compared to last year's budget. Other health issues (e.g., maternal and child health, sexual and reproductive health, non-communicable diseases) have been side-lined as well.

Anticipated reduced support from development partners: As a developing country, Nepal relies heavily on development partners' support for various development agendas, including implementing SDGs. The pandemic has hit most countries globally, including development partners of Nepal. Thus, there are concerns if ongoing official development assistance and capacity building activities would continue in the medium and long terms. While the partners are and would support controlling the pandemic, there are questions on whether and to what extent they will continue to support implementing and financing SDGs. This concern is due to the shrinkage of their economies and additional funds required for revitalizing their economies. Most support provided by the development partners lately is in the form of loans, which is likely to increase the indebtedness of a developing country like Nepal.

3.2 Transformative opportunities

The pandemic has also opened a window of opportunities for sustainable transformations. Although these opportunities' impacts would be visible in the medium and long terms, the window to grasp these opportunities would be short and become narrower over time. In the absence of steering towards more sustainable pathways, rebounds would occur, following the past business-as-usual trajectories. The achievement of SDGs would depend on the successful utilization of these opportunities. We present the five key transformative opportunities together with their promoting impacts on various SDGs.

Lessons learned: The pandemic has laid bare the strengths and weaknesses in governance, socio-economic systems, and leadership worldwide. Its bright side is that various lessons are learned (e.g., from improving planning and actions on SDGs to preparing for future crises). These lessons could positively impact many SDGs in the medium and long terms. We highlight lessons in the four main categories as key transformative opportunities below, separately. Our discussion here mainly focuses on other lessons that have promoting impacts on SDGs.

The pandemic has highlighted the crucial role of proper nutrition to have a healthy population, i.e., to end all forms of malnutrition and the importance of maintaining plant genetic diversity, promoting rural infrastructure and agricultural research, and enhancing food self-sufficiency (SDG 2). Activities that could positively impact SDG 2, e.g., cultivation of fallow land, development of urban rooftop gardens, and use of local seeds, have increased during the lockdowns. Nepal observed the highest area of paddy cultivation this year (MOALD, 2020). The pandemic provided lessons and raised awareness on sanitation and hygiene (SDG 6) and various aspects of healthcare systems to ensure the public health and well-being and required funding for it (SDG 3). Another lesson learned, mainly because of job loss, is a need for education policy that promotes entrepreneurial- and skill-oriented focus on self-employment (SDG 4). Similarly, the pandemic has largely impacted poor and vulnerable populations regarding access to health care facilities and social security programs. This impact provides an essential lesson on the need to reduce inequalities (SDG 10), including the promotion of gender equality (SDG 5).

The pandemic has also emphasized the need for regularization and upgrading of low-income settlements, inadequate housing, and public transport systems for overall urban transformations (SDG 11). There is limited possibility of maintaining physical distances in low-income settlements and public transport systems required to control the spread of COVID-19. The pandemic also revealed a lack of holistic disaster risk management plans at different governance levels, which is also crucial to managing other crises.

Public awareness has also been raised during the pandemic on responsible consumption and production (SDG 12), e.g., food waste reduction due to decreased food availability and waste management for maintaining hygiene. This raised awareness also holds for climate action (SDG 13) to respond to the climate emergency, mainly conserving nature for resilience and adaptive capacity and ensuring environment-friendly development through pollution and emission reduction in sectors like transportation and industries. Since the source of the pandemic and zoonotic diseases is the degradation of nature, the planners and policymakers would be more aware of the importance of healthy ecosystems for ensuring public health (SDG 15). The pandemic has taught us all around the globe that maintaining better air quality is essential for avoiding severe health outcomes from the pandemic. The current health emergency has provided

glimpses of the potential climate emergency in the absence of climate action (Vinke et al., 2020). Another crucial lesson of the pandemic is to promote South-South cooperation together with North-South cooperation (SDG 17). So far, Nepal has not been able to get many benefits from South-South cooperation.

Socio-economy recovery plan: A sound plan is required to recover from the pandemic's negative impacts. This plan provides a window of opportunity to steer socio-economic systems towards sustainable transformation instead of letting them rebound to the past trajectories. The lessons learned from the pandemic can contribute to designing the recovery plan with positive impacts on SDGs. For example, the pandemic has highlighted a need for a more pro-poor, gender-sensitive, equitable, and inclusive policy framework (SDG 1, 5, 10), e.g., on social security programs. Similarly, the pandemic has reversed many processes in achieving SDGs related to the health and education sectors (SDG 3 and 4). Thus, the recovery plan should focus on reinstalling the activities and programs disturbed by the pandemic and developing new ones to accelerate the progress on various SDGs based on past experiences. Self-reliance, resilience, and local resources should be at the forefront of the recovery plan, focusing on low carbon and environment-friendly development (SDG 13 and 15). This approach would lead to poverty eradication (SDG 1), employment generation (including green jobs), economic growth (SDG 8), and equitable development (SDG 5, 10), together with the promotion of clean and affordable energy (SDG 7). The pandemic has reinforced the importance of a build-back better and greener economy with a low carbon strategy and development cooperation (SDG 17). During the pandemic, another lesson is that Nepal should no longer rely on tourism and international remittances to support its economy. External forces could easily hit these sectors, crippling the economy. Nepal has made a clear realization that the agriculture sector needs to be self-sufficient to avoid any future problems demonstrated by the pandemic. Hence, it has increased its agriculture budget this year.

Information and communication technologies (ICTs) and digital economy: The use of ICTs and the digital economy played an essential role in coping with pandemic impacts across different sectors. This use has opened a transformative opportunity to promote many SDGs in the medium and long terms. For example, online delivery, new online business, commercial, and banking activities could contribute to equal rights to ownership, essential services, technology, economic resources (SDG 1), decent work, and economic growth (SDG 8). The pandemic has opened a new window of opportunity to leverage digital and distance learning across educational levels and disciplines despite the digital divide, also promoting international cooperation (SDG 4). With adequate digital infrastructure and facilities, this new learning approach can also enhance many health workers' skills in remote areas (SDG 3). The increased use of ICTs and the digital economy could also empower women in the medium and long terms (SDG 5). For example, digital innovations have provided women entrepreneurs with an opportunity to strengthen skills and expand their business during the pandemic. The pandemic's lessons and experiences using ICTs to acquire vital registration and acquainting with social and digital media would help achieve targets on providing universal legal identity and ensuring public access to information (SDG 16). Overall, the ICTs' awareness and experience during the pandemic will be crucial for further developing sustainable development measures (SDG 17). To achieve universal and affordable access to ICTs is also a target of SDG 9.

Reverse migration and 'brain gain': The pandemic has also triggered reverse migration in Nepal, i.e., from abroad to Nepal or from urban centers to rural areas, leading to 'brain gain.'

Reverse migration, mainly of the youth population, provides an opportunity, not available otherwise, to utilize the skilled-workforces with experience abroad and their knowledge for sustainable transformation of various sectors. The lockdown period has provided some glimpses of these possibilities if realized. The reverse migration has stimulated the cultivation of fallow land left due to labor shortage, raising hope for increasing food production (SDG 2) (MOALD, 2020). In the medium and long terms, self-reliance and a rural economic transformation due to reverse migration would strengthen regional development (SDG 11). The return of skilled and semi-skilled migrant workers would also provide the needed labor force and investment to increase agricultural and industrial production capabilities (SDG 9). These economic activities driven by reverse migration would also trickle down to the population's lower strata (SDG 10). For sustainable transformation, policies to utilize reverse migration and brain gain need to focus on creating green jobs based on conservation-friendly policies (SDG 15) instead of following the past trajectories. Swift and widespread policies and actions need to put in place to tap on the resources provided by reverse migration and brain gain. In the lack of livelihood opportunities, the returnees have already started migrating again.

Exercising authorities by local government: The pandemic has also provided an opportunity for local governments to exercise their authority over jurisdiction given by Nepal's 2015 Constitution. The constitution has entrusted local governments with different functional competencies to operate as a government, unlike the central government's decentralized unit. During the pandemic, most local governments are being as responsive as provincial and federal governments and active in health care and other provisioning services, which was rarely the case before. Their positive performance in managing the pandemic could be an asset to improve the health sector (SDG 3) and sustainable transformation at the local level. For example, they could actively contribute to eradicating poverty (SDG 1), fostering sustainable urbanization (SDG 11), building a climate-resilient society (SDG 13), and conserving biodiversity (SDG 15).

4 Discussion

As our results show, the pandemic has put additional challenges to achieving SDGs and opened a window of sustainable transformation opportunities. However, urgent actions are needed to utilize these opportunities before rebounds occur. Key insights and learnings from the Nepal case study may also be applicable in other parts of the world, particularly in the developing world contexts. More specifically, the pandemic's perception as a challenge and an opportunity to reset priorities, resources, capacities, and planning can be useful elsewhere in devising appropriate pathways for sustainable transformation. We bring several novel understandings to realize such sustainable transformation.

First, our study provided a holistic understanding of the pandemic's potential impacts on SDGs at the target level. Like the existing studies (UN, 2020), we found that the pandemic has restricted most SDGs in the short term. However, this study also advanced the state-of-art understanding by figuring out a few promoting impacts in the medium and long terms. These pandemic's positive and negative impacts are similar to SDG interactions, consisting of synergies and trade-offs (Pradhan et al., 2017). The negative impacts on SDG, i.e., trade-offs, need to be tackled by understanding the impending factors behind them. Simultaneously, transformative opportunities generating positive impacts or synergies need to be identified and leveraged for achieving the 2030 Agenda.

Second, we identified key impeding factors directly or indirectly linked to the pandemic. Most key factors are associated with repercussions of the measures taken to contain and control the pandemic, including lockdowns, underemployment and unemployment, and institutions and facilities' closure. These findings highlight how vulnerable Nepal's current social and economic systems are to unprecedented disasters like the pandemic. Therefore, there is a need for sustainable transformation of our social and economic systems, building resilience to unprecedented disasters, including climate emergencies.

Third, we highlighted key transformative opportunities generated by the pandemic for achieving SDGs. These opportunities are mostly associated with various lessons learned during the pandemic with an expectation of a transformative recovery plan in the post-COVID era. The promoting impacts of these transformative opportunities would be visible in the medium and long terms. However, the window to grasp these opportunities is tiny and shrinking. The rebounds may soon occur following the past trajectories. The pandemic has provided an opportunity to build back better, focusing on overall sustainability, including biodiversity conservation, climate resilience, and living in harmony with nature. In the lack of urgent actions now, opportunities for sustainable transformation would be missed.

Fourth, key insights and experience gained from the methodological approach applied in our study can also be useful in future studies. In particular, field research in the post-COVID world may require adapting existing research methods (i.e., through the blended approach we adopted). Our experience shows that online tools can effectively facilitate useful interactions among research team members and experts. They also help enhance the sharing of knowledge and experience and foster co-learning, capacity building, and co-generation of knowledge involving experts from multiple disciplines.

At the same time, we also acknowledge that our study has a few limitations. First, it is too early to estimate the pandemic's full impacts on our society, economy, and environment quantitatively. Nevertheless, we provide a holistic qualitative understanding of the potential impacts on SDGs. Second, our study is based on expert judgment and perception of what is anticipated instead of quantification or simulation of potential impacts. Even so, expert judgment is an accepted approach given the need for rapid assessment. Third, we did not focus on the impacts of SDGs on pandemics, which could be a question for future research. Achievement of SDGs could also help contain and combat pandemics and similar challenges in the future. There are specific interactions between SDGs and pandemic, e.g., achieving SDG 3 and SDG 15 could help reduce the risks and spread of zoonotic diseases in the future. Fourth, our understanding of the potential impacts, the key impending factors, and the transformative opportunities are based on Nepal's case study. The transfer of this understanding to other countries needs to be taken cautiously. However, our approach to knowledge co-creation is applicable in other countries.

Finally, there are some policy lessons and specific recommendations for Nepal. The way forward for the country to recover from the pandemic consists of several aspects. Better coordination among federal, provincial, and local governments is needed to develop, implement, and monitor the transformative socio-economic recovery plan. This plan needs to compose special packages for poor, vulnerable, and disadvantaged groups and returnees based on a gender-sensitive approach with more significant support to largely impacted sectors and societies. More systematic and coordinated efforts are also required to enhance awareness about the importance of nature conservation and nature-based solutions among the politicians and the general public. Collaboration among all stakeholders is another important aspect of designing

and implementing the plan. For implementing SDGs, Nepal needs to mobilize national and international funds, knowledge, and skills, including diaspora Nepali, together with other enabling conditions (e.g., governance, transparency, and accountability). Sound interdisciplinary and transdisciplinary research is required to explore, investigate, identify, utilize, and facilitate the implementation of transformative opportunities. Evidence-based policymaking is a crucial component of governance that enables sustainable transformations and, thus, for achieving the SDGs and the national aspiration of "Prosperous Nepal and Happy Nepali."

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