

Estimating Economic Cost of COVID-19 in Nepal

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Abstract

This paper assesses COVID19 scenario total economic cost of COVID19 in Nepal through descriptive statistics and macro econometric model. This paper finds COVID19 as an infectious diseases infecting 5.2 million populations and killing 0.4 million population in the World. Globally, the figures of COVID19 cases are extremely intensive more in G20 countries with higher transmission rate. Similarly, in South Asia, its rate is slow and gradual but it threatens India, Bangladesh, Pakistan and Nepal. India is an epic center of COVID19. As a result, there is more than 3 trillion USD economic losses at global level and 540 billion NRs economic loss at national level in Nepal with 402 COVID cases. Its reason was health crisis at individual and national level and nationwide long lockdown. The economic impact of COVID19 was less than national wide lockdown. In the estimation, coefficient of COVID19 is -.407 percent meanwhile coefficient of economic loss due to lockdown is -0.86. Therefore, the COVID19 preventive measure is more counter-productive to national income, national output, aggregate demand and employment than the infection and transmission of COVID19 pandemics. Therefore, the government of Nepal should focus a best resilient policy measure instead of preventive measure to minimize policy counter-productive outcomes at national economy more than COVID19 pandemics for stopping economic recession.

Keywords: COVID 19, macroeconomic indicators, economic growth & health system.

Introduction

Despite developing multiple anti-dose vaccines and boosters, the issue of COVID19 seems to be back bounce again and again in the different variants from COVID19 to COVID delta, Omicron and Omicron Delta in the world and so on (WHO, 2021). The COVID19 is so powerful unpredictable exogenous diseases that has smashed badly health system as well as socio-economic system with its mutant characters and fast transmittable and then the politics. Its indicators are multiple and rapid transmitted COVID cases and death rates of the world. WHO (2021) reported 299.1 million COVID19 cases and 5.4 million deaths (15%). These figures are massive, despite 257.1 million recovered cases (85%). The 85 percent COVID19 cases made crowd out effects in the limited capacity of the hospitals to provide bed, oxygen and isolation. In the health crisis, the strong and stable governments have adjusted their capacity as soon as possible as per COVID cases demand. Still, overflowed cases have harassed the government, the hospital management, doctors and nurses. Similarly, in the 15 percent death tolls, its daily rate was consistent over short time periods.

Its crowd out effects was not in the hospital but also in the death body management. In another words, the public health system was broken badly with disclosing poor and weak emergency capacity and facility, along with health utilities and logistics (insufficient beds, testing kits and medicines)(Huang et al., 2020, Kambalagere, 2020, Sohrabi et al., 2020 and Zhang et al., 2020). G20 countries including USA, Italy, UK, France, Germany, etc. have not comfortable situation to handle COVID19 cases because of lack of their rapid and emergency preparedness. Being a benchmark country, USA could not provide hospital beds to the over flooded COVID19 patients. Its scenario was a critical.

In addition, health crisis of the COVID19 has produced multidimensional crisis. In the socio-cultural dimension, health protocols, restrictive measures and social distancing restricted the family to perform well funeral ceremony of their family member's death body with good condolence and farewell. It was so emotional crisis to the family. In Spain, it is viral news in which the coffin producers and traders could not supply as demand of coffin because of such over flooded death body. However, the coffin industry was closed because the nationwide locked down disrupted the supply chain of coffin raw materials and shortage of labor. Similarly, In Guatemala, death body was left a long week in the street of his family because the government of Guatemala issued health protocol, restrictive measure, lockdown and guidelines to collect the death body. It was a humanitarian crisis. Thus, COVID19 has extended crisis in socio-cultural and humanitarian side of the society without market values in the World, along with in the politics.

Likewise, health crisis and transmittable fear factors have demobilized human resources to be resilient, despite unnecessary socio-economic burden. Its adverse effects are found in the regular function of production, distribution and exchange. Its economic loss was a huge. Furthermore, the government's preventive lockdown measures have made zero mobility and flow of goods and services forcefully stopping production, distribution and exchange for the safety of the population and crack down of the COVID19. It means zero mobility of 7.8 billion populations and their global production of 80 trillion USD in the world, except their consumption. Partially, the global lock down and zero mobility preventive measures have disrupted *global production system, global supply system and global trade regime*. Let's imagine their impact on those economies having over integrated with this global economic system. IMF and the World Bank have reported approximately 3 trillion USD worth cost of the preventive measures to the global economy. Its equivalence loss is 3 percent average economic growth. OXFAM (2020) predicted the growth of more than 50 percent unemployed populations and the growth of more than 50 percent poverty and vulnerability indeveloping and least developing countries of Africa and Asia. Thus, the threat of the COVID19 pandemic is more beyond the health crisis of population and the world.

Over three years, Nepal has been a hot spot for COVID19, like South Asian countries. Like in 2020 and 2021, in 2022, MoH(2022) confirmed the third wave of the COVID19 pandemic. Within a week, COVID19 cases have a swing up at higher level with more than 10000 COVID19 cases. In 2020 and 2021, 0.9 million COVID19 cases were registered. Out of it, 11,651 peoples died. MoH(2022) issued a health protocol. Similarly, MoH(2022)

decided a smart lockdown (odd and even transport's mobility, prohibited public activities—gathering, public show, seminars, etc. and closed down school and colleges, etc. by making a mandatory of COVID vaccine cards for public services, although the lockdown has negative relationship with economic growth. Therefore, COVID19 pandemic is a big issue having wider effect in national economy of Nepal.

The WHO, (2020) explains the COVID19 pandemic as rapid transmittable infectious respiratory diseases having three levels: a) infected, b) recovery and c) non-recovery-death. Its transmittable capacity that is invisible with higher than SARs and HIV/ AIDs is either local or imported. Its major cause is mentioned to social integration and touch of human being. In order to prevent this threat, WHO (2020) has recommended health protocol including five things: *mask, sanitizer, washing hands, social distancing* and *intake of vaccines*.

Like WHO (2020), CCSA (2020), Cheng, Kim, and Koh, (2020), and Clemente-Suárez (2021) argue it unpredictable nature spreading differently across the country. Cheng, Kim, and Koh, (2020) and Clemente-Suárez (2021) have argued as surprises to the world health system.

WHO (2020) considers it highly and directly affects human health and livelihood and indirectly national economy. Similarly, IMF (2020) indicates it's sever economic impacts on the global economic system. Cheng, Kim, and Koh (2020) mention health and economic crisis as the impact of the COVID19 pandemics. As evidence, Clemente-Suárez (2021) found its adverse effect on health, particularly mental health. Therefore, these literatures make clarity about COVID19 pandemic as a deadly disease changing the world socio-economically and politically.

In health sector and livelihood of the people, Cheng, Kim, and Koh, (2020) found a large decline satisfaction and domain-specific satisfaction, except satisfaction with health and dropping household income during the COVID19. Clemente-Suárez, *et al.* (2021) considered it as health stressor having direct impact on the mental health of the population by provoking the public health for flexible, innovative and adaptive. Therefore, McKibbin, and Fernando, (2020) argued the need of the greater investment on public health system in all economies but particularly in less developed economies.

In economic sectors, the COVID19 pandemics have adverse effects. Like ADB (2020) and IMF (2020), UN (2020) specified the impact on macro economy as sharp declines in domestic demand, lower tourism and business travel, trade and production linkages, supply disruptions, and health effects, along with the magnitude of the economic impact based on the outbreak length. McKibbin, and Fernando, (2020) found the significant impact on the macro economy and financial economics of the global economy in the short run. Likewise, CCSA (2020) found 40 percent falling global FDI in 2020, 20 % falling global manufacturing output in April 2020, 150 million full time job loss, growing 71 to 100 million people into extreme poverty and unprecedented decline in the HDI and declining 43

percent remittance inflow. Thus, the analysis concludes changing the world towards vulnerable and unstable in short runs.

As supplement, UN (2020), ADB (2020) and IMF (2020) quantitatively found 3 percent economic growth loss in the global economy that is equivalent to 3 trillion USD economic losses. Additionally, CCSA (2020) has predicted adverse effects of the COVID19 pandemic on Asian economy.

In this context, Nepal has adopted two preventive measures such as health protocol and nationwide lockdown as a crackdown COVID19's 14 days evolution cycle like as SAARC and the world. In health protocol, three activities including mask, sanitizer and social distancing have been a habit of individual people across age, income, geography and qualification. Similarly, nationwide lockdown has reached at 60 days (MoH, 2020). As a negative impact of COVID19 pandemic and nationwide lockdown, IMF (2020) reported specifically 3 percent economic growth loss of 3.67 trillion USD economy of SAARC. In this reference, MoF (2020) estimated similar economic loss and its impact in national economy of Nepal. As a result, the economic growth was only 2.3 percent in 2020 and 1.5 percent in 2021. Both economic growths reveal 3-4 percent economic growth loss because all economic sectors were in recession in these respective years, except agriculture sector. Bista (2020) mentions slowdown of sector economies including manufacturing, service and trade. WFP, MoAL and AD (2020) found 11 percent household losing jobs and 31.2 percent reporting income loss, along with its extreme severity in the provinces 6 and 7 more than the remaining provinces. Besides, the survey indicates 20 percent respondents concerning price hike during the COVID19 and food shortage. Thus, the people have lost their employment and income and welfare. In the review paper, Poudel and Subedi(2020) found adverse impact on health, trade and tourism, agriculture, education, media sectors, vulnerable people. Besides, Karn (2021) found the impact of COVID19 as a biggest fall in GDP and agricultural and remittance loss. Dawadi, Giri and Simkhada(2020) found negative impact of the COVID19 pandemic on school education in Nepal with the disruption of nationwide lock down. Singh, et al., (2021) found maternity service, immunization and supply of essential medicine as the most affected areas of health care delivery at local health system during the lockdown. Thus, the COVID19 pandemic has negative impact on Nepalese economy. However, none of literatures have assessed the impact of lockdown measures on the national economy, except Sharma and Parajuli (2021). Sharma and Parajuli (2021) reported adverse effect of lockdown in the different economic sectors. Therefore, this study is relevant.

In this context, this study examines the impact of policy shocks on national economy by assessing the economic loss from COVID19 in Nepal. Its result will be valuable policy input to the policy makers to choose a best policy option to prevent the transmission of the COVID19 pandemic and health hazards.

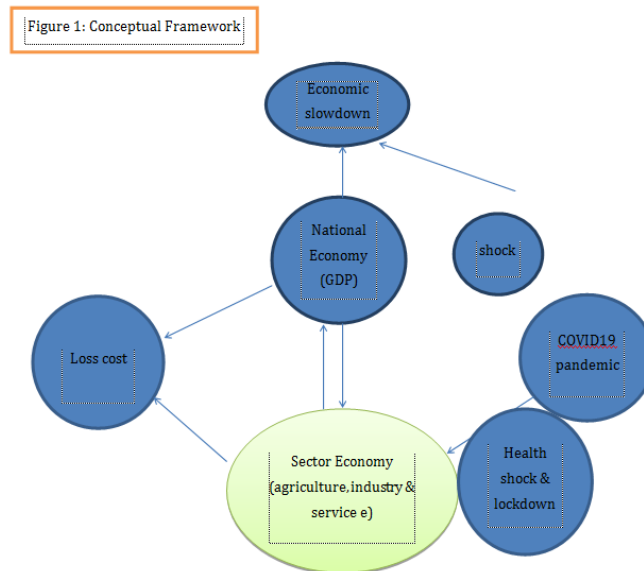
This paper has 10 sections: section 1: introduction, section 2: objectives, section 3: conceptual framework, section 4: data sets, section 5: model, section 6: result and discussion, section 7: conclusion and section 8: Reference.

Objectives

Broader objective of this paper is to assess the impact of COVID19 and its shocks on national of Nepal. Its specific objectives are as follows: a) to review COVID19 scenario, b) to asses economic loss from COVID19 in Nepal, c) to examine its shocks on national economy, and d) to identify its issues for the further policy implication.

Conceptual Framework

This section presents theoretical framework. Let’s consider lock down is a preventive measure to COVID19 and it’s out spread. Lock down refers to close down human activities: political, economic and social and stay safe at home. In the economy, it is a lock down of the whole economic activity: *production, distribution and exchange*, exchange household consumption. In production, available factors of production are fixed variable-capital goods and infrastructure and non-fixed variable- labor, raw materials, energy, water, communication, transportation, etc. Fixed variable losses its potential capacity meanwhile non-fixed variable losses their utilization. Ultimately, the potential outputs will be zero. It is economic loss of production sector. Similarly, distribution and exchange have economic loss from their real and potential economic activities. So far concern with COVID19, it will be a cost of preventive measure. We can consider it preventive cost as indirect cost of COVID19. Its details is below in the figure 1



Let’s suppose P_C as preventive cost of lock down is equilibrium with total output loss of all economic sectors i.e. O_L . Its functional form is

$$P_c = f(O_L).....(i)$$

In addition, COVID19 damages health of human being. Their treatment expenditure of individuals and nations is a direct cost of the economy, along with other measures to safe human and the society. Let's suppose direct cost is D_c as the function of health expenditure (H_e) and Security expenditure (S_e). Thus, its functional form is

$$D_c = f(H_e, S_e) \dots \dots \dots (ii)$$

As a result, total economic cost of COVID19 in Nepal is TEC. It is sum of direct and indirect cost of the economy. Based on the equation (i) and (ii), its functional form is

$$TEC = D_c + P_c \dots \dots \dots (iii)$$

Data Sets

This study is descriptive cum analytical nature of the quantitative research. As per nature of the research, time series data sets of COVID19, GDP and economic losses as total economic cost due to COVID19 and preventive measures were collected across the country from February 2020 to May 2020 from the daily report of the WHO, Ministry of Finance, and Ministry of Health, Nepal Government, National Planning Commissions, and statistics of Nepal Rastriya Bank.

Model

Let's assume that total economic cost of COVID19 have implication at macro and micro economic level particularly economic growth, production, employment, fiscal deficit, balance of payment, foreign currency reserve and poverty level.

Let's suppose GDP is "Y" and Total Economic Cost of COVID19 is "TEC". Let's assume Total Economic Cost of COVID makes slow down to GDP growth. GDP has directly related with Total Economic Cost of COVID aggregately and dis-aggregately. In its multi regression model, its function is

$$Y = f(TEC) \dots \dots \dots (iv)$$

$$Y = f(D_c, ID_c) \dots \dots (v)$$

Let's expand in the regression model as follows

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \epsilon \dots \dots \dots (vi)$$

Where, α = intercept, β_1 =coefficient of COVID19 positive cases (X_{1it}), β_2 =coefficient of Economic cost (X_{2it}), ϵ =error term, X_{1it} =COVID19 positive cases, and X_{2it} =Economic cost

Where α , β_1 , β_2 & β_3 are parameters with $\alpha > 1$, $0 < \beta_1 < 1$ and $0 < \beta_2 < 1$.

The growth and spread of COVID19 depends on resilient capacity and preventive measures of individual and areas.

1. Analytical tool

This model was main analytical tool to the objective 3 : to examine the impact of the COVID19 on national economy. Besides, the descriptive statistics was used to objective 1:

to assess the COVID19 scenario. Additionally, the theoretical framework was used objective 2: to calculate the total economic loss for total economic cost of the economy.

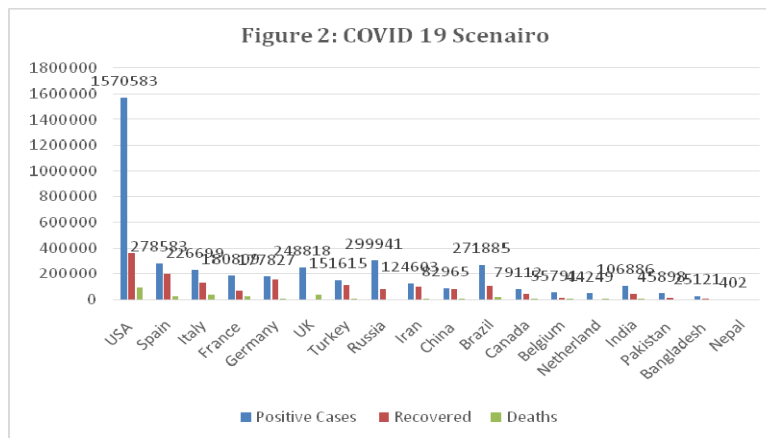
2. Data Processing and Cleaning

The study employed excel sheet to insert all data bases of COVID19 and real GDP for exporting SPSS. In the excel sheet, the study estimated Total Economic Cost (TEC) by using averting method. In the SPSS, the study run simple regression to estimate coefficient mentioned below.

Results And Discussion

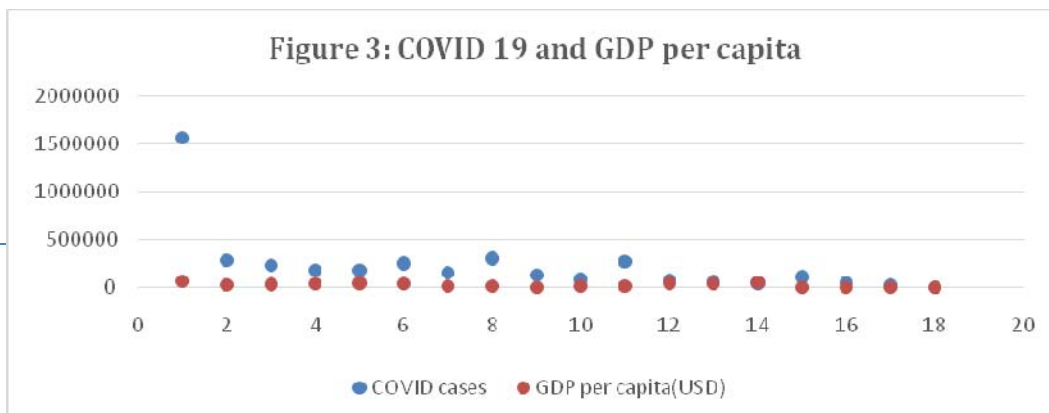
1. Result 1: Covid 19 Scenairo

Coronavirus disease (COVID19) is an infectious disease (WHO, 2020). As per report of WHO, it can infect massively by attacking mildly respiratory system of human body. Its nature indicates no need of special treatment but if old age people having medical problems like cardiovascular diseases, diabetes; chronic respiratory disease and cancer are more vulnerable.



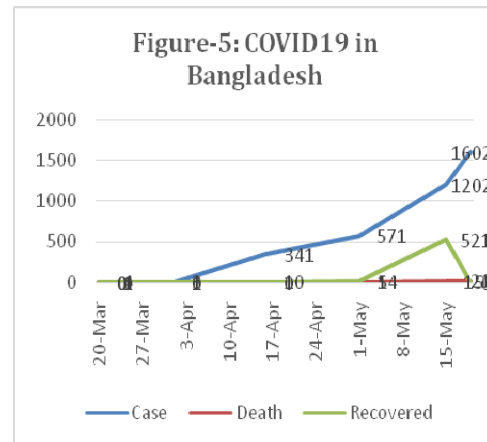
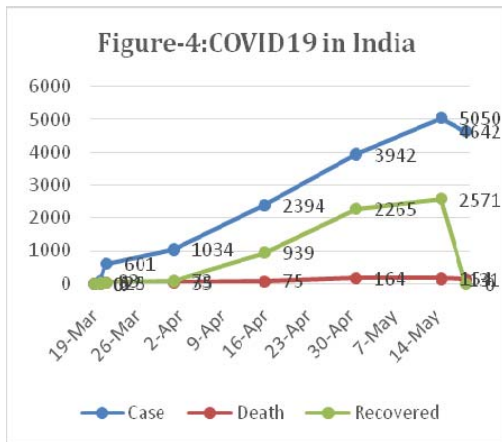
Its transmission can be slow down with awareness, washing hand and sensitization and then isolation. Despite its mildness, no specific vaccines or treatments for COVID19 is still in clinical trail and kill 0.335 million people by infecting 5.2 million people of 210 countries of the World (Figure2). In this scenario, COVID19 has not considered income per capita categorization and regions of the country, along with age, sex, caste, language, religion, income, post and color.

Its transmission level is two sources: imported and local. All countries have COVID19 imported from Wuhan City, China at initial level but then its transmission to family and then

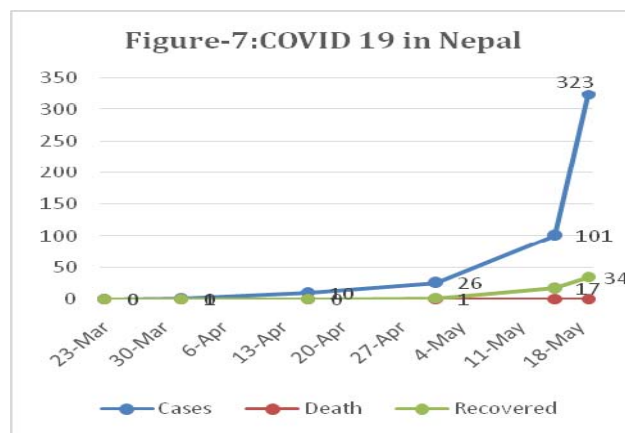
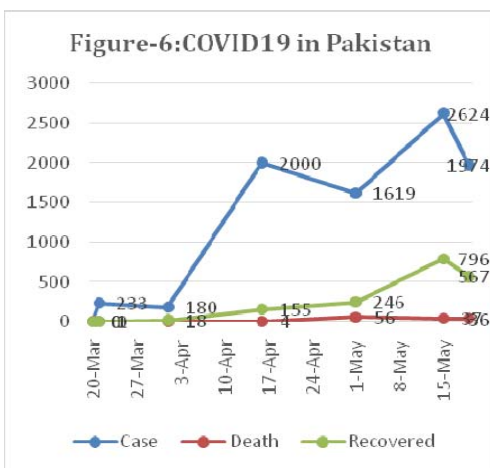


society at mass level. Interestingly, COVID19 is not reported not more Buwahan City and the remaining Chinese cities. But its fast growth and concentration can be found Italy and Spain and then USA, UK, France, Germany and Russia and now slow and gradually, its outbreaks can be found in low per capita income countries. Figure3 shows the positive correlation between COVID19 and per capita income.

In South Asia, India has become an epi center of COVID19. It is followed by Bangladesh, Pakistan and Nepal too. Figure4, 5, 6&7 shows 0.11 million population infected, 49026 recovered and 3600 deaths in India, 506924 infected, 15201 recovered and 1067 deaths in Pakistan, 30205 population infected, 6190 recovered and 432 deaths in Bangladesh and 507 infected, 70 recovered and 3 deaths in Nepal. Such numbers indicate slow gradual growth.



However, Figure 4 & 6 shows India and Pakistan have declined trend but Bangladesh and Nepal have inclined trend (Figure 5&7). It indicates the growth of COVID threat in South Asia. Therefore, the collective effort of SAARC is relevant.



2. Empirical Data Analysis

Result-2: Total Economic Cost Of Covid19

In the estimation tool of COVID19, total economic cost (TEC) includes its direct cost including health expenditure of the government (testing, tracking and treatment) and indirect economic cost (economic loss of preventive measure- lockdown).

Direct cost of COVID19 is 3 billion NRs spent by the government of Nepal meanwhile its indirect cost is tentatively 537 billion NRs based on output loss of economic sectors all over the country (Figure 8). Thus, over 60 days long lockdown, its total economic cost (TEC) is 540 billion NRs. It is not small cost of Nepalese economy. Its GDP ratio is approximately 14 percent having served ever economic consequences. Based on the last year's budget, it is 35 percent budget resource.

Result: Descriptive Statistics

Table-1 presents mean and standard deviation of key variables in regression econometric model estimation. In column 1, there are three key variables such as GDP(Y) as dependent variable and COVID19 positive cases and Economic Cost as Independent variables.

Table No 1: Descriptive Statistics (Mean and Standard Deviations)

Variables	Mean	Std. Deviation	N
GDP	3.4906E3	175.20	44
COVID19	98.2727	101.48	44
Economic loss	2.9765E2	162.26	44

Result: Regression

Table-2 provides the results of regression of dependent variable, GDP(Y) on two independent variables, COVID19 and Economic Loss. There are two parameters: β_1 Table No-2: Results of Regressions of Real GDP(Y),

Explanatory Variable	Coefficient	t (P)
Constant	3787.3 (4.5)	839.75(.000)
COVID19	-0.407(0.033)	-12.3(.000)
Economic Loss (Cost)	-0.86(0.021)	-41.8(.000)
Observations	44	
Overall R2	0.99	
Note: * is <5 percent of P value. Dependent variable: GDP		

COVID19 positive cases and Economic Cost (Loss) and β_2 . In the results of regression, parameter (β_1) represents marginal change of COVID19, which explains how much increase of COVID19 is needed to change 1 percent negative GDP growth. Similarly, parameter (β_2)

denotes marginal change of Economic Loss, which describes how much Economic loss is necessary to get 1 percent negative GDP growth.

3. Discussion

In economics, equilibrium and disequilibrium are important stationary points in the dynamic moments of economic activities. In both points, endogenous or exogenous variables can either equilibrium or disequilibrium economy. In present, disequilibrium of the economy at global and national level is a result of COVID19 pandemic exogenous unpredicted big shock without physical and mental preparation of human being in the world. This paper covers the level of disequilibrium in national economy of Nepal as the impact assessment of COVID19 pandemic with three major variables: GDP(Y), COVID19 and Economic cost (loss) due to the national wide lock down.

Descriptive statistics of these three variables such as GDP(Y), COVID19 and Economic cost (loss) presents nature, movement and behavior of their time series data. In the result of descriptive statistics, standard deviation of these variables from mean is no so far significant. Thus, mean of these variables represents properly times series data of GDP(Y), COVID19 and Economic Cost collected from secondary source.

The paper used simple regression of GDP loss (Y) with two independent variables: COVID19 losses and Lockdown induced Economic losses to capture the relationship between them. It is well explained simple regression econometric model. The estimated result of macro econometric model, COVID19 share -0.407 percent meanwhile economic loss share is -0.86 . Both independent variables of the model are negative. It means the relationship between dependent and independent are negative. Both variables exogenous (COVID19) and endogenous (lockdown induced losses) have adversely affected national economy of Nepal (GDP). At the level of adverse effects, the coefficient value of exogenous COVID19 variable is -0.407 . It means if COVID19 losses increases by 1 percent, its adverse effects will be 0.40 percent in GDP. Similarly, the coefficient value of endogenous lockdown policy variable losses is 0.86 . It means if the lockdown policy to COVID19 increases by 1 percent, its adverse effects will be 0.86 percent in GDP. In this way, endogenous policy variables impact is effective more than exogenous COVID19 variables. In the result of regression, R^2 value is 0.99. It explains GDP (Y) only by 99 percent from independent variables: COVID19 cases and economic cost. However, its error is only 15.13 percent which include different unobserved variables such as hospital facility, testing, tracking and treatment. Therefore, national wide lockdown policy is disastrous more than COVID19 pandemic.

Conclusion

This paper analyzes total economic cost of COVID19 in Nepal and its implication at macro and micro level based on secondary data through descriptive statistics and macro econometric model. In the global and south Asian scenario COVID19, the paper finds COVID19 as an infectious diseases infecting 5.2 million population and killing 0.4 million population in the World as mentioned in the report of WHO (2020). Globally, the figures of COVID19 cases are extremely intensive more in G20 countries with higher transmission

rate. The paper finds similar scenario in South Asia where its rate is slow and gradual but it threatens India, Bangladesh, Pakistan and Nepal. India is an epic center of COVID19 followed by Nepal. In total economic loss, the paper finds more than 3 trillion USD economic losses at global level and 540 billion NRs economic loss at national level in Nepal with 402 COVID cases. Its reason was health crisis at individual and national level and nationwide long lockdown. The economic impact of COVID19 was less than national wide lockdown. In the estimation, coefficient of COVID19 is -.407 percent meanwhile coefficient of economic loss due to lockdown is -0.86. Therefore, the COVID19 preventive measure is more counter-productive to national income, national output, aggregate demand and employment than the infection and transmission of COVID19 pandemics. As outcome, its negative impact contracted significantly sector inputs (labor, capital, raw materials, etc.) and outputs (trade and supply chain), GDP and GDP growth of Nepal and then balance of payment, remittance and fiscal deficit. It is predicated that its impact may fall national income distribution and poverty generation. Therefore, the government of Nepal should focus a best resilient policy measure instead of preventive measure to minimize policy counter-productive outcomes at national economy more than COVID19 pandemics for stopping economic recession.

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