The Socioeconomic Impact of COVID-19 in Sudan: Results from the Sudan High-Frequency Survey on COVID-19, 2020

Huda Mohamed Mukhtar

Department of Econometrics and Social Statistics
Faculty of Economic and Social Studies
University of Khartoum
haudashalab@gmail.com

Ibitsam Satti Ibrahim

Department of Sociology and Social Anthropology
Faculty of Economic and Social Studies
University of Khartoum
ibtisam@outlook.com

Mazin Fikri Mohamed Osman

Central Bureau of Statistics
Khartoum
m.f.digna@gmail.com

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Huda Mohamed Mukhtar, Ibitsam Satti Ibrahim, Mazin Fikri Mohamed Osman

Abstract

The coronavirus outbreaks and the measures taken to control their spread negatively impacted the global economy. This study aims to provide insights into the socioeconomic impacts of COVID-19 in Sudan, using data from the Sudan High-Frequency Survey on COVID-19 conducted by phone. The study used descriptive and analytical statistical analysis. The results revealed that about 98% of the population heard about the coronavirus. However, the measures taken to limit the spread of the virus were more practiced in Khartoum than in other regions. An estimate of about 1.7 million households (47%) lost income from any source due to COVID-19. Accordingly, around 25%-30% of households could not access staple foods and medicine. More than 90% of school- children in all regions, except Khartoum (76%), were not engaged in any education activity during school closures. Adopted coping strategies were living on previous savings in 1.3 million households (22%), reducing food consumption in 2.8 million households (48%), reducing non-food consumption in 1.4 million households (23%), relying on credit purchasing in 873,362 households (15%), and engaging in additional income-generating activities in 389,003 households (7%) while 7% received assistance from friends and relatives. These results will enable policymakers to design result-based policies to mitigate the socioeconomic impacts of coronavirus in Sudan and to learn lessons for future precautions.

Keywords: COVID-19; Impacts; Sudan's High-Frequency Survey; mobile phones; policies.

الآثار الاجتماعية والاقتصادية لكوفيد ١٩ في السودان: نتائج مسح السودان عالي التردد حول كوفيد ١٩ (٢٠٢٠)

هدى محمد مختار، ابتسام ساطي إبراهيم، مازن فكري محمد عثمان

الملخص

أثر تفشي فيروس كورونا، وكذلك التدابير المتخذة للسيطرة عليه، سلباعلى الاقتصاد العالمي. تهدف هذه الدراسة إلى تقديم نظرة ثاقبة حول الآثار الاجتماعية والاقتصادية لكوفيد١٩في السودان ، وذلك باستخدام بيانات مسح السودان عالي التردد حول كوفيد١٩الذي تم اجراءه بالهاتف. استخدمت الدراسة التحليل الإحصائي الوصفي ، وكشفت النتائجأن حوالي ٩٨٪ من إجمالي السكان سمعوا عن فيروس كورونا. ومع ذلك ، فإن التدابيرالتي اتخذت للحد من انتشار الفيروس كانت تمارس في الخرطوم أكثر من مناطق السودان الأخرى، تشير التقديرات إلى أن حوالي ١,٧ مليون أسرة (٤٧٪) فقدت مصادردخلها بسببكوفيد ١٩. وبناءا على ذلك، لم يتمكن حوالي ٢٥ – ٣٠ في المائة من الأسر المعيشية من الحصول على الغذاء والدواء الأساسيين. كما أن أكثر من ٩٠٪ من أطفال المدارس في جميع المناطق، باستثناء الخرطوم (٧٦٪) لم يشاركوافي أي نشاط تعليمي أثناء إغلاق المدارس. كانت استراتيجيات التكيف المعتمدة هي: العيش علىالمدخرات السابقة ١,٣ مليون أسرة (٢٢٪) ، خفض استهلاك الغذاء ٢,٨ مليونأسرة (٤٨٪)، وانخفاض الاستهلاك غير الغذائي ١,٤ مليون أسرة (٢٣٪)، اعتمدت ٨٧٣,٣٦٢ أسرة على الشراء بالاستدانة (١٥٪) ،٣٨٩,٠٠٣ أسرة تبنت المشاركة في أنشطة إضافية مدرة للدخل(٧٪) وتلقت فقط ٧٪ من الأسر مساعدة من الأصدقاء والأقارب. هذه النتائج ستمكن واضعي السياسات من تبني سياسات قائمة على النتائج للتخفيف من الآثار الاجتماعية والاقتصادية الناتجةمن فيروس كورونا في السودان.

الكلمات المفتاحية: السودان؛ كوفيد ١٩؛ الآثار؛ مسح السودان عالي التردد؛ التلفون المحمول؛ السياسات.

Introduction

The coronavirus outbreak that began in China in late 2019 and invaded the globe during the first half of 2020 resurged again for a second wave with no sign of declining. The virus has killed around three million people worldwide at the time of writing this paper. The burden of the COVID-19 pandemic is not only demographic (illness and deaths) but also social and economic, nationally and globally. The pandemic has adverse effects on the world economy, including shocks in supply and demand resulting from the remarkable reduction in consumption and production. Many employees and workers have been furloughed because of the economic closure, halted business, and other health measures taken to curtail the spread of the virus; this made them lose all or part of their income. As part of the global economic drawbacks caused by COVID-19, African economies witnessed significant setbacks due to the loss in productivity and trade between and within countries. The decline in world trade, as projected by the World Trade Organization (WTO), ranged between 13 - 32% in 2020 (Azevêdo, 2020). In African economies, a fall of about 1.4% in GDP and a contraction of up to 7.8% in smaller economies are estimated by Gondwe (2020).

In Sudan, the situation is even more aggravated by the fragility of the health and economic systems under the new coming transitional government. Previously, Sudan had experienced economic crises, including inflation, unemployment, currency depreciation, and GDP contraction. Induced by high production-input costs, inflation reached 363% in Apr. 2021, and GDP is projected to contract further by 0.8% in 2021. During the first wave of Covid 19, 20% of large enterprises and 100% of agriculture enterprises were closed (CBS & WB. 2020). Sales decreased by 81% compared to the same period in 2019, and 8% of workers were laid off.

This paper attempts to shed light on the effects of COVID-19 on households' lives and the coping strategies adopted by households in Sudan. It also aims to highlight the heterogeneity of the impacts and the adopted coping strategies by region, gender of household head, and mode of living. The population s' knowledge, practice, and attitude to health issues differ across states and regions depending on their beliefs, customs, and traditions. In rural areas and some states with strong social relations, we expect weak implementation of measures needed for curbing the spread of coronavirus. With a fragile health system, economic destitution, and political instability, Sudan needs such information for formulating evidence-based policies conducive to mitigating the impacts of the pandemics on people.

Literature Review

Corona virus was spreading through human-to-human transmission by close contact via airborne droplets generated by coughing, and sneezing (Kumar et al., 2020). Thus, COVID-19 is not only a public health problem that causes a toll of deaths; it also has negatively affected the global economic and social systems. The social and economic effects are even more challenging on least developed, developing, and emerging market economies irrespective of their income level. Most witnessed a drop in GDP, employment rate, and income losses, leading to more poverty, food insecurity, and malnutrition. Thus, the resources and capacities needed to control the spread of the pandemic vary worldwide, with developing countries disproportionately sharing its intertwined adverse health, social and economic impacts. Gondwe (2020), evaluating the impacts of COVID-19 on Africa s' economic development, stated that while the health impacts are directly through contagion, the economic impacts are caused essentially a consequence of the preventive measures adopted by the respective governments to curtail its spread. These measures include, among others, the closure of frontiers, complete or partial lockdowns of economies, and temporary closure of businesses, schools, and social services.

However, these measures have caused significant disadvantages for African economies, resulting in the loss of productivity and trade within and between countries. The immediate result was that all vital growth-boosting sectors of many economies became weak and unproductive, and eventually, their overall income dropped in amount and value. Africa faces more significant risks of severe negative impacts from COVID-19. Coibion et al. (2020) studied how the disparity in the timing of local lockdowns due to COVID-19 causally affects households' spending and macroeconomic expectations at the local level using several waves of customized surveys with more than 10,000 respondents participating in the Kilts Nielsen Consumer Panel (KNCP). They found that about 50%

of the respondents had lost income and wealth due to the coronavirus, with the average losses being estimated at $5,293 and $33,482, respectively. Total consumer spending plummeted by 31 log percentage points, with the most significant drops in travel and clothing. Over the twelve months after the lockdown, the unemployment rate was estimated to be 13 percentage points higher; further increase in unemployment was also expected at the horizons of three to five coming years.

According to Gupta et al. (2020), about 40% of the decline in the labor market was driven by a nationwide shock, while state social distancing policies drove 60%. The authors argued that more jobs were lost during the first three months of COVID-19 than during the Great Recession. Heterogeneity in the labor market due to the COVID-19 pandemic in Canada was addressed by Cortes and Forsythe (2020). According to the authors, the pandemic has exacerbated pre-existing inequalities as the widespread loss of employment has been significantly more prominent in lower-paying occupations and industries.

Disadvantaged groups, including Hispanics, females, younger workers, and individuals with low levels of education, have disproportionately undergone job losses and decreases in hiring rates. Further, Alon et al. (2020) provided evidence that the impact of the current pandemic sharply differs by gender compared to another economic downturn. They argued that most US states and other countries closed schools and daycare facilities as the first step to stop the disease outbreak; hence, more women than men were laid off from their work. In Pakistan, the pandemic adversely impacted the lives of the people. The country has witnessed an imminent risk to Pakistanis' social and economic lives as well. In this regard, already gained advantages, such as the decline in the poverty rate by 40 percentage points in 2015, plummeted due to COVID-19 pandemic (United Nations Development Program, 2020).

While the literature on the impact of COVID-19 is meager and fragmented, the Sudanese literature is even scarcer. According to Babiker (2021), the COVID-19 pandemic reached Sudan at a critical stage during the first year of the post-revolutionary transitional period, when most of the envisaged reforms had yet to commence. Against this background, the emergency measures in response to COVID-19 affected the political transition and, conversely, impacted responses to the pandemic. In order to contain the spread of COVID-19, the transitional government restricted freedom of assembly and association by banning some public demonstrations. Ahmed et al. (2021) found that the COVID-19 infection control and prevention measures have contributed to the increase in incidence of intimate partner violence (IPV) and negatively impacted access to health and legal systems. Relative to Malawi and Kenya, Sudan lacks laws against IPV, as it has not yet ratified the Convention on Elimination of All Forms of Discrimination Against Women (CEDAW). The lack of law made it difficult to access IPV services in Sudan.

The present study focuses on the socioeconomic impacts of COVID-19 on the Sudanese people, segregating estimates by gender, region, and mode of living, and adds to the Sudanese literature on impacts of pandemics.

Data and Methodology

The present study adopted descriptive and analytical statistical analysis as a research methodology, using data that the Sudan High-Frequency Survey collected on COVID-19, conducted by the Central Bureau of Statistics (CBS) and the World Bank (WB) using mobile phones. The study used all mobile number lists in the country as a frame and selected a stratified sample by rural/ urban that covers all the states: this guaranteed data coverage and reduced sampling errors. The survey was conducted as follows; round 1 was conducted in June-July 2020, round 2 in August-October 2020, and round 3 between November and January 2020/2021. In round 1, 4032 households were interviewed (one phone for each household). Rural and urban areas in each state were represented, and the states were represented proportionally to their population size. Weights were calculated to adjust for under-coverage and non-respondent errors, and we used these in our analysis and in estimating population means and totals.

The survey questionnaire includes many modules that cover the essential characteristics of individuals and households, knowledge about the coronavirus, government policy to curb the pandemic, employment, access to basic needs, change in behavior, income loss, and coping strategies. One number was selected from each household, and only one person aged 18 years or older answered the individual-level or house-

hold-level questions. However, when necessary, the phone was passed to the most knowledgeable person. Details on survey design and data collection methods are available in the final report released by CBS and WB (2020). Mobile surveys exclude those who do not have phones, which is apparent from the fact that those who reported completing secondary school or completing university or higher in round 1 were about 31% and 40%, respectively, which is different from previous studies. Despite this evidence of exclusion, policymakers can still benefit from the data because it will estimate the lower bound of the impacts of the pandemic. We did descriptive and inferential statistics, including data visualization, and estimated population totals and means. We tried to investigate the changes in outcome variables such as income loss, knowledge, and behavior, coping strategies, etc. We also estimated the average and conditional effects of the covariates of the outcome variables controlling for differences across populations. Given some outcome Yi and some covariates Xi, the conditional expectation function (CEF) is given by (Hansen, 2000):

[i]CEF is the population average of

Y_i, while X_i is a fixed constant.

Y_i can be decomposed into CEF and residual:

Y_i = E $[Y_i | X_i] + e_i$,

E$[e_i | X_i]$ = 0 2

e_i is independent of X_i, and CEF is a function of

X_i that best predicts Y_i in the sense of mean squared error.

The total variation = V(Y_i) =

E [V($Y_i|X_i$)]+$V(E[Y_i|X_i])$ 3

$\beta = \arg\min_b E [(Y_i - X'_i b)^2]$

By making the first derivative concerning b,

and equating to equations to 0, we can solve for β as:

$\beta = E[X_i X'_i]^{-1} E[X_i Y_i]$..4

β is a vector of coefficients of Ordinary Least Square (OLS).

To correct for heteroskedasticity,

we used White- Huber robust standard errors, hence:

[ii]$V(\grave{\beta}) = (X'X)^{-1} X' \sum X (X'X)^{-1}$

....5

We created a new variable of "region" by combining the data of adjacent states. The new variable consists of the northern region, which includes the Northern State and the River Nile State, and the Central region includes Al-Gazera State, Sinnar State, Blue Nile State, and White Nile State. The Eastern region encompasses the Red Sea, Al-Gadarif, and Kassala State. Kordufan region encompasses all states of Kordufan, and the Darfur region includes all states of Darfur. This helps us to maintain the assumption in equation (2).

Results

Households' knowledge of COVID-19, government actions to curb the spread of the virus, and resulting behavioral changes.

About 34% of the survey participants lived in urban areas and 66% in rural areas. The majority (79%) were males, and 21% were females. The mean household size was 7, with a standard error of 0.05. The findings showed that 6% of the participants had never attended school, 16% completed primary school, 5.8% completed intermediate school, 31.9% completed secondary school, and about 40% completed university or higher education. Slightly less than three-fourths of the respondents were connected to the internet.

Knowledge of COVID-19 and measures taken to curb the spread of the pandemic, such as handwashing with soap, staying at home, social and physical distancing, and using masks and sanitizer, are depicted in Figure 1. For all states, including urban and rural areas, those who know about coronavirus were above 98%, albeit there is a considerable difference regarding the measures needed to reduce the possibility of infection. Comparing between regions, people in Khartoum State were by far the most knowledgeable, with about 80% familiar with at least six measures. Using masks and sanitizer, as well as social distancing, were the least practiced measures across regions, and residents of the Northern and Kordufan regions were significantly less knowledgeable than those in other regions. There is no significant difference between urban and rural regarding individuals' knowledge of handwashing; however, using a mask, sanitizer, and social distancing was by far lower in rural areas.

Figure 1: Percentage of individuals who know and took measures to prevent infection , by mode of living and regions, Sudan 2020
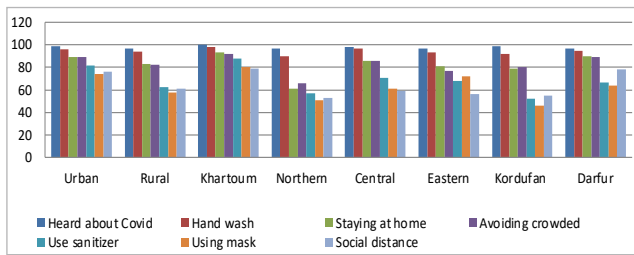
Source: Compiled by the authors from the Sudan High-Frequency Survey on COVID-19, 2020

The government took actions to control the outbreak of the virus; these included the closure of schools and non-essential businesses, restriction of travel, disseminating of knowledge, and advancing people to stay at home. Compared to Khartoum, individuals in most regions were less likely to know actions such as advising people to stay at home, restricting travel, and closing schools. Closure of non-essential business was less practiced in Darfur and Northern regions. There is no significant difference in knowledge of actions taken by the government to prevent the spread of the virus by gender (Table 1).

Table (1): Action taken by the government to curb the spread of coronavirus, Sudan 2020

	Advice citizens to stay at home	Disseminate knowledge	Restricts travel within the country	Closure of schools and universities	Closure of non-essential business
Female	-0.008 (0.031)	-0.015 (0.034)	0.058 (0.052)	0.064 (0.044)	0.010 (0.026)
Northern	-0.216*** (0.054)	0.026 (0.081)	-0.141*** (0.023)	-0.152*** (0.039)	-0.046* (0.024)
Central	-0.115*** (0.040)	-0.072* (0.038)	-0.062 (0.044)	0.0001 (0.052)	0.037 (0.025)
Eastern	-0.079 (0.047)	0.009 (0.078)	-0.170*** (0.026)	-0.187*** (0.044)	0.133 (0.110)
Kordufan	-0.262*** (0.036)	0.016 (0.064)	-0.037 (0.058)	-0.107** (0.047)	0.064 (0.071)
Darfur	0.143*** (0.035)	-0.007 (0.060)	-0.090* (0.050)	0.026 (0.059)	-0.050* (0.026)
Northern - Central	0.0023	0.4417	0.0813	0.007	0.0004
Northern - Eastern	0.0178	0.9002	0.3521	0.4177	0.1141
Northern - Kordufan	0.4627	0.5237	0.0894	0.3730	0.1230
Northern - Darfur	0.0000	0.6308	0.2890	0.0054	0.8756
Central - Eastern	0.9103	0.3350	0.0254	0.0019	0.3894
Central - Kordufan	0.0001	0.0297	0.7302	0.0894	0.7047
Central - Darfur	0.0127	0.5447	0.6514	0.7123	0.0008
Eastern - Kordufan	0.0035	0.6171	0.0368	0.1369	0.5964
Eastern - Darfur	0.0290	0.5077	0.1449	0.0016	0.1067
Kordufan - Darfur	0.0000	0.0831	0.4905	0.0570	0.1174
Observations	3,969	3,969	3,969	3,969	3,969
R^2	0.057	0.012	0.024	0.040	0.034

Each column shows the coefficients of a binary regression that takes 1 if the respondent knows the actions taken by the government, 0 otherwise, and takes 1, if the respondent is female and 0 otherwise. The outcome variables are regressed on indicators for each region, taking Khartoum State as a reference and on gender with males as a reference. The lower part of the table includes the P-values of the Wald test for hypotheses that the coefficients of indicators of two different regions are equal. (*** = P <0.01, ** = P <0.05, * = P < 0.10). Results are based on data collected in round 1.

Table 2 depicts individuals' behavior change for reducing the spread of coronavirus since the first outbreak. The findings show that Khartoum State significantly differed from other regions of the country regarding avoiding shaking hands, avoiding crowdedness, and using masks. Compared to Khartoum, people of all regions were less likely to wear masks when they go out. People, in the Northern and Kordufan regions, were also less likely to avoid two measures: handshaking and crowded places. No heterogeneity in behavioral change regarding hand washing with soap is captured. Females have significantly changed their behavior in actions known to limit the spread of the coronavirus (Table 2).

Table (2): Change in behavior to curb the spread of coronavirus since the first outbreak, Sudan 2020

	Avoided hand-shakes	Washed hands with soap	Avoid Crowded places	Wear a mask when going out
Female	0.171*** (0.034)	0.072*** (0.026)	0.080* (0.040)	0.108** (0.046)
Northern	-0.125** (0.059)	-0.093 (0.057)	-0.114*** (0.030)	-0.325*** (0.027)
Central	-0.138*** (0.043)	0.004 (0.029)	-0.100 (0.062)	-0.214*** (0.037)
Eastern	-0.125 (0.077)	-0.39 (0.031)	-0.128** (0.049)	-0.190*** (0.058)
Kordufan	-0.280*** (0.062)	-0.055 (0.048)	-0.142*** (0.023)	-0.411*** (0.036)
Darfur	-0.050 (0.042)	0.002 (0.043)	-0.247*** (0.080)	-0.195*** (0.060)
Northern - Central	0.8534	0.1006	0.8319	0.0201
Northern - Eastern	0.9979	0.3633	0.8085	0.0432
Northern - Kordufan	0.0598	0.5894	0.4709	0.0565
Northern - Darfur	0.2601	0.1590	0.1347	0.0628
Central - Eastern	0.8827	0.1801	0.7194	0.7258
Central - Kordufan	0.0467	0.2329	0.5334	0.0006
Central - Darfur	0.1076	0.9647	0.1557	0.7848
Eastern - Kordufan	0.1100	0.7561	0.8086	0.0038
Eastern - Darfur	0.3750	0.3667	0.2182	0.9563
Kordufan - Darfur	0.0019	0.3253	0.2108	0.0046
Observations	3,940	3,981	3,968	3,972
R²	0.049	0.015	0.036	0.066

Each column shows the coefficients of a binary regression that takes 1 if the respondent changed his or her behavior, 0 otherwise, and regresses on behavior indicators for each region, taking Khartoum State as a reference. The lower part of the table includes the P-values of the Wald test for hypotheses that the coefficients of indicators of two different regions are equal. (*** = P <0.01, ** = P <0.05, * = P < 0.10). Results are based on data collected in round 1.

The estimated population-weighted mean number of individuals who changed their behavior over time is depicted in Table 3. The findings showed a behavioral change across time consistent with the waves of virus outbreaks. The first wave of the outbreak started in March 2020 and declined in May, followed by two peaks in October and March 2021. Thus, the behavioral change for the four measures significantly declined after the first wave and started to increase again during the third wave. Though the proportion of people washing their hands with soap was declining over the survey rounds (June 2020 to January. 2021), it was still the most used measure for curbing the spread of the virus.

Table (3): Estimated population-weighted mean number of individuals who changed their behavior across time.

	Wash hands with soap.	Avoid hand-shakes	Avoid Crowded places	Wear a mask when going out
Round 1 (June-July)	0.897 (0.016)	0.633 (0.038)	0.693 (0.038)	0.609 (0.037)
Observations	3,981	3,940	3,968	3,972
Round 2 (August-Oct.)	0.455 (0.046)	0.165 (0.038)	0.218 (0.041)	0.327 (0.035)
Observations	2,976	2,979	2,976	2,898
Round 3 (Nov.-Jan.)	0.604 (0.025)	0.412 (0.032)	0.367 (0.022)	-
Observations	2,974	2,977	2,986	-

Each column represents the estimated population-weighted mean number of individuals who reported behavioral change, with standard errors in parenthesis.

Behavioral changes and the intention of people to follow government measures are also affected by their opinion on how the government deals with the outbreak of the virus. According to Figure 2, slightly more than 60% of participants strongly or just agreed that the government is trustworthy in the way it managed the pandemic, about 70% intended to follow the guidelines of the government, slightly more than 45% strongly or just disagreed with the fact that the government can assist, about 23% and 19% did not agree that the government can provide health care or health services, respectively.

Figure 2: Individuals' opinion on how government was dealing with coronavirus and their intention in following guidlines
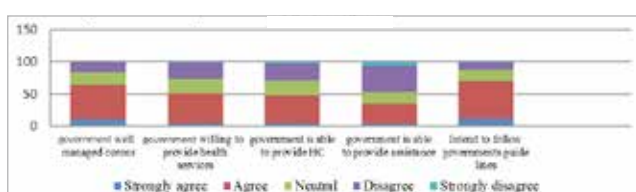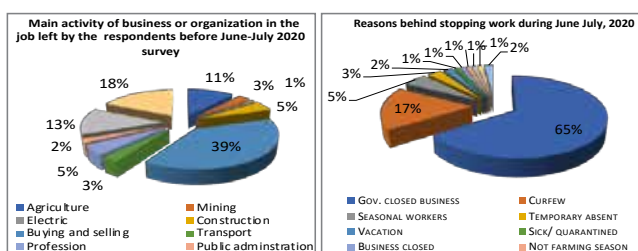

Source: Compiled by the authors from the Sudan High-Frequency Survey on COVID-19, 2020

Economic impacts of the pandemic:

Labor market participation during the spread of coronavirus

The measures for curbing the spread of coronaviruses such as school and business closures and lockdown and curfew orders, affected the socioeconomic characteristics of households. An estimated 29.9 million people (61%) were not working during the last seven days preceding the survey in June-July 2020, though about 19.8 million people (66%) were working before the outbreak of the coronavirus. The majority (39%) of those who lost work were buyers and sellers, followed by 13% who worked in personal services, 11% in agriculture, 5% in the construction sector, and 18% who were day workers, employees, or freelancers (Figure 3, left panel).

Figure 3: Percentage distribution of respondents by activity left during June-July and reasons for leaving work.

Source: Compiled by the authors using data from the Sudan High-Frequency Survey on COVID-19, 2020.

About 65% of those who were not working reported business closure as the main reason for losing work, 17% stopped working because of a curfew ordered by the government to control the spread of the virus, and 5% were seasonal workers (Figure 3, right panel). The characteristics of those who lost work during the spread of coronavirus are depicted in Table 4.

Table (4): Percentage distribution of those who lost work by socio-demographic characteristics.

Those who were not working during the last week preceding the survey round 1 (June-July 2020. N=2472)		
	Were working before March 2020	Were also not working before March 2020	Total
Age:			
18-24	0.41	0.59***	100
25-29	0.67	0.33	100
30-34	0.74	0.26	100
35-39	0.82	0.18	100
40-44	0.84	0.16	100
45-49	0.79	0.21	100
50-54	0.71	0.29	100
55-59	0.74	0.26	100
60	0.73	0.27	100
Gender:			
Male	0.79	0.21***	100
Female	0.33	0.67	100
Mode of living:			
Urban	0.65	0.34	100
Rural	0.66	0.33	100
Education:			
Never attended school	0.44	0.56**	100
Primary	0.73	0.27	100
Secondary	0.74	0.26	100
Higher	0.60	0.40	100
Region:			
Khartoum	0.70	0.30	100
Northern	0.69	0.31	100
Central	0.70	0.30	100
Eastern	0.63	0.37	100
Kordufan	0.62	0.38	100
Darfur	0.63	0.34	100

Source: Calculated by the authors using data from round 1 of the Sudan High-Frequency Survey on COVID-19, 2020.

The findings showed that stopping work during the lockdown and business closure significantly differed by age, gender, and education level; however, no significant difference is reported by mode of living and region. Middle-aged people (35-44) were the most disadvantaged group, as four in five stopped working during the coronavirus outbreak. Slightly more than three-thirds of males and one-third of females also lost work. About 44% of uneducated people lost their work during the lockdown compared to 60% of highly educated people and about 73% of those who had completed primary or secondary school. The proportion of lost work due to the coronavirus outbreak in Khartoum, Central, and Northern regions was higher than in the other regions (Table 4).

Income Loss

In general, the lockdown reduced households' income from any source of livelihood. The distribution of households by different sources of income is shown in Table 5. Regardless of the different sources of received incomes, the study estimated households reported income loss from any source by the 1,742,588 households, which equals to 47%. By sector, the ones with the biggest losses were non-farm family business (54%) and the properties and investments sector (55%).

Table (5): Estimated total and average number of households' source of income and income loss

	Family Farming and fishing	Non-farm Family Business	Household member work for wage	Receive remittance from outside Sudan	Receive remittance from inside Sudan	Income from properties
Total	679,156 (107,586)	206,785 (64,100)	1,805,096 (393,281)	311,346 (90,753)	229,015 (46,829)	999,548 (24,104)
Mean	0.525 (0.088)	0.058 (0.012)	0.263 (0.027)	0.045 (0.007)	0.033 (0.005)	0.141 (0.021)
Observations	558	2,131	4,011	4,009	4,008	4017
Total income loss or reduced income:						
Total	290,737 (40,229)	110,269 (37,233)	508,616 (139,304)	113,265 (24,564)	81,538 (27,223)	547,241 (132,596)
Mean	0.429 (0.039)	0.541 (.059)	0.282 (0.034)	0.363 (0.056)	0.356 (0.103)	0.547 (0.053)

Source: Estimated by the authors from data collected in round 1, of the Sudan High-Frequency Survey on COVID-19, 2020. To compare income loss between regions, we created a new variable by giving 0 if a household's income from a particular source increased or stayed as it was and 1 if its income was reduced or lost. Each column in the first panel estimated the total and mean number of households by the source of income. In contrast, the second panel represents the total and the average number of households that reported income loss by their source of income. Standard errors are in parenthesis.

The results showed that Darfur was more likely to have lost income from properties, non-farm family businesses, and remittances from outside Sudan, whereas the Northern region was less likely to lose income from the family farm and family non-farm business and income from properties. Wage income loss was also significantly less in the Central and Eastern regions, and there was no heterogeneity in wage income loss between Khartoum, Kordufan, and Darfur (Table 6).

Table (6): Heterogeneity in income loss due to the outbreak of coronavirus by region and source of income

	Family Farming and fishing income total or partial loss	Non-farm Family Business income total or partial loss	Wage income total or partial loss	Remittance from outside Sudan, total or partial	Remittance from inside Sudan's total or partial loss	Properties income total or partial loss
Northern	-0.263** (0.104)	-0.259*** (0.043)	-0.051* (0.027)	0.059 (0.123)	0.100 (0.164)	-0.240*** (0.076)
Central	-0.070 (0.099)	-0.018 (0.113)	-0.134** (0.052)	0.034 (0.096)	0.135 (0.236)	-0.256*** (0.048)
Eastern	-0.120 (0.099)	-0.137 (0.126)	-0.226*** (0.068)	0.249** (0.092)	-0.102 (0.147)	-0.203* (0.111)
Kordofan	-0.153 (0.102)	-0.445** (0.169)	0.003 (0.050)	0.175 (0.116)	0.453** (0.198)	0.105 (0.074)
Darfur	-0.087 (0.152)	0.374*** (0.018)	-0.033 (0.087)	0.600*** (0.127)	-0.304*** (0.097)	0.202*** (0.046)
Northern - Central	0.0052	0.0623	0.1253	0.8702	0.8928	0.8485
Northern - Eastern	0.0284	0.3732	0.0147	0.2198	0.2568	0.7737
Northern - Kordo	0.1103	0.3042	0.2729	0.4988	0. 1067	0. 1795
Northern - Darfur	0.1907	0.0000	0.8370	0. 0055	00057.	0.000
Central - Eastern	0.3809	0.5010	0.2629	0.1023	0.3482	0.6462
Central - Kordofan	0.1855	0.0570	0.0471	0.3394	0. 2462	0.0631
Central - Darfur	0.8965	0.0027	0.3135	0. 0012	0.0570	0.0000
Eastern - Kordofan	0.5837	0.1842	0.0068	0. 6255	0.0087	0.4468
Eastern - Darfur	0.7794	0.0007	0.0819	0.0375	0. 0949	0.0011
Kordofan - Darfur	0.6157	0.0001	0.7072	0.0275	0.0001	0.0004
Observations	287	152	1,200	218	142	588
	0.017	0.092	0.034	0.098	0.194	0.106

Given that households were receiving income from a particular source of income before March 2020, each column gives a result of regression of a dichotomous variable that takes 1 if the household lost income from that source of income and 0, otherwise. The outcome variables were regressed on region indicators, taking Khartoum as a reference. Adjusted Wald test of hypotheses that the coefficient of one region is equal to the coefficients of other regions are in the lower part of the table. Robust standard errors are in Parentheses. (*** =$P < 0.01$, **= $P < 0.05$, * =$P < 0.10$).

The study estimated that 25% of the households in Sudan had members who operated family businesses during the year 2020. Slightly less than two-thirds (63%) of them reported that their revenue was either lost or reduced compared to the last month preceding the survey. Loss of revenue was sustained through time as the respondents were more likely to lose revenue in the second (August-Oct.) and third survey rounds (November-January (2021) compared to the first round in June 2020. While the Central region was more likely to have more revenue loss than the Khartoum region, the Kordufan region was more likely to have less revenue loss. Nevertheless, there is no heterogeneity in family business loss between Khartoum, the Northern, Darfur, and the Eastern regions (Table 7).

Table (7): Loss of family business revenue over time and region

	Non-farm family business revenue loss
Round 2	1.681*** (0.268)
Round 3	1.638*** (0.476)
Northern	0.094 (0.228)
Central	-0.390** (0.195)
Eastern	-0.038 (0.381)
Kordufan	0.639** (0.302)
Darfur	0.177 (0.256)
Round 2 Round 3	0.9308
Northern - Central	0.1788
Northern - Eastern	0.7590
Northern - Kordufan	0.1308
Northern - Darfur	0.7899
Central - Eastern	0.3817
Central - Kordufan	0.0014
Central - Darfur	0.0319
Eastern - Kordufan	0.0973
Eastern - Darfur	0.5384
Kordufan - Darfur	0.0536
Observations	1.362
	0.073

Ordered logit regression is used; the dependent variable was ordered variable, taking 0 if revenue was lost, 1 if revenue is reduced, 2 if the revenue was the same, and 3 if revenue was higher. Independent variables were the rounds of surveys, with the first round used as a reference and regions with Khartoum region used as a reference. Adjusted Wald test of hypotheses that the coefficient of one region is equal to the coefficients of other regions are in the lower part of the table. Robust standard errors are in Parentheses. (*** =P < 0.01, **= P < 0.05, * =P < 0.10).

On the national level, due to income loss and the lockdown, an estimated 2,003,794 (30%) of households were unable to access bread and cereal, and 1,605,409 (25%) were unable to access milk and milk products. In comparison, 279,038 (24%) and 1,767,772 (31%) were unable to access health care and buy medicine, respectively (Table 8). Across all the regions, households were unable to access bread and medicine, albeit the Northern region was more likely to access food and health needs. As we have no information on households' income or wealth index, we used ownership of electricity as an indicator of a households' socioeconomic deprivation status. Thus, we examined the distribution of access to basic needs by household ownership of electricity. By socioeconomic groups, there was no heterogeneity regarding accessing basic food and health needs.

Table (8): Estimation of the total and mean number of households unable to access basic food and health needs by regions

	All	Khartoum	Northern	Central	Eastern	Kordufan	Darfur
Household unable to access bread and cereal:							
Total	2,003,794 (92,510)	382,204 (19,696)	176,453 (48,441)	482,143 (128,563)	261,978 (87569)	314,638 (61,478)	386,376 (104,435)
Mean	0.299 (0.012)	0.317 (0.016)	0.439 (0.059)	0.294 0.024	0.271 (0.080)	0.341 (0.024)	0.248 (0.040)
Observations	3,967	958	290	989	455	466	809
Household unable to access milk and milk products:							
Total	1,605,409 (280,753)	313,790 (18, 692)	111,332 (43,832)	365,787 (47,240)	185,984 (45,454)	304,097 (106,147)	324,417 (96,776)

	All	Khartoum	Northern	Central	Eastern	Kordufan	Darfur
Mean	0.245 (0.019)	0.263 (0.015)	0.282 (0.072)	0.222 (0.037)	0.199 (0.039)	0.337 (0.048)	0.219 (0.047)
Observations	3,916	946	288	988	444	462	788
Household unable to access health facilities:							
Total	279,038 (66,585)	65,138 (7,689)	32,403 (11,367)	56,923 (16,232)	37,494 16,784	37,137 (17,760)	49,939 (25,521)
Mean	0.239 (0.031)	0.328 (0.038)	0.426 (0.098)	0.182 (0.050)	0.253 (0.129)	0.172 0.074	0.232 (0.041)
Observations	724	167	53	202	63	115	124
Household unable to buy medicine:							
Total	1,767,772 (368,253)	359,313 (18,237)	183,618 (53,384)	547,288 (171,774)	215,322 (40,844)	207,552 (80,434)	254,676 (107,622)
Mean	0.309 (0.024)	0.349 (0.017)	0.487 (0.102)	0.365 (0.016)	0.235 (0.055)	0.299 (0.047)	0.212 (0.072)
Observations	3,390	820	282	876	432	335	645

Source: Estimated by the authors using round 1 data from the Sudan High-Frequency Survey on COVID-19, 2020. Estimation is based on the condition that households had tried to access the basic food and health needs. Robust standard errors are in parentheses.

The lockdown policy has negatively affected education. Due to school closures, an estimated 14.8 million children (92%) were not engaged in educational activities (distance and online education). There was considerable heterogeneity in not being engaged in school or any educational activities between Khartoum and other regions (Table 9).

Table (9): Estimated total and average number of children not engaged in any educational activities since school closure

	All	Khartoum	Northern	Central	Eastern	Kordufan	Darfur
Total	14,800,000 (561,629)	2,009,023 (95811)	479,123 (44,910)	3,083,455 (152,685)	1,435,081 (187,907)	2,572,906 (188,450)	5,253,329 (330,973)
Mean	0.916 (0.024)	0.764 (0.023)	0.903 (0.043)	0.906 (0.019)	0.932 (0.022)	0.965 (0.018)	0.968 (0.012)
Observations	2,338	562	123	531	207	352	563

Source: Estimated by the authors using data from round 1 of the Sudan High-Frequency Survey on COVID-19, 2020

Respondents were asked if they had experienced any shock during the coronavirus outbreak. These include job loss, non-farm business closure, theft looting of properties, disruption of farming, fishing, and livestock activities, increase in prices of input and decrease in the output of the farming business, increase in prices of basic needs, and illness or death of the household breadwinner. We estimated the total household that witnessed at least one shock during the lockdown as 5.9 million households (86%). This ranged from 94% of households in Darfur and Kordufan, above 80% in Khartoum, Central, and Northern regions, and 74% in the Eastern region (Table 10).

Table (10): Estimated number of households reported a shock due to COVID-19

	All	Khartoum	Northern	Central	Eastern	Kordufan	Darfur
Total	5,910,436 (118,921)	984,483 (16,619)	333,370 (13,590)	1,409,334 (31,538)	717,343 (43,837)	895,952 (42,132)	1,569,952 (58,771)
Mean	0.862 (0.009)	0.810 (0.013)	0.830 (0.030)	0.847 (0.015)	0.738 (0.040)	0.946 (0.019)	0.946 (0.016)
Observations	4,021	966	290	997	461	475	832

Source: Calculated by the authors using data from round 1 of the Sudan High-Frequency Survey on COVID-19, 2020

Given that a household has experienced at least one shock during the COVID-19 lockdown, the respondents were asked if they had adopted any coping strategy. A range of coping strategies was adopted, including: living on previous savings in 1.3 million households (22%), reducing food consumption in 2.8 million households (48%), reducing non-food consumption in 1.4 million households (23%), relying on credit purchasing in 873,362 households (15%), and engaging in additional income-generating activities in 389,003 households (7%), while another 7% received assistance from family members and friends (Table 11).

**Table (11): Coping strategies adopted by households that experienced
at least one shock during COVID-19 in Sudan**

	Relaying on savings	Reduced food consumption	Reduced Non-food consumption	Credit purchase	Engaged in additional income-generating activities.	Received assistance from family and friends
Total	1,313,573 (74,067)	2,815,257 (563,627)	1,355,526 (713,125)	873,362 (70,144)	389,003 (47,398)	398,639 (44,745)
Mean	0.222 (0.012)	0.476 (0.031)	0.229 (0.034)	0.147 (0.011)	0.065 (0.007)	0.067 (0.007)
Observations	3,411	3,411	3,411	3,411	3,411	3,411

Source: Estimated by the authors using data from round 1 of the Sudan High-Frequency Survey on COVID-19, 2020

Heterogeneity by the gender of household head, mode of living, and region is depicted in Table 12. The findings showed that male-headed households were significantly more likely to engage in additional income-generating activities and reduce non-food consumption than their female-headed counterpart. No heterogeneity in coping strategies by mode of living was detected. Households in Khartoum State were more likely to rely on savings compared to the Northern, Eastern, and Kordufan regions, whereas the Central region had significantly reduced non-food consumption. Moreover, food consumption was less reduced in the Northern, Eastern, and Central region compared to Khartoum State, and credit purchase was more likely to be adopted in the Kordufan region. Engaging in additional income-generating activities was less likely to be adopted in the Eastern region.

Table (12): Coping strategies and gender of household head, mode of living, and regions

	Relaying on savings	Reduced Non-food consumption	Reduced food consumption	Credit purchase	Engaged in additional income-generating activities.	Received assistance from family and friends
Female	0.039 (0.156)	0.109 (0.160)	-0.213** (0.088)	-0.041 (0.054)	-0.067*** (0.018)	-0.012 (0.022)
Rural	0.037 (0.038)	0.023 (0.031)	-0.054 (0.036)	0.003 (0.026)	-0.005 (0.019)	-0.019 (0.016)
Northern	-0.200*** (0.061)	-0.086 (0.073)	-0.171** (0.076)	0.051 (0.058)	-0.026 (0.039)	0.015 (0.027)
Central	-0.088 (0.053)	-0.165*** (0.042)	-0.085* (0.050)	-0.051 (0.034)	-0.005 (0.031)	-0.014 (0.023)
Eastern	-0.157*** (0.051)	-0.057 (0.061)	-0.187*** (0.067)	0.083 (0.059)	-0.061** (0.026)	0.028 (0.036)
Kordufan	-0.221*** (0.054)	-0.013 (0.055)	0.105 (0.66)	0.117* (0.055)	-0.044 (0.028)	-0.002 (0.030)
Darfur	-0.014 (0.058)	-0.119 (0.052)	-0.011 (0.061)	-0.018 (0.039)	-0.001 (0.034)	-0.006 (0.027)
Northern - Central	0.0455	0.2830	0.2671	0.0698	0.5936	0.1550
Northern - Eastern	0.4180	0.7378	0.8636	0.6810	0.3026	0.7277
Northern - Kordufan	0.7012	0.3774	0.0022	0.3664	0.6183	0.5356
Northern - Darfur	0.0092	0.7037	0.0775	0.2431	0.5557	0.4308
Central - Eastern	0.1891	0.0887	0.1478	0.0292	0.0292	0.2207
Central - Kordufan	0.0118	0.0069	0.0062	0.0022	0.1694	0.6654
Central - Darfur	0.2751	0.4388	0.2960	0.4056	0.9192	0.7617
Eastern - Kordufan	0.1785	0.5572	0.0005	0.6636	0.3376	0.4446
Eastern - Darfur	0.0281	0.4139	0.0380	0.1235	0.0582	0.3831
Kordufan - Darfur	0.0020	0.1359	0.1639	0.0241	0.2070	0.9099
Observations	1,378	1,378	1,378	1,378	1,378	1,378
	0.036	0.021	0.042	0.0318	0.068	0.005

Each column gives a result of regression of a dichotomous variable that takes 1 if the household adopted the particular coping strategy and 0, otherwise. The outcome variables were regressed on the gender of the head of the household, using male as a reference, place of residence, taking urban area as a reference, and region, taking Khartoum as a reference. The adjusted Wald test of hypotheses that the coefficient of one region is equal to the coefficients of other regions is presented in the lower part of the table. Robust standard errors are in Parentheses. (*** =P < 0.01, **= P < 0.05, * = P < 0.10).

Being exposed to shocks and unable to access financial institutions and health facilities due to the lockdown orders, household members were concerned about their health and financial status in the near future. Nationwide, an estimated 37.5 million people (76%) were worried that any one of the households would catch coronavirus, and 37.9 million people (91%) were worried about financial risks. Nationwide more than 75% of the population was aware of health hazards associated with the virus outbreak and worried about anyone catching the virus. However, in Kordufan, only 58% reported this. For all regions, the level of concern about financial risk was also high (Table 13).

Table (13): Households' worries about households' health and financial status

	All	Khartoum	Northern	Central	Eastern	Kordufan	Darfur
Worried about household health							
Total	37,500,000 (1,086,619)	6,896,460 (167,185)	2,162,455 (130,237)	8,742,502 (316,703)	5,026,974 (435,413)	4,461,398 (369,633)	10,200,000 (696,072)
Mean	0.757 (0.017)	0.860 (0.014)	0.833 (0.035)	0.754 (0.021)	0.766 (0.046)	0.581 (0.047)	0.781 (0.048)
Observations	4,014	964	287	996	461	475	831
Worried about household finance							
Total	37,900,000 (1,055,206)	6,136,866 (141,126)	2,058,433 (123,591)	9,102,195 (303,567)	4,415,263 (332,399)	5,293,031 (413,685)	10,900,000 (632,754)
Mean	0.907 (0.016)	0.952 (0.009)	0.884 (0.031)	0.886 (0.015)	0.848 (0.056)	0.933 (0.030)	0.920 (0.049)
Observations	3,360	760	248	879	355	349	769

Source: Estimated by the authors using data of round 1 of the Sudan High-Frequency Survey on COVID-19

Concern about household health and finance significantly differ by the gender of the household head. Female-headed households were more likely to be concerned about illness and COVID-19-related financial risk than their male-headed counterparts. The Central, Eastern, and Kordufan regions were less likely to be concerned about any household member falling ill with COVID-19.

While the Eastern region was less likely to be concerned about financial risk related to COVID-19, the Darfur region was more concerned (Table 14).

Table (14): Worries about households' health and finance by gender of household head and region.

	Worried about households' health (2)	Worried about the households' Financial status (3)
Female	0.109** (0.051)	0.039** (0.016)
Northern	-0.042 (0.055)	-0.011 (0.043)
Central	-0.091** (0.037)	-0.043 (0.030)
Eastern	-0.212** (0.089)	-0.225** (0.111)
Kordufan	-0.372*** (0.075)	0.002 (0.045)
Darfur	-0.054 (0.053)	0.051*** (0.018)
Northern - Central	0.4320	0.4910
Northern - Eastern	0.0961	0.0667
Northern - Kordufan	0.0002	0.8053
Northern - Darfur	0.8678	0.1133
Central - Eastern	0.1938	0.1068
Central - Kordufan	0.0004	0.3424
Central - Darfur	0.5481	0.0002
Eastern - Kordufan	0.1611	0.0524
Eastern - Darfur	0.1203	0.0118
Kordufan - Darfur	0.0004	0.2471
Observations	1.659	1.347
R^2	0.085	0.093

Each column gives results from a single regression of a binary variable equal to 1 if the response is "yes" to whether they were worried that a household member might fall ill with coronavirus or that the household would experience a financial problem due to the spread of coronavirus. The outcome variables were regressed on the gender of the head of household, using male as a reference, and region, taking Khartoum as a reference. The adjusted Wald test of hypotheses that the coefficient of one region is equal to the coefficients of other regions is presented in the lower part of the table. Robust standard errors are in Parentheses. (*** =$P < 0.01$, **= $P < 0.05$, * = $P < 0.10$).

Discussion and Conclusions

While the transitional government faced a staggering challenge to political transition and economic development, the outbreak of COVID-19 emerged as one of the most significant health and economic threats. In addition to the political instability and uprisings here and there, the newly borne government faced complex socioeconomic challenges such as poverty, inflation, unemployment, fluctuations in the exchange rate, and a fragile health system. Despite all these changes, the Sudanese government promptly acted to curb the spread of COVID-19 by setting up a high-level emergency committee to coordinate the efforts of related ministries and declared a nationwide health emergency. The early responses included social distancing orders, closure of borders, schools, and non-essential businesses, besides a nationwide curfew. Individuals' adoption and adherence to the series of recommended health measures provided by the government and public health authorities played a critical role in controlling and preventing of COVID-19 infection. Indeed, these recommendations are generally effective in lessening the pandemic's impact and spread.

Nevertheless, sometimes there is a denial of the transmission of the virus by people. Demographic

characteristics such as age, gender, level of education, occupational status, household income, size, and housing conditions are essential to abide by these precautions. Added to these are the barriers to preventive behaviors such as unavailability of soap or water, inability to buy masks and sanitizers, being accustomed to shaking hands when meeting with others, low awareness and poor understanding of COVID-19 and the seriousness of the virus, and impossibility for physical distancing due to living and housing or work conditions.

Thus, we need to deeply understand the socioeconomic impacts of the coronavirus on all levels. Policymakers need to formulate evidence-based policies to mitigate any adverse impact of the COVID-19 pandemic on the already fragile health and economic systems. To this end, we analyzed the data collected by the Sudan High-Frequency Survey on COVID-19 rounds conducted by the CBS and the WB, using mobile phones. We used descriptive and analytical statistics to give insights on the impacts of the COVID-19 pandemic; we examined knowledge about and attitude towards the coronavirus, employment opportunities, income and revenue losses, and coping strategies by region, mode of living, and gender of the household head. We estimated the totals and averages of individuals and households affected by the lockdown orders nationally and regionally.

Though our findings showed that about 98% have heard about COVID-19, and four out of five people know at least six measures for curbing the spread of the pandemic, about 30% reported no intention to follow the government's measures. The problem is partly because people believe in the opponents' rumor that the government fabricated the emergence of COVID-19 to force people to stay at home and thus not to gather to protest government policies. In addition, social distancing runs contrary to the community's cultural values. The data revealed that the Northern region is the least tied by measures such as washing hands, staying home, and avoiding crowded place. The region is crowded with artisanal gold miners from all parts of the country and is located on the border with Egypt; this is likely to expose the residents to COVID-19 infections. Also, poor literacy, lack of education, religious practices, and ceremonies can be counted as influencing factors.

We estimated that 19.8 million people (66%) were not working during June-July 2020 due to the spread of coronavirus; the majority reported the closure of business or government institutions as a reason for being off work. The most deprived groups during the lockdown were those who ran their own business, like sellers and buyers. Those who worked in personal services and agriculture were not compensated for the loss of income, while government workers were paid during the lockdown. Inequality and heterogeneity in labor market participation during COVID-19 were also detected in the study conducted by Cortes and Forsythe (2020). Concurrently, 1.7 million households (47%) lost income from any source, and those who rely on non-farm family businesses and properties are the most disadvantaged sectors. These results are supported by Coibion et al. (2020).

Geographically, the Darfur region was more likely to lose income from non-farm family business income, remittances from outside, and properties. As a result of income and revenue loss, around one-fourth of households were also unable to access necessities such as bread and cereal, milk and milk products, health facilities, and medicine. The real challenge is that the lockdown policy posed higher prices and worsened the surging prices. According to Famine Early Warning System Network (2020), in November 2020, cereal prices were 250 to 300 percent higher than in the previous year and 550-680 percent higher than the five-year average. For this reason, poor people and day-to-day workers cannot stay at home as recommended by health authorities.

Due to school closure, 14.8 million schoolchildren (92%) were not engaged in educational activities. However, regional heterogeneity is also evident, as about 26% of children in Khartoum State were engaged in some educational activities. Households in Khartoum had access to the internet and thus to e-learning facilities. In sum, due to the COVID-19 outbreak, about 5.9 million households (86%) were exposed to at least one economic shock. Households adopted coping strategies in many different ways; however, reducing food consumption was the most common coping strategy, as reported by 48% of households with at least one shock during the COVID-19 pandemic.

In conclusion, heterogeneity in losing work during June-July 2020 by gender, education, and age is evi-

dent. Lockdown orders and the resulting shortage in food production led to hyperinflation to the extent that a considerable proportion of the population could not access basic food and health services. Thus, the COVID-19 outbreak exacerbated the already fragile health and economic systems. Therefore, we recommend conducting policy discussions based on lessons learned from this and other studies.

Declarations

References:

Ahmed, S. A., Changole, J., & Wangamati, C. K. (2021). Impact of the COVID-19 pandemic on intimate partner violence in Sudan, Malawi and Kenya. Reproductive Health, 18(1), 1-7.

Alon, T., Doepke, M., Olmstead-Rumsey, J. & Tertilt, M. (2020). The impact of COVID-19 on gender equality. (Working Paper No. w26947). National Bureau of Economic Research. http://www.nber.org/papers/w26947.

Azevêdo, D.G. (2020, April 8). Trade set to plunge as COVID-19 pandemic upends global economy. [Press release] WTO Trade Forecast. https://www.wto.org/english/news_e/archive_e/tfore_arc_e.htm. (Cited on Sep.24)

Babiker, M. A. (2021). COVID-19 and Sudan: The Impact on Economic and Social Rights in the Context of a Fragile Democratic Transition and Suspended Constitutionalism. Journal of African Law, 65(S2), 311-331.

Central Bureau of Statistics (CBS) & World Bank (WB). (2020). Socioeconomic Impact of COVID-19 on Sudanese Households. https//documents1.worldbank.org/curted/en394981620725892919/pdf/Socioeconomic-Impacts of- COVID-19-on-Sudanese Households.pdf

Coibion, O., Gorodnichenko, Y. & Weber, M. (2020). The cost of the COVID-19 crisis: Lockdowns, macroeconomic expectations, and consumer spending. (Working Paper No. w27141). National Bureau of Economic Research. http//www.nber.org/papers/w27141

Cortes, G.M., & Forsythe, E. (2020). The heterogeneous labor market impacts of the COVID-19 pandemic. Industrial and Labor Relations Review, 76(1), 30-55. https://doi.org/10.1177/00197939221076856.

Famine Early Warning Systems Network (FEWSNET). 2020a. "Harvests improve food access, but high food prices drive atypically high food insecurity" https://fews.net/east-africa/sudan/key-message-update/november-2020

Gondwe, G. (2020). Assessing the impact of COVID-19 on Africa s' economic development. United Nations Conference on Trade and Development https://unctad.org/system/files/official-document/aldcmisc2020d3_en.pdf.

Gupta, S., Montenovo, L., Nguyen, T.D., Lozano-Rojas, F., Schmutte, I.M., Simon, K.I., & Wing, C.(2020). Effects of social distancing policy on labor market outcomes. (Working Paper, No.w27280). National Bureau of Economic Research. http://www.nber.org/papers/w27280.

Hansen, B. (2000). "Econometrics" Prenton University Press.

Kumar, D., Malviya, R., & Sharma, P. K. (2020). Corona virus: A review of COVID-19. Eurasian Journal of Medicine and Oncology, 4(1), 8-25. https://doi.org/10.14744/ejmo.2020.51418.

United Nations Development Program (2020). COVID-19- Pakistan socioeconomic impact assessment & responses plan, April 2020. https://reliefweb.int/sites/reliefwebint/files/resources/PAKISTAN-Preparedness-and-Response-Plan-PPRP- COVID-19_0.pdf.