

First Draft of ERF Research Project

The Impact of COVID-19 on Households and Firms in the MENA Region: the case of Sudan

The ERF Research Project: ‘The Impact of COVID-19 on Households and Firms in the MENA Region’

By Professor Dr. Samia Satti Osman Mohamed Nour

Professor of Economics, Head of the Department of Economics,

Department of Economics, Faculty of Economic and Social Studies,

University of Khartoum, Khartoum, Sudan

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Dedication

To the Soul of my beloved kind mother Alawya,

On Thursday 8th of April 2021, she passed away due to coronavirus (COVID-19) and broke my heart,

*No words are ever sufficient to express my sadness and my sorrowfulness and to measure the immeasurable
impact of coronavirus (COVID-19) that has caused the death of my beloved kind mother*

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List of abbreviations

MENA	Middle East and North Africa
MSME	Micro, Small and Medium Enterprises
SHO	Sudan Health Observatory
WHO	World Health Organization

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The Impact of COVID-19 on Households and Firms in the MENA Region: the case of Sudan
ERF Research Project: 'The Impact of COVID-19 on Households and Firms in the MENA Region'

Abstract

This paper discusses the impacts of COVID-19 pandemic on households and firms in Sudan as a case study of the Middle East and North Africa (MENA) region. Mainly, it aims to explain COVID-19 economic impacts on household (household income, labour market status, employment benefits, working conditions, and unemployment), and social impacts (on social protection for workers) in Sudan defined by household characteristics (gender, education, and family size), and policy measures to manage the impacts on workers in Sudan. It aims to investigate the impact of COVID-19 on micro, small and medium size enterprises (MSME) and firms' current status of work and business operations defined by firms' characteristics (defined by firm size). The research uses the descriptive and comparative approaches, uses qualitative and quantitative analysis and uses new primary data obtained from the World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020).

We discuss the impact of COVID-19 on food security, mainly on intensifying the incidence and severity of food insecurity and the impact of COVID-19 on farming activities, mainly, inability to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 (32.8%), and inability to sell any products from farms during the last seven day (31.7%).

We discuss the impact of COVID-19 on employment status, and explain that the loss of jobs for the majority and nearly two third of households who were not working for paid work and income generation activities during the last seven days (61.6%), and were not currently working and working before March 2020 (66.6%). The business / gov't closed due to coronavirus legal restrictions was reported as the main reason that the households either not currently working (69.5%), or did not do any paid work, business, farming or other activity to generate income (61.4%), and even changing jobs (43.7%). We show that the impact of COVID-19 on employment also demonstrated from the effects on the received payment. The majority and nearly half of households who were not able to work as usual received partial payment (46%), while, nearly fifth did not receive payment (19%). We explain that the impact of COVID-19 on employment also demonstrated from the effects on the loss and reduction of households' means of livelihood or source of income since mid-March 2020 from non-farm family business (53.3%), income from properties, investments or savings (47.5%), and income from family farming, livestock or fishing (38.5%). The impact of COVID-19 also appears from declining (52.6%), or stagnating (25.1%) revenues from business sales. We show the differences in the status of employment according to gender, household educational level and household family size. We show the impact of COVID-19 on women and gender inequality that implies large impacts of COVID-19 on females compared to males. The probability of not working for paid work and income generation activities during the last seven days is higher for females (87.1%) compared to males (54.8%), the probability of not currently working and not working before March 2020 is higher for females (67.8%) compared to males (18.9%), and the probability of not currently working and working before March 2020 is higher for males (81.1%) compared to females (32.2%), we find that females changed their jobs more than males. We find that full payment for households who were not able to work as usual for males (41.7%) is more than three times higher than females (13.3%).

We find that the impact of COVID-19 on the operation and current status of the micro, small and medium size enterprises (MSME) appears from temporary closed establishments (21.4%), and permanently closed establishments (8.2%). And also from the reported decrease in sales (81.1%), stagnation in sales (15.3%), and reported substantial rate of decrease in sales (70.8%).

We show that the impact of COVID-19 appears from the effects on household's access to health (healthcare system, medicine, health services), and on households mental health in Sudan. The findings also indicate that the impact of COVID-19 on education appears from the serious effects on limiting the access to education, and limited use of ICT to facilitate access to education during the lockdown period in Sudan. The major policy implication from this result is the potential opportunities and challenges for the use of ICT and digital solutions in education and higher education in Sudan to manage the impact of COVID-19.

Key words: COVID-19 pandemic, economic impacts, social impacts, households, firms, MENA Region, Sudan.

The Impact of COVID-19 on Households and Firms in the MENA Region: the case of Sudan

1.1. Introduction: Statement of the research problem and value added

The rapid spread of the coronavirus (COVID-19) throughout the world and the declaration of the coronavirus (COVID-19) as a global pandemic caused critical consequences in all world countries. This confirms the importance of comprehensive investigation of the economic and social impacts of the COVID-19 crisis in the global economy.

Several studies in the international literature discuss the impact of COVID-19 in the global economy, indicating that the world is facing the worst public health and economic crisis in a century. The economic ramifications could rival those of the Great Depression in the 1930s (IMF, 2020). The implications of the pandemic encompass public health, economics, social stability, politics, and geopolitics. The necessary measures taken to respond to the immediate threat of Covid-19, including the shutdown of many economic activities for weeks, have led to a global economic crisis with massive job losses and major impacts especially on poor and vulnerable groups, rising and compounding existing extreme poverty, and inequalities within and among many countries, increasing food insecurity and malnutrition, especially for low-income people, increasing people's anxiety and worry, personal insecurity and financial insecurity. From economic perspective, the economic impacts of the COVID-19 crisis appears from the serious slowdown and diminishing in economic growth (GDP growth rate) for all world economies, an unprecedented shock to labour markets with the worst global crisis and biggest employment decline since the Second World War, caused increase in underemployment and unemployment rates, for instance, according to ILO (2020), partial lockdown measures have affected almost 2.7 billion workers, representing around 81% of the world's workforce. On the social side, there was a shocking loss of employment – a decline of almost 10.5% in total working hours, the equivalent of 305 million full-time workers. Some 1.6 billion students have been affected by school closures and the crisis will push an additional 40 – 60 million people into extreme poverty. In addition, the critical impacts of COVID-19 appear from the potential increase in extreme poverty, potential negative impact threatening the achievement of Sustainable Development Goals (SDGs) in poor regions. In addition to the impact of the lack of access to the Internet that implies that during the lockdown only minority of students unable to go to school have been able to study online. Also, COVID-19 created challenges for universities and students to facilitate and accelerate regular access to quality education from home. The insufficient access to ICT infrastructure caused critical challenges enlarging digital disparities. (See CCSA, 2020; ILO, 2020, FAO, 2020; UNESCO, 2020 Sachs, 2020; Schmidhuber, 2020; OECD, 2020a; b; c)

Based on the above, in view of the rapid spread and the uncertainty regarding the trajectory of the COVID-19 pandemic that put a tremendous pressure in all world countries, MENA countries and Sudan, it would be important to examine the economic and social impacts of COVID-19 in Sudan. This paper aims to discuss the impacts of the COVID-19 pandemic on households and firms in Sudan as a case study of the MENA region. In particular, this paper aims to discuss the COVID-19 economic impacts (on income, labour market status, employment benefits, working conditions, and unemployment), and social impacts (on social protection to workers) on households in Sudan defined by household characteristics (gender, education, and family size). To explain the impact of COVID-19 on household and individual source of income, changes in source of income, and the effects on

the loss of households' means of livelihood or source of income in Sudan. To examine the impact of COVID-19 on household enterprises, the impact on workers livelihoods, income, labour market status, employment benefits, and working conditions and policy measures to manage the impacts on workers in Sudan. To investigate the impact of COVID-19 on firms' current status of work and business operations, sales, revenue, workers, and access to inputs in Sudan defined by firms' characteristics (defined by firm size). To discuss the main challenges facing firms due to COVID-19, the effects on firms' expectations for the future, the effects of lockdowns, policy measures, and the policy response and government support for firms in Sudan. To explain the firms' commitment and the households' commitment to social distance and physical distancing measures defined by household characteristics (gender, education, and family size) and to examine other suggested public health measures to enhance the household commitment to social distance and physical distancing measures in Sudan. To discuss the impact of COVID-19 on food security, intensifying the incidence and severity of food insecurity, and the effective policy responses to eliminate food insecurity in Sudan. To explain the impact of COVID-19 on healthcare system, health services, and household mental health, and the impact of COVID-19 on education and higher education in Sudan. To show the impact of COVID-19 on farming activities: ability to perform the normal activities on the farm, raising livestock, or fishing, ability to sell products from farm, and the effects on prices of farm products. To investigate the impact of COVID-19 on gender inequality and women in Sudan: (on the time women spent on activities of caregiving in Sudan: (taking care of children, caring for children during schools closing, doing housework and doing other household activities). To discuss the potential opportunities and challenges for the use of ICT and digital solutions in education, higher education and workplace to manage the impact of COVID-19, and the implications on widening the digital disparities in access to education and higher education and the digital disparities in workplace in firms, business and establishments in Sudan.

One merit of the proposed research is that different from our previous studies (Nour 2020a; b) we provide a more comprehensive and in-depth investigation of the impact of the COVID-19 pandemic on households and firms in Sudan as a case study of the MENA region. One merit of the proposed research is that it fills the gap in the literature and provides significant contribution by discussing the COVID-19 economic impacts (on income, loss of source of income, labour market status, employment benefits, working conditions, and unemployment), and social impacts (on social protection to workers) on households in Sudan, and discussing the impact of COVID-19 on firms' current status of work and business operations, sales, revenue, workers, and access to inputs in Sudan. Another advantage of the proposed research is that it also fills the gap in the literature and provides an extremely valuable contribution by investigating the impacts of COVID-19 in Sudan, mainly on households defined by household characteristics (gender, education, and family size), and on firms defined by firms' characteristics (defined by firm size). Another merit of the proposed research and a novel element of our analysis is that we use a new primary data obtained from the World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020) to discuss the impact of the COVID-19 pandemic on households and firms in Sudan. Another advantage of the proposed research is the interesting and comprehensive analysis of the impact of COVID-19 on food security (and/or food insecurity), health (healthcare system, health services and households mental health), education and higher education, farming, household enterprises, gender inequality, women, and digital disparities in Sudan.

Another merit is that from policy perspective the proposed research provides useful policy recommendations to implement a more comprehensive and coherent strategy to adopt effective and preventive policy measures including sound health, economic and social measures to curb the further spread of the COVID-19 pandemic in Sudan, and to increase government support to manage the economic and social impacts on households, workers, and firms in Sudan.

1.2. Specific Research Questions and Data:

The proposed research will discuss the following questions on the impact of COVID-19 on households and firms in Sudan:

1. How has COVID-19 affected household and individual income, source of income and loss of source of income, labour market status, employment benefits, working conditions, unemployment, social protection and mental health in Sudan? How the effects of COVID-19 on households in Sudan vary according to household characteristics (gender, education, and family size)?
2. How has COVID-19 affected household enterprises, workers in the formal and informal economies, workers' livelihoods, income, labour market status, employment benefits, and working conditions in Sudan? How have policy measures for workers been applied in Sudan?
3. How has COVID-19 affected firms' current status of work and business operations, sales, revenue, workers, and access to inputs in Sudan? How the effects of COVID-19 on firms differ according to firms' characteristics (defined by firm size) in Sudan?
4. What are the main challenges facing firms due to COVID-19 in Sudan? How has COVID-19 affected firms' expectations for the future in Sudan? How have lockdowns or the stringency of policy measures affected firms in Sudan? What are the main policy response and government support for firms in Sudan?
5. How effective are commitment of firms and commitment of households to social distance measures in Sudan vary according to households' characteristics (gender, education, and family size)? What are other suggested public health measures to enhance commitment to social distance measures in Sudan?
6. What has the impact of COVID-19 been on food security in Sudan? What has the impact of COVID-19 on intensifying the incidence and severity of food insecurity? Have policy responses to eliminate food insecurity been effective in Sudan?
7. What has the impact of COVID-19 been on health (healthcare system, health services) and impacts on education and higher education in Sudan?
8. What has the impact of COVID-19 been on farming activities: ability to perform the normal activities on the farm, raising livestock, or fishing, ability to sell products from farm, and the effects on prices of farm products in Sudan?
9. What has the impact of COVID-19 been on gender inequality and women in Sudan: (on the time women spent on activities of caregiving: (caring for children, caring for children during schools closing, doing housework and household activities)?

10. What are the potential opportunities and challenges for the use of ICT and digital solutions in workplace, education and higher education in Sudan to manage the impact of COVID-19 been on widening the digital disparities in access to education and higher education and the digital disparities in workplace in firms, business and establishments in Sudan?

The proposed research will use the new primary data obtained from the World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020). The Central Bureau of Statistics (CBS) in Sudan conducted a High Frequency Survey in partnership with the World Bank to assess the impact of COVID-19 on Sudanese households and enterprises. The survey aims to inform policymaking, strategic planning, and government responses to contain the impact of the pandemic to its lower possible level in Sudan. This research uses the data from the first round of the Sudan High Frequency Survey on COVID-19, collected during August 2020. The panel survey is implemented jointly by the Central Bureau of Statistics (CBS) and the World Bank. The objective of the Sudan Enterprise High Frequency Survey on COVID-19 is to quickly collect enterprise-level information, using phones, to monitor the crisis and assess the dynamics of the impacts of COVID-19 on Micro, Small, and Medium Enterprises (MSMEs) in Sudan. The survey is expected to help inform dialogue and mitigation measures. The survey focuses on the impacts of COVID-19 on MSMEs' performance and provides near real-time data, supporting an evidence-based response to the crisis. It should be noted that the MSMEs' performance is not only affected by COVID-19 but also other constraints that have adversely affected enterprises. The survey is implemented jointly by the Central Bureau of Statistics (CBS) and the World Bank. As face-to-face surveys were not feasible, the survey was conducted using mobile phones and covers Khartoum State, where most of the Sudanese enterprises are located. The survey aims to monitor the impact of coronavirus on the operation of enterprises that are being interviewed, with a panel of nearly 500 formal enterprises. The survey sample frame was derived from eligible enterprises obtained from the Central Bureau of Statistics, Sudanese Businessmen and Employers Federation and marketing databases. The sampling methodology for the survey was stratified random sampling and the strata for the survey are enterprise size and business sector, consistent with the International Standard Industrial Classification (ISIC). Round 1 of data collection was conducted during August 2020. The Household survey is implemented jointly by the Central Bureau of Statistics (CBS) and the World Bank. As face-to-face surveys were not feasible, the survey was conducted using mobile phones and covers all 18 states of Sudan. The Household survey aims to monitor the impact of coronavirus on the daily lives of Sudanese, who are being interviewed, with a panel of 4,032 households, representative at the national level. Round 1 of data collection was conducted during June 16–July 5, 2020 (about three months after the declaration of the outbreak in Sudan and lockdown). This sample allows to draw statistically inferences of the Sudanese population at the national and rural/urban levels. Several questions were asked in Round 1 regarding different topics: knowledge of COVID-19 and social behaviour, access to goods and services, food security, and jobs.¹

The data from the household questionnaire provides useful and suitable information to discuss the impact of COVID-19 pandemic on households in Sudan. It provides background information: mainly, demographics information and information about households' characteristics, labour market status, household and individual

¹ See The World Bank and the Central Bureau of Statistics (CBS) (2020) 'Effects of COVID-19 on Sudanese Enterprises,' p.1. See also The World Bank and the Central Bureau of Statistics (CBS) (2020) 'Socioeconomic Impact of COVID-19 on Sudanese Households,' p. 1.

income, food security, education and children, social protection, mental health, and social distancing. It focuses on work, activities, workers, and wage workers and the changes and challenges due to COVID-19. It focuses on farmers' activities and impact of COVID-19 on farming activities: ability to perform the normal activities on the farm, raising livestock, or fishing, ability to sell products from farm, and the effects on prices of farm products in Sudan. It focuses on women (employment, income, source of income and changes in employment, working condition, job loss and loss in income sources due to COVID-19). The data from the enterprises' questionnaire provides useful and suitable information to discuss the impact of COVID-19 pandemic on micro, small and medium enterprises in Sudan. It provides background information: mainly, basic information about firms' characteristics (firm size, activities and industry) in Sudan. The firm samples defined by size categories (0-5, 6-49 and 50-199 workers) (February 2020) and broad industry sectors to ensure a sufficient sample of micro, small and medium enterprises across industries. The firm questionnaire covers the impact of COVID-19 on firms' current status of work and business operations, sales, revenue, workers, imports, and access to inputs in Sudan. It also explains the main challenges facing firms due to COVID-19 in Sudan, the impact of COVID-19 on firms' expectations for the future, the effects of lockdowns or the stringency of policy measures on firms, the potential opportunities for using ICT and digital solutions to manage the effects of COVID-19 on firms and the main policy response and government support for firms in Sudan. In addition we use primary data based on short interview with experts in Sudan's Ministry of Health, Sudan's Ministry of Education and Sudan's Ministry of Higher Education to explain the impact of COVID-19 on health, education and higher education in Sudan respectively.

Regarding the organization and structure, this research is organized in six sections. Section 1 provides introduction and shows the statement of the research problem and value added; research questions and data, methodology and structure of the research. Section 2 presents the literature review. Section 3 explains the incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan. Section 4 discusses the impact of COVID-19 on households in Sudan (using Household Survey). Section 5 discusses the impact of COVID-19 on micro, small and medium size enterprises (MSME) in Sudan (using Enterprises Survey). Finally, section 6 provides the conclusion.

1.3. Research Methodology:

The proposed research will use the descriptive and comparative approaches, use qualitative and quantitative analysis and use the new primary data obtained from the World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020). To answer Question (1): the impact of COVID-19 on households we use the results obtained from the households questionnaire and use the indicators (household and individual income and income source, labour market status, employment benefits, working conditions, unemployment, social protection and mental health and households characteristics (gender, education, and family size). To answer Question (2): the impact of COVID-19 on household enterprises, we use the indicators (workers in the establishments, workers' livelihoods, income, labour market status, employment benefits, and working conditions and applied policy measures for workers) To answer Question (3): the effects of COVID-19 on firms, we use the results from the firms' questionnaire and we use the indicators (firms' current status of work and business operations, sales, revenue, workers, and firms' characteristics (defined by firm size). To answer Question (4): the main challenges facing firms

due to COVID-19, the effects of COVID-19 on firms' expectations for the future, the effects of the lockdowns and policy measures on firms and the main policy response and government support for firms we use the results obtained from the firms' questionnaire. To answer Question (5): firms' and households' commitment to social distance measures and the other suggested public health measures to enhance the commitment to social distance and physical distancing measures in Sudan we use the results obtained from the households and firms questionnaire. To answer Question (6): the impact of COVID-19 on food security, and on intensifying the incidence and severity of food insecurity in Sudan, we use the results from households' questionnaire. To answer Question (7): the impact of COVID-19 on health (healthcare system, health services) and on education and higher education in Sudan we use the results from the short interview with experts at Sudan's Ministry of Health, Sudan's Ministry of Education and Sudan's Ministry of Higher Education respectively. To answer Question (8): the impact of COVID-19 on farming activities, we use the results obtained from the questionnaire. To answer Question (9): the impact of COVID-19 on gender inequality and women in Sudan, we use the results obtained from the households' questionnaire. To answer Question (10): the potential opportunities and challenges for the use of ICT and digital solutions to manage the impact of COVID-19 in Sudan, we use the data obtained from the questionnaire and the results of the short interview with experts in Sudan's Ministry of Education and Sudan's Ministry of Higher Education respectively.

2. Literature Review

Many studies in the international literature explain the impact of COVID-19 in the global economy, arguing that the world is facing the worst public health and economic crisis in a century. The economic ramifications could rival those of the Great Depression in the 1930s (IMF, 2020). As COVID-19 (coronavirus) has spread across the world, the World Bank has projected extreme poverty to increase for the first time since the Asian crisis in 1998, putting at risk the global goal of reducing extreme poverty to 3% of the world's population by 2030. The duration and scale of impacts are highly uncertain and expected to vary widely within and across countries and over time, which makes it really important to closely monitor the impacts of the crisis on households and firms for designing policy responses.² Morgan and Trinh (2021) discuss the impacts of COVID-19 on households in ASEAN countries. They find that the outbreak of the COVID-19 virus and the resulting falls in demand due both to uncertainty and policy interventions such as lockdowns, "social distancing," and travel restrictions are having a severe impact on Asian economies and hence on Asian households. These negative impacts come through a variety of channels, including loss of employment or reduced working hours, loss of sales and income of a household business, inability to travel to work, increased need to stay at home to look after children or sick household members, higher prices and/or lack of availability of staple items, reduced access to schooling, etc. In order to better understand these impacts, they carried out computer-assisted telephone interviews of households in eight countries: Cambodia, the Lao People's Democratic Republic, Indonesia, Malaysia, Myanmar, the Philippines, Thailand, and Viet Nam. Their empirical results suggest that various household characteristics, including household income class (before COVID-19), household demographic factors, and COVID-19-induced factors such as having at least one person who lost their job or being located in lockdown areas, all affected the likelihood of a decline in income. In all countries, having at least

² See Carolina Sánchez-Páramo and Ambar Narayan (2020).

one person who lost their job or had reduced working time increases the likelihood of experiencing financial difficulties by 17 percentage points. About 27% of children who stopped attending school could not fully participate in online learning programs due to weak/insufficient internet connections and a lack of digital devices. Two COVID-19- related factors—having at least one person who lost their job or had working hours reduced and experiencing financial difficulties—significantly affect the intensity of online classes taken by children in an average household.

The coronavirus pandemic has had unprecedented, widespread impacts on households across America, raising concerns about the ability to weather long-term health and financial harms. While billions of dollars have been appropriated by federal and state governments since the start of the coronavirus outbreak, a series of polls by NPR, the Harvard T.H. Chan School of Public Health, and the Robert Wood Johnson Foundation find that a substantial share of households have not been protected from serious impacts of the pandemic across many areas of residents' lives. "The Impact of Coronavirus" poll series offers a national look at the problems emerging from the pandemic relating to household finances, jobs, health care, housing, transportation, caregiving, and well-being. Researchers interviewed 3,454 adults age 18 or older across the United States. The first survey report in a series of five, "The Impact of Coronavirus on Households in Major U.S. Cities," shows that households in the four largest U.S. cities—New York City, Los Angeles, Chicago, and Houston—experienced widespread, serious financial and health problems since the start of the coronavirus outbreak. The findings reinforce the need for strong safety net supports that reach populations most deeply and disparately impacted by the pandemic. The second survey report, "The Impact of Coronavirus on Households, By Race/Ethnicity," explored serious problems facing households in high-risk racial/ethnic groups across the nation during the coronavirus outbreak. In particular, findings highlight the experiences of Latino, Black, and Native American communities, who have all been disproportionately impacted by COVID-19 with high rates of cases, hospitalizations, and deaths. The third survey report, "The Impact of Coronavirus on Households across America," details experiences across different areas of people's lives, including serious problems with their finances, jobs, health care, housing, transportation, caregiving, and well-being. The fourth survey report, "The Impact of Coronavirus on Households with Children," highlights serious problems reported across a wide range of areas during the pandemic, including depleting household savings, serious problems paying credit card bills and other debt, and affording medical care. The fifth survey report, "The Impact of Coronavirus on Households in Rural America," finds that rural communities are facing distinct challenges during the pandemic due to long-standing systemic health and social inequities. When it comes to health care, the coronavirus outbreak has dramatically affected delivery, with systems facing disruptions, delays, and deferrals in care for many patients.³

Martin, Markhvida, Hallegatte, and Walsh (2020) investigate the socio-economic impacts of COVID-19 on household consumption and poverty. They argue that the COVID-19 pandemic has caused a massive economic shock across the world due to business interruptions and shutdowns from social-distancing measures. To evaluate the socio-economic impact of COVID-19 on individuals, a micro-economic model is developed to estimate the direct impact of distancing on household income, savings, consumption, and poverty. The model assumes two

³ See the Impact of Coronavirus on Households across America: (<https://www.rwjf.org/en/library/research/2020/09/the-impact-of-coronavirus-on-households-across-america.html>) (Accessed 30 April 2021)

periods: a crisis period during which some individuals experience a drop in income and can use their savings to maintain consumption; and a recovery period, when households save to replenish their depleted savings to pre-crisis level. The San Francisco Bay Area is used as a case study, and the impacts of a lockdown are quantified, accounting for the effects of unemployment insurance (UI) and the CARES Act federal stimulus. Assuming a shelter-in-place period of three months, the poverty rate would temporarily increase from 17.1% to 25.9% in the Bay Area in the absence of social protection, and the lowest income earners would suffer the most in relative terms. If fully implemented, the combination of UI and CARES could keep the increase in poverty close to zero, and reduce the average recovery time, for individuals who suffer an income loss, from 11.8 to 6.7 months. However, the severity of the economic impact is spatially heterogeneous, and certain communities are more affected than the average and could take more than a year to recover. Overall, this model is a first step in quantifying the household-level impacts of COVID-19 at a regional scale. This study can be extended to explore the impact of indirect macroeconomic effects, the role of uncertainty in households' decision-making and the potential effect of simultaneous exogenous shocks (e.g., natural disasters).

They argue that COVID-19 has led to severe and acute losses in many economies around the world due to illness and government-mandated social distancing orders. The impact and duration of the economic crisis on individual households, resulting from the pandemic, is difficult to predict as many uncertainties surround the crisis duration, i.e. length of "stay-at-home" orders, as well as impacted industries and the post-crisis consumption and recovery. There is a plethora of ongoing research studies on estimating the economic impact of COVID-19, in both emerging and developed countries. Due to widespread business closures, especially in lower income populations, national economies are expected to contract, leading to a dramatic rise in unemployment and poverty rates. A report from the World Bank estimated that 11 million people could fall into poverty across East Asia and the Pacific (World Bank 2020). Analysing the effect of the pandemic on poor communities across four continents, (Buheji et al. 2020) estimates that 49 million individuals will be driven into extreme poverty in 2020 (living on less than \$1.90 per day). Several recent studies in the MENA countries explain the economic impact of COVID-19 in households and firms in the MENA countries (e.g. Jordan, Egypt, Morocco and Tunisia) (cf. recent studies based on the Economic Research Forum (ERF) COVID-19 MENA Monitor Data, 2020-2021). Economic growth in Jordan potentially will come to a halt this year. This comes as a result of the COVID-19 pandemic outbreak. Government imposed an economic lockdown which restricted non-essential economic activities and people's movement in order to contain the virus. A SAM multiplier model was used to estimate the economic impact of the lockdown and to explore potential recovery pathways for the Jordanian economy. Some of the key findings from this modelling exercise are: National GDP is estimated to have fallen by 23 per cent during the lockdown period. The services sector was hardest hit, seeing an estimated drop in output of almost 30 per cent. Food systems in Jordan are estimated to have experienced a reduction in output by almost 40 per cent. Employment losses during the lockdown were estimated at over 20 per cent, mainly driven by job losses in services, followed by agriculture. Household income fell on average by around one-fifth due to the lockdown, mainly driven by contraction in service sector activities, by slowdown in manufacturing activity, and by lower remittances from abroad. GDP growth rates for Jordan's economy will continue to be negative through 2020, ranging from -5.7 to -7.4 per cent, depending on the speed of economic

recovery. A slow pace of recovery is expected. This economic recovery offers opportunities for fostering sustainable economic transformation and structural change. Economic policies and incentives should be directed towards more economic diversification, greater resilience to withstand economic shocks, and job creation.⁴ The impact of COVID-19 on the Egyptian economy: Economic sectors, jobs, and households: The COVID-19 crisis may lead to a 1.1 per cent decline in Egypt’s GDP during the 4th quarter (April to June) of the 2019/20 fiscal year, compared to the same quarter in 2018/19. Without the Government of Egypt’s COVID-19 emergency response package, GDP. The impact of COVID-19 on Tunisia’s economy, Agri-food system, and households: The COVID-19 crisis is expected to lead to a 46.4 per cent decline in Tunisia’s GDP during the 2nd quarter of 2020 (April to June). The industrial sector will be hit hardest, with output falling by 52.7 per cent, followed closely by services (-49.0 per cent).

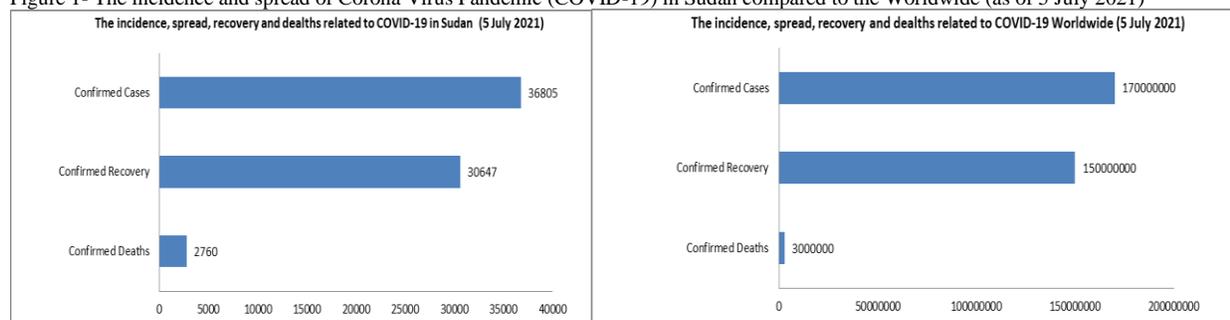
3. The incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan

According to the world health organization (2021) in Sudan, from 3 January 2020 to 29 April 2021, there have been 33,944 confirmed cases of COVID-19 with 2,349 deaths, reported to World Health Organization (WHO). As of 4 April 2021, a total of 49,932 vaccine doses have been administered. (See Figures 1-3)

The incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan compared to the Worldwide (as of 5 July 2021) implies the high number of confirmed cases Worldwide (+170 M), and despite the high confirmed recovery Worldwide (+ 150 M), however confirmed deaths Worldwide are high (+ 3 M). The incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan compared to the Worldwide (as of 5 July 2021) implies the high number of confirmed cases in Sudan (36805), and despite the high confirmed recovery in Sudan (30647), however confirmed deaths in Sudan are high (2760). (See Figure 1)

The regional distribution of the spread of Corona Virus Pandemic (COVID-19) defined by the number of COVID-19 cases as of 4 July 2021 (see Table 2) implies the high concentration of the spread and the reported incidence of nearly two thirds of confirmed cases in Khartoum (66.68%), followed by nearly tenth of cases in Gazira (9.49%), River Nile (4.34%), Red Sea (3.87%), Gadariff (3.17%), North (2.45%), Sinnar (2.15%), White Nile (1.53%), Kassala (1.52%), North Darfur (1.4%), North kordofan (1.30%), West Kordofan (0.64%), Unclassified (0.4%), South Darfur (0.38%), West Darfur (0.23%), South Kordofan (0.16%), Blue Nile (0.14%), East Darfur (0.11%), and Central Darfur (0.02%) respectively. (See Figure 2)

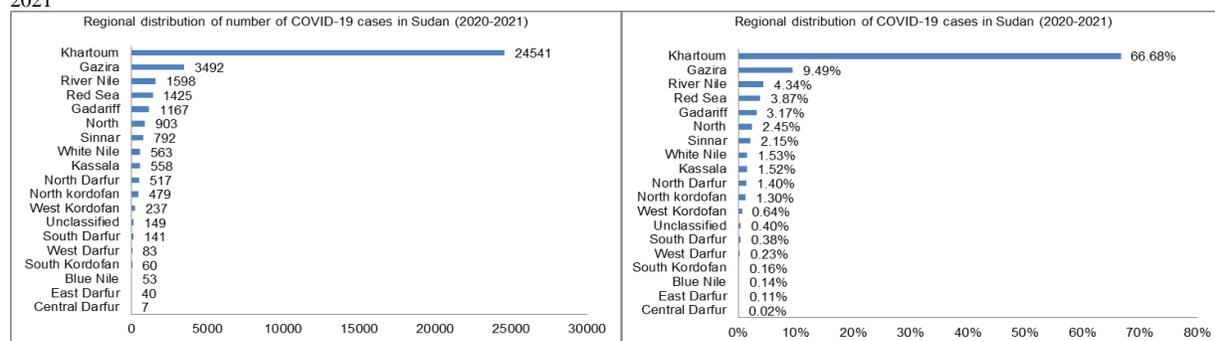
Figure 1- The incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan compared to the Worldwide (as of 5 July 2021)



Source: Sudan Ministry of Health – Sudan Health Observatory (SHO) - COVID-19 Pandemic– (updated: Monday, 05 July 2021): <http://www.sho.gov.sd/controller/> (Access 13 July 2021)

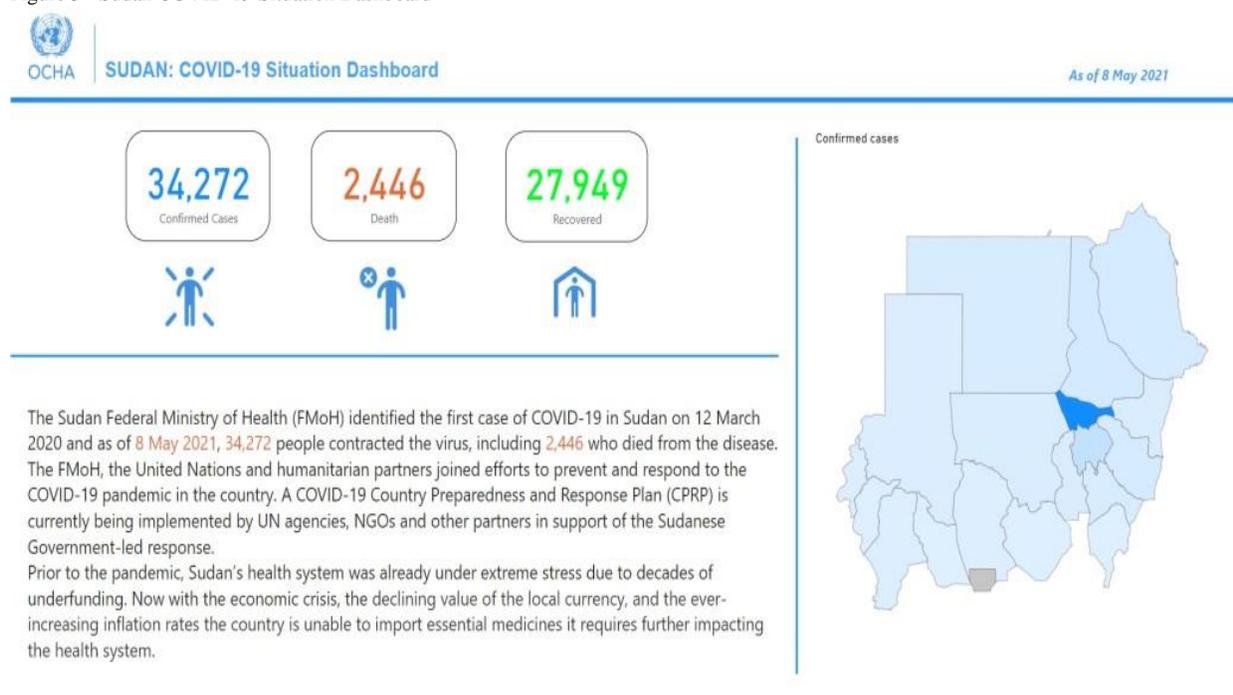
⁴ See Raouf, Elsabbagh, and Wiebelt (2020).

Figure 2- Regional distribution of the spread of Corona Virus Pandemic (COVID-19) defined by the number of COVID-19 cases as of 4 July 2021



Source: Sudan Ministry of Health – Sudan Health Observatory (SHO) - COVID-19 Pandemic – Access 13 July 2021 (<http://www.sho.gov.sd/corona/>, <http://www.sho.gov.sd/corona/uploads/7b03e-4.jpg>)

Figure 3 - Sudan COVID-19 Situation Dashboard



Source: <https://reports.unocha.org/en/country/sudan/#cf-49cURoYa8t7WajAjLYWl4b> (Accessed 29 July 2021)

4. The impact of COVID-19 on households in Sudan (using Household Survey)

4.1. Knowledge Regarding the Spread of COVID-19

The results of the households' survey show high knowledge and awareness about coronavirus and knowledge about the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus (see Table 1). For instance, the majority of households indicate their knowledge and awareness about coronavirus and COVID-19 pandemic (99%), and also the majority of households indicate their knowledge regarding the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus. For instance, the majority of households indicate their knowledge about the measures of hand washing, avoid travel, avoid crowded places or gatherings with many people, staying at home and avoiding going out unless necessary, use of sanitizer, avoiding touching their face, maintain enough distance of at least 1 meter when talking face to-face, no handshake/ physical greetings, use

of mask, use of gloves, and other (including for instance, the use of homemade treatments (e.g. Garadh, Honey)). Knowledge and awareness about coronavirus and knowledge about the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus vary according to gender, educational level and family size. For instance, females show better knowledge compared to males concerning knowledge regarding the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus. Moreover, knowledge about the spread of COVID-19 and measures households taking to prevent gets infected by coronavirus increases with the increase of households' education level, but decreases with the increase of households' family size (see Table 1).⁵

The results also show knowledge of the citizens about the steps the government taken to curb the spread of the coronavirus in households' area and satisfaction with government policies (see Table 2). For instance, from all households' perspectives the most important steps the government taken to curb the spread of the coronavirus in households' area include curfew/lockdown (86.4%), nearly half of the households indicate that the second important step is that citizens are advised to stay at home (43.5%), while, nearly a quarter of the households indicate the step related to closure of schools and universities (25.6%), whereas, nearly fifth of the households indicate the step concerning restricted travel within country/area (19.5%). While, less than fifth of the households indicate that the other steps include disseminate knowledge about the virus, restricted international travel and closure of non essential businesses respectively. Very few of households indicate other steps including building more hospitals or renting hotels to accommodate patients, provide food to needed and open clinics and testing locations respectively (see Table 2). Knowledge about the steps the government taken to curb the spread of the coronavirus in households' area varies according to gender, household educational level, and household family size. For instance, females show better knowledge compared to males concerning knowledge about the steps the government taken to curb the spread of the coronavirus in households' area. In addition, the results imply that knowledge about the steps the government taken to curb the spread of the coronavirus in households' area increases with the increase of household educational level, but decreases with the increase of household family size. All households confirmed that they received information on social distancing and self isolation as a preventive measure against the coronavirus. From the all households' perceptive mean through which they received information on social distancing and self isolation as a preventive measure against the coronavirus through SMS, health care worker, television, newspaper, telephone, Radio, neighbours / family, local authority, NGO worker, Facebook/twitter/social media respectively (see Table 2). Although the majority of the households express their satisfaction with the government's response to the coronavirus crisis (84.8%), but more than tenth of households express their dissatisfaction with the government's response to the coronavirus crisis (15.2%). Females seem to be more satisfied than males regarding the government's response to the coronavirus crisis, i.e. males seem to be more dissatisfied compared to females concerning the government's response to the coronavirus crisis. The most important reasons households not satisfied with government's response to the coronavirus crisis include no financial assistance from the government, late response by government, shortage of medical materials, limited testing points and other respectively (see Table 2). The major policy implications from these results are improvement of government assistance, fast response by government, increase availability and affordability of medical materials and increasing testing points.

⁵ For the purpose of this research we define small size family (1-4), medium size family (5-10), and large size family (11-37).

Table 1-Knowledge about coronavirus, about the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus

	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
Knowledge and awareness about coronavirus	99.60%	98.80%	97.50%	98.40%	95.30%	99.00%	99.70%	99.50%	98.90%	98.00%	99.00%
Hand washing	98.50%	95.50%	91.20%	94.30%	91.80%	96.90%	97.10%	95.70%	96.40%	94.50%	96.10%
Avoid travel	92.40%	86.30%	82.00%	84.10%	81.30%	89.80%	88.50%	87.10%	88.20%	84.20%	87.60%
Avoid crowded places or gatherings with many people	94.30%	85.70%	79.90%	83.90%	77.50%	89.10%	89.50%	88.50%	87.40%	86.00%	87.50%
Staying at home and avoid going out unless necessary	94.50%	85.30%	80.90%	81.40%	80.80%	87.80%	90.00%	87.60%	87.50%	84.70%	87.20%
Use of sanitizer	82.30%	75.20%	59.30%	62.30%	71.40%	76.20%	84.20%	79.10%	77.10%	69.40%	76.70%
Avoiding touching face	82.50%	74.50%	63.90%	68.00%	70.90%	75.90%	81.00%	100.00%	100.00%	100.00%	76.20%
Maintain enough distance of at least 1 meter when talking face to-face	77.10%	69.20%	59.80%	60.00%	66.50%	70.40%	76.50%	73.60%	70.30%	68.90%	70.90%
No Handshake/physical greetings	80.20%	67.50%	66.00%	60.40%	67.00%	68.80%	75.20%	74.80%	70.00%	62.70%	70.20%
Use of mask	74.50%	68.30%	56.20%	57.90%	61.00%	72.20%	73.80%	68.60%	70.30%	66.90%	69.60%
Use of gloves	56.50%	49.30%	44.30%	37.50%	47.80%	48.90%	57.60%	51.90%	51.20%	46.40%	50.90%
Other (specify)											
Drink natural Juices	42.10%	30.00%	0.00%	0.00%	100.00%	30.80%	36.40%	36.40%	29.40%	75.00%	34.70%
Homemade treatments (Garadh, Honey.)	21.10%	30.00%	0.00%	100.00%	0.00%	46.20%	15.20%	9.10%	32.40%	25.00%	26.50%
Follow all health instructions	0.00%	20.00%	0.00%	0.00%	0.00%	7.70%	15.20%	36.40%	5.90%	0.00%	12.20%
Use sanitizers in cleaning the house	15.80%	10.00%	0.00%	0.00%	0.00%	7.70%	15.20%	9.10%	14.70%	0.00%	12.20%
Have Vitamins C	15.80%	6.70%	0.00%	0.00%	0.00%	7.70%	12.10%	9.10%	11.80%	0.00%	10.20%
Warm drink	5.30%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%	2.90%	0.00%	2.00%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

Table 2- The steps the government taken to curb the spread of the coronavirus in households' area and satisfaction with government policies

	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
Curfew/lockdown	88.80%	85.80%	82.90%	85.40%	84.80%	86.20%	87.50%	87.10%	85.90%	88.90%	86.40%
Advised citizens to stay at home	43.20%	43.60%	37.70%	36.00%	37.70%	41.30%	49.00%	45.30%	43.40%	40.30%	43.50%
Closure of schools and universities	26.90%	25.30%	19.60%	20.60%	14.70%	22.70%	31.50%	26.50%	25.50%	25.10%	25.60%
Restricted travel within country/area	20.70%	19.20%	12.10%	16.00%	8.90%	19.50%	22.70%	21.70%	18.70%	20.90%	19.50%
Disseminate knowledge about the virus	16.50%	15.50%	8.00%	14.60%	11.50%	17.60%	16.10%	15.00%	16.10%	15.20%	15.70%
Restricted international travel	13.70%	13.10%	8.00%	11.10%	6.80%	13.00%	15.30%	14.60%	13.00%	11.50%	13.20%
Closure of non essential businesses	12.20%	13.60%	9.00%	14.80%	7.90%	15.90%	11.90%	11.80%	13.70%	13.00%	13.30%
Other, specify	4.10%	3.00%	1.50%	2.80%	1.60%	2.90%	4.00%	1.80%	3.60%	3.40%	3.20%
Building more hospitals or renting hotels to accommodate patients	1.30%	0.90%	1.00%	1.10%	0.50%	0.20%	1.70%	1.20%	1.10%	0.20%	1.00%
Provide food to needed	0.70%	0.60%	0.50%	1.10%	0.00%	0.50%	0.60%	1.20%	0.40%	1.20%	0.60%
Open clinics and testing locations	0.40%	0.40%	0.50%	0.40%	0.00%	0.20%	0.60%	0.60%	0.30%	0.20%	0.40%
Noting	3.30%	4.30%	5.50%	3.30%	2.60%	4.00%	4.50%	4.00%	4.10%	4.40%	4.10%
Received information on social distancing and self isolation as a preventive measure against the coronavirus	87.20%	83.50%	69.80%	81.00%	77.50%	83.80%	86.20%	100.00%	100.00%	100.00%	100.00%
SMS	68.20%	64.60%	52.50%	57.70%	69.60%	63.90%	69.60%	68.80%	64.60%	63.60%	65.40%
Health care worker	37.50%	38.50%	7.20%	18.00%	20.90%	30.60%	54.70%	41.10%	37.50%	37.90%	38.30%
Television	35.20%	38.50%	59.70%	46.40%	41.20%	38.50%	32.20%	35.50%	37.50%	44.70%	37.80%
Newspaper	28.90%	35.30%	29.50%	34.30%	28.40%	36.30%	33.00%	31.30%	34.70%	34.30%	33.90%
Phone number	14.40%	17.30%	10.80%	13.90%	10.80%	16.20%	18.90%	16.20%	16.90%	15.70%	16.70%
Radio	9.90%	12.30%	5.80%	6.50%	14.20%	13.20%	12.60%	12.00%	11.50%	13.30%	11.80%
Neighbours / family	4.50%	6.40%	6.50%	8.00%	6.10%	7.30%	4.40%	4.10%	6.30%	7.70%	6.00%

Local authority	3.80%	6.00%	5.00%	7.80%	4.10%	6.10%	4.60%	5.60%	5.70%	4.10%	5.50%
NGO worker	4.80%	4.60%	1.40%	2.80%	3.40%	3.20%	6.70%	5.70%	4.80%	1.50%	4.70%
Facebook/twitter/social media	1.50%	2.20%	1.40%	2.00%	1.40%	1.50%	2.50%	3.00%	1.80%	1.50%	2.00%
Faith based healer	1.20%	0.80%	1.40%	0.40%	0.70%	0.70%	1.10%	1.10%	0.70%	1.50%	0.90%
Other outreach	0.50%	0.60%	0.00%	0.20%	0.00%	0.50%	0.90%	1.00%	0.50%	0.30%	0.60%
Traditional healer/ pastor/ faith based healer	0.10%	0.20%	0.00%	0.40%	0.00%	0.30%	0.10%	0.40%	0.20%	0.00%	0.20%
Other (awareness)	100.00%	90.50%	100.00%	100.00%	100.00%	100.00%	88.20%	87.50%	94.10%	100.00%	93.30%
Households satisfaction with the government's response to the coronavirus crisis	88.20%	83.90%	86.40%	84.50%	80.60%	84.10%	83.20%	85.20%	84.50%	86.00%	84.80%
Households dissatisfaction with the government's response to the coronavirus crisis	11.80%	16.10%	13.60%	15.50%	19.40%	15.90%	16.80%	14.80%	15.50%	14.00%	15.20%
Reasons households not satisfied with government's response to the coronavirus crisis											
No financial assistance from the government	51.50%	58.10%	76.20%	74.30%	64.30%	57.70%	49.50%	59.20%	56.90%	56.70%	57.00%
Late response by government	32.30%	23.50%	4.80%	21.60%	21.40%	26.80%	26.70%	22.50%	25.40%	25.10%	25.00%
Shortage of medical materials	17.20%	10.30%	4.80%	4.10%	10.70%	13.90%	12.30%	12.50%	11.00%	11.50%	11.40%
Limited testing points	3.00%	3.60%	9.50%	5.40%	7.10%	1.50%	3.50%	3.30%	3.30%	3.60%	3.50%
Other, specify	19.20%	23.70%	23.80%	12.20%	7.10%	23.20%	27.40%	20.00%	24.00%	22.80%	23.00%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.2. Households' behaviour and social distancing

The households' behaviour shows the households' commitment to the social distancing (see Table 3). For instance, the most important households' behaviour that explains households' commitment to the social distancing include washing hands with soap more often than used to (89.5%), in addition to avoiding groups of more than 10 people such as family gatherings, parties, church / mosque, funerals, etc., reduce the number of times go to the market/ grocery store because of coronavirus, avoid handshakes/ physical greetings, wear facemask everytime went out of house, cancel travel plans since mid-March 2020, and stock up on more food than normal because of coronavirus respectively (see Table 3). Household's behaviour and commitment to social distancing vary according to gender, household educational level, and household family size. For instance, females are more committed compared to males concerning commitment to social distancing, in addition, commitment to the social distancing increases with the increase of household educational level, but decreases with the increase of household family size (see Table 3).

The reasons that nearly third of households did not wear facemask everytime they went out of their houses (32.5%): because they indicate that facemask are unavailable/out of stock, increase in price of facemask, households can't breathe when wearing facemask, and lack of money respectively. The other reasons because some of the households believe that they don't need facemask, while, other believe that there is no coronavirus in Sudan, coronavirus rates has declined, there are no coronavirus cases in household's area, uncomfortable in wearing facemask, facemask doesn't prevent infection, facemask causes allergy, and facemask should be used by infected people respectively (see Table 3). Based on these results, the suggested public health measures to enhance commitment to social distancing measures in Sudan include encouraging the use of face mask by increasing availability and affordability of face mask at reasonable price, increasing awareness about the spread of COVID-19 in Sudan and increasing awareness about the importance of wearing face mask everytime went out of houses and in public places to prevent infection.

The results in this section provide answer to part of Q 5. regarding the effective and commitment of households to social distancing measures in Sudan and the differences according to households characteristics (gender, education, and family size), and suggested public health measures to enhance commitment to social distancing in Sudan.

Table 3- Households behaviour and commitment to social distancing in Sudan 2020

During the last 7 days	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
Wash hands with soap more often than used to	92.00%	88.80%	82.10%	88.20%	88.90%	89.40%	90.80%	90.50%	89.40%	88.00%	89.50%
Avoid groups of more than 10 people such as family gatherings, parties, church / mosque, funerals, etc.	82.50%	74.40%	65.30%	71.20%	74.30%	78.60%	77.20%	80.20%	76.10%	67.70%	76.10%
Reduce the number of times go to the market/grocery store because of coronavirus	82.20%	72.60%	64.30%	69.10%	68.60%	76.40%	76.90%	75.40%	74.40%	74.40%	74.60%
Avoid handshakes/ physical greetings	80.10%	66.00%	57.90%	61.10%	69.50%	66.80%	74.20%	73.80%	68.50%	62.20%	68.90%
Wear facemask everytime went out of house	75.90%	65.30%	54.30%	57.50%	58.90%	69.10%	71.90%	69.70%	67.40%	63.50%	67.50%
Cancel travel plans since mid-March 2020	58.50%	59.10%	52.50%	52.50%	67.00%	60.10%	60.10%	56.70%	59.70%	58.00%	58.90%
Stock up on more food than normal because of coronavirus	34.80%	28.70%	20.60%	24.60%	28.80%	28.80%	33.90%	31.90%	29.60%	29.00%	30.00%
The reasons some households did not wear facemask everytime they went out of their houses											
Unavailable/out of stock	51.10%	44.50%	52.90%	44.80%	44.00%	45.50%	44.70%	41.00%	47.10%	42.70%	45.40%
Increase in price	17.20%	17.60%	10.30%	13.50%	30.70%	14.80%	21.00%	17.90%	17.20%	18.90%	17.50%
Can't breath	4.40%	11.60%	1.10%	10.40%	12.00%	11.70%	11.30%	13.50%	10.60%	5.60%	10.60%
Lack of money	1.10%	1.60%	5.70%	3.00%	1.30%	1.00%	0.40%	0.90%	1.60%	2.10%	1.50%
Other	26.10%	24.70%	29.90%	28.30%	12.00%	27.00%	22.60%	26.60%	23.50%	30.80%	24.90%
Other (specify)											
I don't need it	76.60%	69.50%	84.60%	70.80%	66.70%	66.30%	72.10%	75.40%	72.50%	54.50%	70.60%
There is no coronavirus in Sudan	4.30%	9.90%	7.70%	13.80%	22.20%	8.70%	4.80%	9.80%	6.40%	20.50%	9.10%
No reasons	8.50%	7.60%	3.80%	6.20%	0.00%	14.40%	3.80%	6.60%	7.80%	9.10%	7.80%
Coronavirus rates has declined	8.50%	1.50%	0.00%	3.10%	0.00%	0.00%	5.80%	1.60%	3.40%	0.00%	2.60%
There are no coronavirus cases in household's area	0.00%	3.10%	0.00%	3.10%	0.00%	1.90%	3.80%	1.60%	1.00%	11.40%	2.60%
Uncomfortable in wearing	0.00%	3.10%	0.00%	1.50%	11.10%	2.90%	2.90%	1.60%	3.40%	0.00%	2.60%
It doesn't prevent infection	0.00%	3.10%	3.80%	1.50%	0.00%	1.90%	3.80%	1.60%	2.90%	2.30%	2.60%
It causes allergy	0.00%	1.50%	0.00%	0.00%	0.00%	2.90%	1.00%	1.60%	1.00%	2.30%	1.30%
It should be used by infected people	2.10%	0.80%	0.00%	0.00%	0.00%	1.00%	1.90%	0.00%	1.50%	0.00%	1.00%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.3. Impact of COVID-19 on access to medicine, health services, and impact on the households' mental health

The impact of COVID-19 appears from the effects on household's access to medicine, health services, and impact on the households' mental health (see Table 4). For instance, more than a quarter of households indicate that they are unable to buy Medicine (26.6%), nearly fifth of households indicate their need for medical treatment since mid-March 2020 (18%), and nearly a quarter of households indicate that they are not able to access a health facility (23.4%). The inability to buy Medicine, the need for medical treatment, and inability to access health services vary according to gender and family size. For instance, the inability to buy Medicine and the need for medical treatment increases with the increase of family size, the inability to buy Medicine for males is higher than females, the need for medical treatment and the inability to access health services for females is higher than males. The reasons households were not able to buy Medicine because Medicine are unavailable/out of stock, increase in price, local

pharmacies closed, lack of money and restriction to go outside. The reasons households not able to access health services/ facilities because no medical personnel available, lack of money, restriction to go outside, afraid of going and getting the virus, turned away because facility was full, limited/no transportation and other reasons respectively (see Table 4). The major policy implications from these results are the improvement of access to health facilities by increasing availability of medical personnel, improvement of medical and health facilities and infrastructure, and improvement of availability and affordability of medicine and medical treatment and at reasonable prices.

The impact of COVID-19 on household also appears from the effects on the households mental health demonstrated from households feeling about their life has gone and or in the past four weeks, households feeling fear and stress, feeling worried and feeling a substantial or a moderate threat due to the coronavirus outbreak (see Table 4).⁶ For instance, although the majority of households feeling better (93.1%), the other and more than tenth of the households believe that they will live much worse or somewhat worse 12.7%, females (12.8%) more than males (12.7%) believe that they will live much worse or somewhat worse, large size family (13.3%) more than medium size family (12.7%), and small size family (12.4%) believe that they will live much worse or somewhat worse. Some of household and family (78.5%), females (79.5%) and males (78.2%) feeling about their life has gone during and or in the past 4 weeks (see Table 4). Few of the households indicate dissatisfaction (not satisfied) with their life in general at the present time (3.2%). The dissatisfaction (not satisfied) with life in general at the present time varies with gender, education level and family size. For instance, the dissatisfaction (not satisfied) with life in general at the present time for males (6.8%) is higher than females (5.2%). The dissatisfaction (not satisfied) with life in general at the present time increases with the increase of family size, for instance, the dissatisfaction (not satisfied) with life in general at the present time for large size family (4.3%) is higher than medium size family (3.5%) and small size family (2%) respectively (see Table 4). The majority of household feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus (81.8%). The feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus vary with gender, education level and family size. For instance, the feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus for females (86.4%) is higher than males (80.6%). Moreover, feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus decreases with the increase of family size, for instance, the feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus for small size family (85.3%) is higher than medium size family (81.7%) and large size family (75.4%) respectively (see Table 4). The majority of household feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances (81.9%). The feeling a substantial or a

⁶ According to the World Health Organization fear, worry, and stress are normal responses to perceived or real threats, and at times when [people around the world] are faced with uncertainty or the unknown. So it is normal and understandable that people are experiencing fear in the context of the COVID-19 pandemic. Added to the fear of contracting the virus in a pandemic such as COVID-19 are the significant changes to [people's] daily lives as [people] movements are restricted in support of efforts to contain and slow down the spread of the virus. Faced with new realities of working from home, temporary unemployment, home-schooling of children, and lack of physical contact with other family members, friends and colleagues, it is important that [people around the world] look after their mental, as well as their physical, health. See the World Health Organization 'Mental health and COVID-19': <https://www.who.int/teams/mental-health-and-substance-use/covid-19> (Access July 02, 2021).

moderate threat would the coronavirus outbreak to household's finances vary with gender, education level and family size. For instance, the feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances for females (93.6%) is higher than males (91.3%). Moreover, feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances increases with the increase of family size, for instance, feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances for large size family (93.2%), is higher than medium size family (91.8%), and small size family (91.1%) respectively (see Table 4).

4.4. Impact of COVID-19 on education, education services, and access to internet services at home

The impact of COVID-19 on education appears from the serious effects on limiting the access to education, for instance, although the majority and more than half of households indicate that boys/girls attending school before schools closed in mid-March 2020 (59.6%), and the majority and more than half of households indicate that household's children attended school before schools closed in mid-March 2020 (60.5%), however, only few of households indicate that children engaged in any education or learning activities during the last seven days (12%). The impacts of COVID-19 on education also appears from the types of education or learning activities the children have been engaged during the last seven days, for instance, only few of children completed assignments provided by the teacher (5.5%), session/meeting with lesson teacher (tutor), watched educational TV programs, used mobile learning applications respectively. It is observed that listened to educational programs on radio was suggested by the Ministry of education as a substitute channel to after the schools closed, but finally this channel was not implemented. Only few of children or other in household remained in contact with teachers (4%), concerning the means for contacting children's teacher, the majority of children or other in household in contact with their teachers through telephone (audio) (84.4%), while, few and less than tenth of children or other in household in contact with their teachers through WhatsApp (8.3%), and very few use Facebook (1%), use SMS (0.1%), use online applications (0.2%), and other. Somewhat surprising that Email and Mail were not at all used by any of household children. This implies the use but only limited use of ICT to facilitate access to education during the lockdown period in Sudan.

The limitation on online education is not surprising in view of the well documented limitation on access to ICT and also the limitation on access to electricity. The impact of COVID-19 appears from the effects on household's access to Internet services (see Table 5). For instance, although the majority of households indicate that they have access to internet at home (74.5%), however, more than a quarter of households indicate that they do not have access to internet at home (25.5%). Access to Internet at home varies according to gender, education level and household family size. For instance, the majority of males (74.7%) more than females (73.8%) indicate that they have access to Internet at home. Access to Internet at home increases with the increase of educational level, and access to Internet at home for large size family (76.7%) is higher than small size family (74.4%) and medium size family (74.2%) respectively (see Table 5). The lack of access to Internet at home for females (26.2%) is higher than for males (25.3%), this implies the incidence of the gender digital divide during the lock down period. The lack of access to Internet at home increases with the decrease of educational level, The lack of access to Internet at home for medium size family (25.8%) is higher than small size family (25.6%) and large size family (23.3%) respectively, this implies

the incidence of the digital divide during the lock down period (See Table 5). The impact of COVID-19 on household also appears from the effects on the households' welfare measured by the ownership of Laptop/Desktop Computer/Tablet and access to Internet and access to electricity. Less than tenth of households (9.1%), females (9.9%) and males (8.8%) indicate they have ownership of Laptop/Desktop Computer/Tablet; the ownership of Laptop/Desktop Computer/Tablet for females (9.9%) is more than males (8.8%). Medium size family (9.2%), more than large size family (9.1%), and small size family (8.5%) indicate that they have ownership of Laptop/Desktop Computer/Tablet (see Table 5). The majority of household and family (81.3%), females (79.9%) and males (81.7%) indicate that they have access to electricity (see Table 5). Access to electricity varies according to gender, education level and household family size. For instance, the majority of males (81.7%) more than females (79.9%) indicate that they have access to electricity. access to electricity decreases with the increase of family size, for instance, the reported access to electricity for small size family (85.4%) is more than medium size family (81.1%) and large size family (74.4%) respectively. (See Table 5)

4.5. Impact of COVID-19 on access to financial services

The impact of COVID-19 appears from the effects on financial services (see Table 5). Regarding access to financial services, although the majority of households indicate their need for using financial services (bank, money agent, ATM) (86.4%) and their successful access to financial services (80.4%), while, nearly fifth of households indicate that they were not able to access financial services (19.6%). The reasons that households were not able to access financial services because households afraid to go out because of coronavirus, bank was closed, movement restriction, other reasons (include bank is crowded, issue in ATM, non availability of network, non availability of cash, and non availability of electricity) respectively. (See Table 5)

The results in this section provide answer to Q7 regarding the impact of COVID-19 been on health (healthcare system, health services) and impacts on education and higher education in Sudan. The results in this section give answer to part of Q 10 regarding the potential opportunities and challenges for the use of ICT and digital solutions in education and higher education in Sudan to manage the impact of COVID-19. The major policy implication from this result is that although the use of ICT and digital solutions provides potential opportunities to manage the impact of COVID-19 in education and higher education in Sudan, but the lack of access to ICT and digital solutions implies potential challenges related not only to the limited use of ICT and digital solutions in education and higher education in Sudan, but also possibility of widening digital disparities in access to education and higher education in Sudan.

Table 4- Impact of COVID-19 on access to Medicine, health services, and household mental health

During the last 7 days	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
A. Access to Medicine											
Unable to buy Medicine	26.20%	26.70%	18.60%	22.10%	33.00%	25.20%	29.30%	26.20%	26.30%	29.20%	26.60%
1b Reasons household not able to buy Medicine											
Unavailable/out of stock	63.50%	66.90%	48.60%	54.00%	64.50%	70.40%	67.90%	65.90%	67.50%	58.80%	66.20%
Increase in price	20.70%	21.10%	18.90%	26.20%	24.20%	19.00%	20.80%	16.40%	20.90%	30.30%	21.00%
Local pharmacies closed	10.80%	8.40%	13.50%	11.90%	4.80%	6.60%	9.70%	15.00%	7.20%	8.40%	8.90%
Lack of money	5.00%	3.10%	18.90%	6.30%	4.80%	3.60%	1.40%	2.30%	4.10%	1.70%	3.50%
Restriction to go outside	0.00%	0.60%	0.00%	1.60%	1.60%	0.30%	0.20%	0.50%	0.40%	0.80%	0.50%
B. Access to health services											
Need for medical treatment since mid-March 2020	21.70%	17.00%	13.10%	16.20%	16.80%	19.10%	18.50%	15.10%	18.30%	21.90%	18.00%

Not able to access a health facility	23.90%	23.30%	30.80%	16.30%	34.40%	19.60%	26.50%	26.00%	23.80%	18.00%	23.40%
5. Reasons household or family members were not able to access a health facility											
No medical personnel available	59.10%	57.90%	25.00%	46.70%	63.60%	63.30%	59.30%	59.40%	58.20%	56.30%	58.20%
Lack of money	6.80%	11.90%	37.50%	20.00%	18.20%	4.10%	9.30%	12.50%	9.00%	18.80%	10.60%
Restriction to go outside	6.80%	8.70%	12.50%	13.30%	9.10%	10.20%	5.80%	12.50%	8.20%	0.00%	8.20%
Afraid of going and getting the virus	11.40%	6.30%	0.00%	6.70%	0.00%	10.20%	8.10%	9.40%	7.40%	6.30%	7.60%
Turned away because facility was full	9.10%	4.80%	12.50%	0.00%	0.00%	6.10%	7.00%	0.00%	6.60%	12.50%	5.90%
Limited/no transportation	2.30%	5.60%	0.00%	13.30%	9.10%	2.00%	4.70%	3.10%	5.70%	0.00%	4.70%
Other (specify)	4.50%	4.80%	12.50%	0.00%	0.00%	4.10%	5.80%	3.10%	4.90%	6.30%	4.70%
Household mental health: perception about the status of household family in the next 3 months you and your family will be better than today or worse											
Don't Know	17.2%	16.9%	29.1%	21.3%	21.1%	20.2%	11.3%	14.7%	17.7%	16.0%	16.9%
Will live much better	45.3%	45.1%	34.7%	44.5%	31.6%	40.3%	51.5%	46.6%	45.0%	43.0%	45.1%
Will live much worse	4.0%	3.9%	2.5%	5.3%	4.7%	3.7%	3.6%	3.3%	4.2%	3.2%	3.9%
Nothing will change	4.7%	4.6%	5.5%	4.9%	8.9%	4.4%	4.1%	4.9%	4.4%	5.4%	4.6%
Will live somewhat better	20.1%	20.7%	19.6%	17.0%	28.4%	21.5%	20.6%	21.3%	20.2%	22.4%	20.7%
Will live somewhat worse	8.8%	8.8%	8.5%	7.0%	5.3%	9.8%	8.9%	9.1%	8.5%	10.1%	8.8%
Will live much worse or somewhat worse	12.80%	12.70%	11.00%	12.30%	10.00%	13.50%	12.50%	12.40%	12.70%	13.30%	12.70%
Feeling about life has gone in the past 4 weeks	79.50%	78.20%	65.30%	73.80%	70.00%	75.40%	84.60%	80.40%	77.90%	78.60%	78.50%
Not satisfied with life in general at the present time	5.20%	6.80%	5.00%	9.10%	7.90%	6.70%	5.50%	2.00%	3.50%	4.30%	3.20%
Worried about the possibility of becoming seriously ill from coronavirus	86.40%	80.60%	71.90%	74.80%	85.90%	80.10%	86.00%	85.30%	81.70%	75.40%	81.80%
Substantial or moderate threat of the coronavirus outbreak to household's finances	93.60%	91.30%	91.40%	92.50%	93.10%	92.30%	91.10%	91.10%	91.80%	93.20%	91.80%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

Table 5- Impact of COVID-19 on access to education services, internet services, electricity, and financial services

C. Access to education services											
	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
Boys/girls attending school before schools closed in mid-March 2020	60.60%	59.70%	38.70%	33.60%	34.00%	37.20%	45.00%	21.70%	67.40%	84.50%	59.90%
Children engaged in any education or learning activities during the last 7 days	11.80%	12.10%	12.30%	8.90%	18.10%	8.80%	15.10%	10.50%	12.30%	11.00%	12.00%
Household's children attended school before schools closed in mid-March 2020	61.00%	60.40%	61.30%	66.50%	66.50%	63.30%	55.80%	22.20%	68.10%	84.50%	60.50%
Types of education or learning activities the children have been engaged during the last seven days											
Completed assignments provided by the teacher	5.40%	5.60%	7.00%	4.60%	11.00%	4.00%	6.20%	2.10%	6.40%	6.60%	5.50%
Session/meeting with Lesson Teacher (tutor)	0.70%	0.80%	0.50%	0.50%	1.00%	0.50%	1.00%	0.00%	0.80%	2.20%	0.80%
Watched educational TV programs	0.70%	0.30%	0.00%	0.20%	1.00%	0.50%	0.30%	0.00%	0.50%	0.00%	0.40%
Used mobile learning apps	0.20%	0.20%	0.00%	0.00%	0.00%	0.10%	0.30%	0.10%	0.20%	0.20%	0.20%
Listened to educational programs on radio	0.00%	0.10%	0.00%	0.00%	0.00%	0.10%	0.10%	0.00%	0.10%	0.00%	0.00%
Other (specify)	0.40%	0.70%	0.00%	0.70%	0.00%	0.50%	0.80%	0.10%	0.70%	0.70%	0.60%
Children or other in household in contact with their teachers	2.70%	4.30%	3.30%	2.60%	5.60%	3.40%	4.80%	3.90%	4.20%	2.60%	4.00%

Children or others in household been in contact with their teachers during the last seven days through											
Telephone (audio)	57.10%	89.00%	100.00%	100.00%	85.70%	89.30%	76.60%	76.50%	86.30%	84.30%	84.40%
WhatsApp	21.40%	6.10%	0.00%	0.00%	0.00%	3.60%	14.90%	5.90%	6.80%	9.80%	8.30%
Facebook	0.00%	1.20%	0.00%	0.00%	0.00%	0.00%	2.10%	0.00%	1.40%	1.00%	1.00%
SMS	0.10%	0.10%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%	0.10%	0.00%	0.10%
Online applications	0.50%	0.10%	0.00%	0.00%	0.50%	0.20%	0.20%	0.10%	0.20%	0.20%	0.20%
Email											
Mail											
Other (specify)	14.30%	4.90%	0.00%	0.00%	0.00%	7.10%	8.50%	11.80%	5.50%	5.90%	6.30%
D. Access to internet services at household home, household or household family have ownership of Laptop/Desktop computer/Tablet, and access to electricity											
Access to internet at home	73.80%	74.70%	38.70%	56.20%	59.70%	70.80%	88.80%	74.40%	74.20%	76.70%	74.50%
No access to internet at home	26.20%	25.30%	61.30%	43.80%	40.30%	29.20%	11.20%	25.60%	25.80%	23.30%	25.50%
Laptop/Desktop computer/Tablet	9.90%	8.80%	0.50%	2.10%	5.20%	7.30%	14.00%	8.50%	9.20%	9.10%	9.10%
Electricity	79.90%	81.70%	57.30%	67.30%	85.30%	80.70%	88.50%	85.40%	81.10%	74.40%	81.30%
E. Access to financial services											
Need for using financial services (bank, money agent, ATM)	14.30%	15.70%	2.50%	8.10%	11.00%	15.00%	20.10%	86.20%	86.60%	88.30%	86.70%
Successful access to financial services	78.50%	80.80%	2.50%	6.90%	8.90%	12.10%	16.00%	77.90%	81.40%	77.80%	80.40%
Reasons for households not able to access financial services											
Afraid to go out because of coronavirus	7.70%	6.30%	0.00%	0.00%	0.00%	2.60%	9.60%	6.90%	7.40%	0.00%	6.60%
Bank was closed	65.40%	46.90%	0.00%	71.40%	50.00%	50.00%	49.30%	51.70%	49.40%	58.30%	50.80%
Movement restriction	26.90%	30.20%	0.00%	28.60%	50.00%	31.60%	27.40%	20.70%	33.30%	25.00%	29.50%
Other (specify)	0.00%	16.70%	0.00%	0.00%	0.00%	15.80%	13.70%	20.70%	9.90%	16.70%	13.10%
Bank is crowded	0.00%	43.80%	0.00%	0.00%	0.00%	50.00%	40.00%	33.30%	37.50%	100.00%	43.80%
Issue in ATM	0.00%	6.30%	0.00%	0.00%	0.00%	16.70%	0.00%	0.00%	12.50%	0.00%	6.30%
Network not available	0.00%	31.30%	0.00%	0.00%	0.00%	16.70%	40.00%	50.00%	25.00%	0.00%	31.30%
No cash available	0.00%	12.50%	0.00%	0.00%	0.00%	16.70%	10.00%	0.00%	25.00%	0.00%	12.50%
No electricity	0.00%	6.30%	0.00%	0.00%	0.00%	0.00%	10.00%	16.70%	0.00%	0.00%	6.30%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.6. Impact of COVID-19 on access to food and impact on the incidence of food insecurity

The impact of COVID-19 on the incidence of food insecurity is demonstrated from food insecurity experience scale during the last 30 days that implies that the households or household family were worried about the incidence of food insecurity (see Table 5). For instance, during the last 30 days nearly half of households or household family were worried about not having enough food to eat because of lack of money or other resources (42.3%), more than third of households or household family were unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources (36%), and more than a quarter of households or household family ate only a few kinds of foods because of a lack of money or other resources (28.4%). Moreover, nearly fifth of households or household family had to skip a meal because there was not enough money or other resources to get food (18.7%), nearly fifth of households or household family ate less than thought because of a lack of money or other resources (17.5%), nearly tenth of households or household family were hungry but did not eat because there was not enough money or other resources for food (9.4%), nearly tenth of households or household family ran out of food because of a lack of money or other resources (8.8%), and finally, nearly tenth of households or household family went without eating for a whole day because of a lack of money or other resources (6.3%). (See Table 6)

The incidence of food insecurity varies according to gender, household educational level and household family size. For instance, females are more food insecure compared to males concerning food insecurity experience scale during

the last 30 days. In addition, the incidence of food insecurity and food insecurity experience scale during the last 30 days increases with the increase of household family size, but decreases with the increase of household educational level (see Table 5). The impact of COVID-19 on the incidence of food insecurity also appears from the reported lack of access to food, for instance, nearly third of households were unable to buy Food Staple 1 (29.9%), nearly a quarter of households were unable to buy Food Staple 2 (24.6%), and nearly fifth of households were unable to buy Food Staple 3 (16.7%). The reasons households not able to buy food (Food Staple 1, Food Staple 2, Food Staple 3) mainly because of increase in price (59.1%, 75.2%, 74.1%), and also because unavailable/out of stock (31.2%, 12.1%, 10.4%), lack of money (5.7%, 9.5%, 10.4%), local markets/shops closed (3.2%, 2.5%, 4.8%), and restriction to go outside (0.7%, 0.7%, 0.3%) respectively (see Table 6). The major policy implications from these results are improvement of government assistance, and increase availability and affordability of food at reasonable prices. The results in this section provide answer to Q. 6 regarding the impact of COVID-19 on food security/insecurity, mainly, on intensifying the incidence and severity of food insecurity in Sudan. Due to lack of relevant information, it is somewhat difficult to assess the effectiveness of policy responses to eliminate food insecurity in Sudan.

Table 6- Impact of COVID-19 on access to food and food insecurity

A. Food insecurity experience scale: during the last 30 days, was the household or any other adult in household family were											
During the last seven days	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
1. Worried about not having enough food to eat because of lack of money or other resources	46.30%	41.20%	52.80%	52.00%	39.80%	45.50%	35.80%	39.70%	42.20%	48.00%	42.30%
2. Unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources	40.90%	34.70%	49.00%	46.60%	34.60%	37.70%	29.90%	31.70%	36.00%	44.20%	36.00%
3. Ate only a few kinds of foods because of a lack of money or other resources	31.00%	27.70%	41.70%	36.90%	26.30%	30.80%	22.40%	24.10%	28.10%	38.40%	28.40%
4. Had to skip a meal because there was not enough money or other resources to get food	22.10%	17.80%	32.70%	27.20%	17.90%	18.90%	14.30%	15.00%	18.60%	26.80%	18.70%
5. Ate less than thought because of a lack of money or other resources	20.70%	16.70%	28.10%	22.70%	17.80%	19.80%	12.90%	13.30%	17.70%	24.40%	17.50%
6. Ran out of food because of a lack of money or other resources	10.40%	8.30%	15.60%	12.70%	12.10%	8.00%	7.00%	9.00%	8.30%	11.60%	8.80%
7. Hungry but did not eat because there was not enough money or other resources for food	10.50%	9.10%	15.10%	13.90%	13.70%	9.60%	6.60%	7.90%	9.30%	12.60%	9.40%
8. Went without eating for a whole day because of a lack of money or other resources	7.30%	6.10%	12.10%	8.80%	9.40%	5.60%	5.10%	5.70%	6.10%	9.40%	6.30%
B. Access to food and food security during the last 7 days: access to staple foods											
Unable to buy Food											

Unable to buy Food Staple 1	28.60%	30.30%	32.20%	28.60%	43.50%	28.10%	29.90%	29.00%	29.60%	33.90%	29.90%
Unable to buy Food Staple 2	26.30%	24.20%	29.60%	26.00%	38.20%	25.00%	21.80%	23.90%	24.60%	25.90%	24.60%
Unable to buy Food Staple 3	18.10%	16.30%	22.10%	17.40%	35.30%	16.10%	14.30%	16.90%	16.70%	16.50%	16.70%
Reasons household not able to buy Food											
Reasons household not able to buy Food Staple 1											
Increase in price	57.40%	59.50%	54.70%	58.90%	67.50%	55.30%	61.30%	58.20%	57.20%	71.70%	59.10%
Unavailable/out of stock	32.60%	30.80%	25.00%	26.40%	20.50%	36.00%	31.70%	33.30%	32.30%	21.00%	31.20%
Lack of money	5.00%	5.90%	15.60%	6.70%	7.20%	6.30%	3.60%	5.90%	6.00%	3.60%	5.70%
Local markets/shops closed	5.00%	2.80%	4.70%	5.50%	1.20%	2.20%	3.40%	1.70%	3.90%	2.20%	3.20%
Restriction to go outside	0.00%	0.90%	0.00%	2.50%	3.60%	0.30%	0.00%	0.80%	0.60%	1.40%	0.70%
Reasons household not able to buy Food Staple 2											
Increase in price	74.40%	75.40%	54.20%	72.30%	82.20%	69.20%	83.50%	75.90%	75.30%	73.30%	75.20%
Unavailable/out of stock	13.00%	11.80%	11.90%	14.20%	5.50%	15.90%	9.20%	8.20%	13.40%	10.50%	12.10%
Lack of money	9.90%	9.40%	28.80%	8.80%	6.80%	11.60%	5.50%	11.80%	8.40%	12.40%	9.50%
Local markets/shops closed	2.20%	2.60%	3.40%	3.40%	4.10%	2.70%	1.60%	3.60%	2.30%	1.90%	2.50%
Restriction to go outside	0.40%	0.80%	1.70%	1.40%	1.40%	0.60%	0.30%	0.50%	0.60%	1.90%	0.70%
Reasons household not able to buy Food Staple 3											
Increase in price	77.10%	73.20%	56.80%	69.70%	76.10%	69.00%	82.80%	76.80%	73.40%	73.10%	74.10%
Unavailable/out of stock	8.50%	11.00%	9.10%	11.10%	7.50%	13.30%	8.40%	9.40%	10.10%	14.90%	10.40%
Lack of money	9.20%	10.80%	27.30%	12.10%	14.90%	12.90%	3.60%	8.70%	11.20%	9.00%	10.40%
Local markets/shops closed	5.20%	4.60%	6.80%	6.10%	0.00%	4.80%	5.20%	4.30%	5.40%	1.50%	4.80%
Restriction to go outside	0.00%	0.40%	0.00%	1.00%	1.50%	0.00%	0.00%	0.70%	0.00%	1.50%	0.30%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)
Note: Food Staple 1 includes Bread and Cereals (Dura, millet, wheat, sorghum, rice, bread, pasta, flour, kiswa, etc.), Food Staple 2 includes Milk and milk products (milk, milk powder, cheese, yoghurt, etc.), and Food Staple 3 includes Vegetables (Cucumber, tomato, onions, potato, etc.).

4.7. Impact of COVID-19 on farming

The impact of COVID-19 on farming appears from the fact that few and less than a quarter of households worked on households farm growing crops, raising livestock, or fishing since the beginning of 2020 (12.4%). The impact of COVID-19 on farming also appears from the fact that nearly third of households have not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 (32.8%). (See Table 7)

The probability of work on household farm varies according to gender, household educational level and household family size. For instance, the probability of work on household farm for males are nearly twice compared to females, males are more active to work on household farm growing crops, raising livestock, or fishing since the beginning of 2020. The probability of work on farm increases with the increase of household family size, but decreases with the increase of household educational level. In addition, the probability of not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 for females are higher than males, more than half of females (53.3%) compared to nearly third of males (31.9%) have not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 (see Table 7). The reasons households have not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 because of inability to acquire/ transport inputs and/ or inability to sell/ transport outputs (20.2%), restrictions on movement/

travel (8.7%), reduced availability of hired labour (3.8%), required to stay home (1.9%) and other respectively (see Table 7).

The impact of COVID-19 on farming also appears from the effects on the ability to sell products from their farm during the last seven days. For instance, although the majority and nearly two third of households were able to sell any products from their farm during the last seven days (64.2%), however, nearly third of households were not able to sell any products from their farms during the last seven day (31.7%), whereas, more than third of households reported that the products from household farm needed to be sold since the beginning of 2020 (36.3%). The impact of COVID-19 on farming also appears from the effects on prices of farm products. For instance, although the majority and nearly half of households indicate that the price households got for their products was higher compared to this time last year (48.7%), but more than half of households indicate that the price households got for their products was either lower or the same compared to this time last year (51.3%), mainly, nearly third of households indicate that the price households got for their products was lower compared to this time last year (30.3%), and more than fifth of households indicate that the price households got for their products was the same compared to this time last year (21%). (See Table 7)

The findings in this section provide answer to Q. 7 concerning the impact of COVID-19 on farming activities: ability to perform the normal activities on the farm, raising livestock, or fishing, ability to sell products from farm, and the effects on prices of farm products.

Table 7 - The impact of COVID-19 on farming in Sudan 2020

	Female	Male	Never At	Primary	Intermed	Secondar	Bachelor	Small	Medium	Large	Total
worked on household farm growing crops, raising livestock, or fishing since the beginning of 2020	7.00%	13.90%	19.20%	15.00%	11.60%	11.40%	11.70%	9.60%	12.40%	18.70%	12.40%
Have not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020	53.30%	31.90%	18.50%	36.10%	14.30%	30.90%	37.60%	23.10%	35.30%	32.10%	32.80%
The main reason households have not been able to perform the normal activities on the farm, livestock or fishing											
Unable to acquire / transport inputs and / or unable to sell / transport outputs	28.60%	19.60%	20.00%	10.00%	0.00%	34.50%	16.70%	50.00%	18.90%	5.60%	20.20%
Restrictions on movement / travel	14.30%	8.20%	0.00%	10.00%	0.00%	6.90%	10.40%	8.30%	9.50%	5.60%	8.70%
Reduced availability of hired labour	0.00%	4.10%	0.00%	5.00%	0.00%	3.40%	4.20%	0.00%	5.40%	0.00%	3.80%
Required to stay home	0.00%	2.10%	0.00%	0.00%	50.00%	0.00%	2.10%	0.00%	2.70%	0.00%	1.90%
Other (please specify)	57.10%	66.00%	80.00%	75.00%	50.00%	55.20%	66.70%	41.70%	63.50%	88.90%	65.40%
Other											
Curfew	0.00%	6.30%	0.00%	6.70%	0.00%	6.30%	6.30%	40.00%	2.10%	6.30%	5.90%
Fuel Sca	0.00%	3.10%	0.00%	0.00%	0.00%	6.30%	3.10%	0.00%	2.10%	6.30%	2.90%
Increase	25.00%	4.70%	0.00%	6.70%	0.00%	6.30%	6.30%	0.00%	6.40%	6.30%	5.90%
Too much	0.00%	1.60%	0.00%	6.70%	0.00%	0.00%	0.00%	0.00%	0.00%	6.30%	1.50%
Waiting	75.00%	84.40%	100.00%	80.00%	100.00%	81.30%	84.40%	60.00%	89.40%	75.00%	83.80%
Sales of farm products											

Products from household farm that needed to be sold since the beginning of 2020	40.00%	36.10%	44.40%	39.30%	38.50%	40.20%	30.10%	42.30%	33.60%	41.10%	36.30%
Households were not able to sell any products from their farms during the last 7 days	16.70%	32.50%	41.70%	37.50%	40.00%	17.90%	37.50%	22.70%	37.30%	21.70%	31.70%
Household were able to sell any products from their farm during the last 7 days	66.70%	64.00%	41.70%	62.50%	60.00%	76.90%	60.00%	77.30%	56.00%	78.30%	64.20%
Compared to this time last year, the price household got for their products was:											
Higher	99.50%	97.70%	40.00%	66.70%	50.00%	37.50%	31.30%	50.00%	61.10%	48.70%	
Lower	0.10%	1.10%	20.00%	20.00%	50.00%	33.30%	33.30%	31.30%	33.30%	22.20%	30.30%
The same	0.10%	0.70%	40.00%	13.30%	0.00%	16.70%	29.20%	37.50%	16.70%	16.70%	21.10%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.8. Impact of COVID-19 on the status of employment of households

The impact of COVID-19 on employment appears from the effects on the status of employment (see Table 8). For instance, even though more than third of households were working for paid job and income generation activities during the last seven days (38.4%), however, the majority and nearly two third of households were not working for paid work and income generation activities during the last seven days (61.6%) (See Table 8). The impact of COVID-19 on employment also appears from the fact that while nearly third of households were not currently working and not working before March 2020 (33.4%), however, the majority and nearly two third of households were not currently working and working before March 2020 (66.6%) (See Table 8). The status of employment varies according to gender, household educational level and household family size. For instance, the status of employment implies that the probability of households were not working for paid work and income generation activities during the last seven days is higher for females (87.1%) compared to males (54.8%), the probability of households were not currently working and not working before March is higher for females (67.8%) compared to males (18.9%), and the probability of households were not currently working and working before March is higher for males (81.1%) compared to females (32.2%). The main reason households not currently working for the majority and more than two third of households because business / gov't closed due to coronavirus legal restrictions (and/ or for another reason) (69.5%). Other reasons are that households not able to go to farm due to movement restrictions and/or due to lack of inputs, ill / quarantined, not farming season, laid off while business continues, need to care for ill relative, furlough, and other, reduction in staff due to less business, retired, seasonal worker, temporarily absent, vacation and other reasons (including curfew, fuel Issues, and low income). Regarding the structure of employment and distribution of employment by sector of employment, the majority and more than third of households were employed at the buying and selling goods sector repair of goods, hotels & restaurants (38.1%), followed by personal services, education, health, culture, sport, domestic work, and other (15.5%), professional activities: finance, legal, analysis, computer, real estate (8.2%). The structure of employment and distribution of employment by sector of employment implies that few and less than tenth of households are working in agriculture, hunting, fishing (6.1%), and construction (5.2%), transport, driving, post, travel agencies, mining, manufacturing electricity, gas, water supply, public administration, and other. The structure of employment and distribution of employment by sector of

employment vary according to gender, for instance on the one hand, the distribution implies that the majority and nearly half of males are working in the buying and selling goods sector repair of goods, hotels & restaurants (42%), followed by personal services, education, health, culture, sport, domestic work, and other (11.2%), agriculture, hunting, fishing (6.6%), professional activities: finance, legal, analysis, computer, real estate (5.9%) and construction (5.9%), transport, driving, post, travel agencies (3.6%), and mining and manufacturing (3%). While, on the other hand, the distribution implies that the majority and nearly half of females are working in personal services, education, health, culture, sport, domestic work, and other (42.9%), followed by professional activities: finance, legal, analysis, computer, real estate (22.8%), buying and selling goods sector repair of goods, hotels & restaurants (13.2%), transport, driving, post, travel agencies (3.7%), agriculture, hunting, fishing (3.2%), and mining and manufacturing (3.2%).

The impact of COVID-19 on employment also appears from the effects on the change of jobs (see Table 8). For instance, although the majority of households (93.1%), of males (93.3%) and females (90.8%), indicate no change in job: that they are working in the same job done before mid-March 2020, however, few households (6.9%), males (6.7%) and females (9.2%) indicate change in job, as they are working in different and not the same job done before mid-March 2020. Females changed their jobs more than males. The main reasons for changing jobs for the majority and nearly half of households because business/ gov't closed due to coronavirus legal restrictions (and/or for another reason) (43.70%), followed by not able to go to farm due to movement restrictions and/ or due to lack of inputs (2.9%), not farming season (1%). laid off while business continues (1%), other (15.5%), seasonal worker (23.3%), temporarily absent (6.8%), vacation (2.9%), and reduction in staff due to less business (1%) respectively. The main reasons for changing job varies according to gender, for instance, for males the main reasons for changing jobs for the majority and nearly half of males because business/ gov't closed due to coronavirus legal restrictions (and/or for another reason) (40.9%), followed by not able to go to farm due to movement restrictions and/ or due to lack of inputs (3.2%), not farming season (3.2%), laid off while business continues (1.1%), other (17.2%), seasonal worker (24.7%), temporarily absent (6.5%), vacation (2.2%), and reduction in staff due to less business (2.2%) respectively. while, for females the main reasons for changing jobs for the majority and nearly three quarter of females because business/ gov't closed due to coronavirus legal restrictions (and/or for another reason) (70%), followed by seasonal worker (10%), temporarily absent (10%), and vacation (10%) respectively (see Table 8).

Table 8- The impacts of COVID-19 in the status of employment during the last seven days in Sudan in 2020

	Female	Male	Never At	Primary	Intermed	Secondar	Bachelor	Small	Medium	Large	Total
1. Status in employment during the last seven days											
Not working for paid work and no income generation activities	87.10%	54.80%	57.30%	58.10%	61.80%	59.00%	65.20%	61.30%	62.70%	54.90%	61.60%
Working for paid work and income generation activities	12.90%	45.20%	42.70%	41.90%	38.20%	41.00%	34.80%	38.70%	37.30%	45.10%	38.40%
Not currently working and not working before March 2020	67.80%	18.90%	38.60%	29.40%	30.50%	31.70%	35.60%	29.80%	34.20%	35.00%	33.40%
Not currently working and working before March 2020	32.20%	81.10%	61.40%	70.60%	69.50%	68.30%	64.40%	70.20%	65.80%	65.00%	66.60%
Reasons for not currently working											
Business / gov't closed due to coronavirus legal restrictions (and/ or for another reason)	73.80%	68.80%	0.00%	0.00%	0.00%	0.00%	0.00%	70.40%	69.20%	70.30%	69.50%
Not able to go to farm due to movement restrictions and/or due to lack of inputs	0.80%	0.90%	3.20%	3.20%	3.20%	3.20%	3.20%	1.70%	0.70%	0.70%	0.90%

Ill / quarantined	2.10%	0.40%	1.60%	1.60%	1.60%	1.60%	1.60%	0.60%	0.80%	0.00%	0.70%
Not farming season	0.40%	0.60%	4.80%	4.80%	4.80%	4.80%	4.80%	0.30%	0.70%	0.70%	0.60%
Laid off while business continues	1.30%	0.40%	1.60%	1.60%	1.60%	1.60%	1.60%	0.90%	0.50%	0.00%	0.50%
Need to care for ill relative	0.80%	0.30%	3.20%	3.20%	3.20%	3.20%	3.20%	0.30%	0.30%	0.70%	0.40%
Furlough	0.00%	0.20%	1.60%	1.60%	1.60%	1.60%	1.60%	0.00%	0.30%	0.00%	0.20%
Other	8.40%	19.70%	6.30%	6.30%	6.30%	6.30%	6.30%	18.20%	18.50%	13.80%	18.10%
Reduction in staff due to less business	0.80%	1.10%	7.90%	7.90%	7.90%	7.90%	7.90%	1.10%	1.00%	0.70%	1.00%
Retired	0.40%	0.30%	11.10%	11.10%	11.10%	11.10%	11.10%	0.30%	0.30%	0.00%	0.30%
Seasonal worker	2.10%	3.80%	14.30%	14.30%	14.30%	14.30%	14.30%	3.10%	3.00%	8.30%	3.50%
Temporarily absent	6.80%	3.00%	19.00%	19.00%	19.00%	19.00%	19.00%	2.60%	3.90%	3.40%	3.60%
Vacation	2.10%	0.50%	25.40%	25.40%	25.40%	25.40%	25.40%	0.60%	0.70%	1.40%	0.70%
Other reasons											
Curfew	95.00%	96.40%	95.00%	95.70%	100.00%	99.20%	92.00%	93.80%	97.20%	95.00%	96.30%
Fuel Issues	0.00%	1.80%	5.00%	0.00%	0.00%	0.80%	3.40%	0.00%	1.90%	5.00%	1.70%
Income is low	5.00%	1.80%	0.00%	4.30%	0.00%	0.00%	4.60%	6.30%	0.90%	0.00%	2.00%
Employment											
Buying & selling goods, repair of goods, hotels & restaurants	13.20%	42.00%	33.80%	46.70%	36.30%	44.30%	31.20%	38.80%	37.70%	38.90%	38.10%
Personal services, education, health, culture, sport, domestic work, other	42.90%	11.20%	1.50%	7.40%	10.00%	11.80%	22.90%	13.00%	16.10%	17.40%	15.50%
Professional activities: finance, legal, analysis, computer, real estate	22.80%	5.90%	2.90%	3.10%	5.00%	3.10%	14.40%	11.50%	7.10%	8.30%	8.20%
Agriculture, hunting, fishing	3.20%	6.60%	19.10%	10.00%	8.80%	6.20%	3.20%	5.60%	5.70%	10.40%	6.10%
Construction	1.80%	5.70%	11.80%	5.20%	6.30%	5.40%	4.20%	5.90%	5.30%	2.80%	5.20%
Transport, driving, post, travel agencies	3.70%	3.60%	2.90%	4.40%	1.30%	3.90%	3.50%	3.80%	3.70%	2.80%	3.60%
Mining, manufacturing	3.20%	3.00%	5.90%	2.60%	3.80%	3.10%	2.80%	1.80%	3.60%	2.10%	3.10%
Electricity, gas, water supply	1.80%	1.40%	0.00%	2.60%	0.00%	1.40%	1.40%	0.60%	1.70%	1.40%	1.40%
Other	5.00%	19.20%	20.60%	17.50%	26.30%	19.40%	14.30%	18.00%	17.50%	13.90%	17.30%
Public administration	2.30%	1.40%	1.50%	0.40%	2.50%	1.40%	2.00%	0.90%	1.70%	2.10%	1.60%
Other employment											
Day labour	0.00%	13.20%	14.30%	17.50%	23.80%	14.00%	6.90%	8.20%	13.30%	20.00%	12.60%
Employee	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	1.00%	0.00%	0.50%	0.00%	0.40%
Freelancer	90.90%	63.50%	78.60%	67.50%	57.10%	65.00%	62.40%	68.90%	62.80%	70.00%	64.60%
Services centre (credit, telecom.)	9.10%	22.90%	7.10%	15.00%	19.00%	21.00%	29.70%	23.00%	23.50%	10.00%	22.40%
Change in jobs/ employment											
Change in job: not the same job done before mid-March 2020	9.20%	6.70%	2.40%	4.60%	9.60%	6.10%	8.70%	7.30%	6.60%	7.70%	6.90%
No change in job: the same job done before mid-March 2020	90.80%	93.30%	97.60%	95.40%	90.40%	93.90%	91.30%	92.70%	93.40%	92.30%	93.10%
Reasons for changing jobs											
Business / gov't closed due to coronavirus legal restrictions (and/or for another reason)	70.00%	40.90%	50.00%	45.50%	0.00%	46.90%	47.10%	59.10%	43.30%	21.40%	43.70%
Not able to go to farm due to movement restrictions and / or due to lack of inputs	0.00%	3.20%	0.00%	9.10%	0.00%	0.00%	3.90%	0.00%	4.50%	0.00%	2.90%
Not farming season	0.00%	3.20%	50.00%	9.10%	0.00%	3.10%	0.00%	0.00%	3.00%	7.10%	2.90%
Laid off while business continues	0.00%	1.10%	0.00%	9.10%	0.00%	0.00%	0.00%	0.00%	1.50%	0.00%	1.00%
Other (please specify)	0.00%	17.20%	0.00%	9.10%	14.30%	21.90%	13.70%	13.60%	11.90%	35.70%	15.50%
Seasonal worker	10.00%	24.70%	0.00%	18.20%	71.40%	25.00%	17.60%	18.20%	25.40%	21.40%	23.30%
Temporarily absent	10.00%	6.50%	0.00%	0.00%	14.30%	0.00%	11.80%	4.50%	7.50%	7.10%	6.80%
Vacation	10.00%	2.20%	0.00%	0.00%	0.00%	3.10%	3.90%	4.50%	3.00%	0.00%	2.90%
Reduction in staff due to less business	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%	2.00%	0.00%	0.00%	7.10%	1.00%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 on employment also appears from the sector of the work left (the main activity of the business or organization in which households were working in their main job before March 2020). The majority and

nearly a quarter of households left the work at the buying and selling goods sector repair of goods, hotels & restaurants (23.3%), while nearly fifth of household left the work at the agriculture, hunting, fishing (19.4%), personal services, education, health, culture, sport, domestic work, and other (17.5%). Whereas, few and less than tenth of household left the work at construction (7.8%), professional activities: finance, legal, analysis, computer, real estate (3.9%), transport, driving, post, travel agencies (3.9%), mining, manufacturing (2.9%), public administration (1.9%), electricity, gas, water supply (1%), and other. The sector of the work left (the main activity of the business or organization in which households were working in their main job before March 2020) vary according to gender, for instance the majority and nearly a quarter of males left the work at the buying and selling goods sector repair of goods, hotels & restaurants (23.7%), while nearly fifth of males left working in agriculture, hunting, fishing (20.4%), personal services, education, health, culture, sport, domestic work, and other (16.1%). Whereas, less than tenth of males left working in construction (8.6%), transport, driving, post, travel agencies (4.3%), professional activities: finance, legal, analysis, computer, real estate (3.9%), mining, manufacturing (3.2%), and public administration (1.1%) respectively. The majority and nearly third of females left working in personal services, education, health, culture, sport, domestic work, and other (30%), and other sectors (30%), while tenth of females left working in the buying and selling goods sector repair of goods, hotels & restaurants (10%), agriculture, hunting, fishing (10%), professional activities: finance, legal, analysis, computer, and real estate (10%) (See Table 9).

The COVID-19 is expected to have significant impact on employment in view of the fact that the structure of employment implies that the type and nature of main work is basically concentrated in household's own business (62.7%), followed by employee for someone else (21.2%), in a business operated by a household or family member (7%), apprentice, trainee, intern (5.5%), in a family farm, raising family livestock or fishing (3.6%) (See Table 9).

The impact of COVID-19 on employment also appears from the effects on wages. For instance, although the majority of households indicate that they were able to go to the place of work or work from home as usual for their paid job (82.4%), however, nearly fifth of households indicate that they were not able to go to the place of work or work from home as usual for their paid job (17.6%) (See Table 9). The households' ability to go to the place of work or work from home as usual for their paid job vary according to gender, household educational level and household family size. For instance, the ability to go to the place of work or work from home as usual for paid job for males (83.6%) is higher than females (76.9%), the inability to go to the place of work or work from home as usual for paid job for females (23.1%) is higher than males (16.4%). The households' ability to go to the place of work or work from home as usual for their paid job increases with the decrease of households' family size, i.e. the households' inability to go to the place of work or work from home as usual for their paid job increases with the increase of households' family size (see Table 9).

The impact of COVID-19 on employment also demonstrated from the effects on the received payment. For instance, although more than third of households who were not able to work as usual were paid full normal wage (34.9%), however, the majority and nearly half of households who were not able to work as usual received partial payment (46%), while, nearly fifth of households who were not able to work as usual did not receive payment (19%) (See Table 9). The majority and more than third of males who were not able to work as usual received full payment (41.7%), compared to more than tenth of females who were not able to work as usual (13.3%); this implies that full

payment for males who were not able to work as usual is more than three times higher than females who were not able to work as usual. The majority of females who were not able to work as usual received partial payment (73.3%), this implies that the partial payment received by females who were not able to work as usual is nearly twice higher than males who were not able to work as usual (37.5%). More than fifth of males who were not able to work as usual did not receive any payment (20.8%), which is higher than females who were not able to work as usual (13.3%) (See Table 9). Partial payment increases with the increase of households' family size, no payment increases with the decrease of household's family size (see Table 9). The reasons households were not able to work as usual for the majority of households because of business / gov't closed due to coronavirus legal restrictions and/ or for another reason (80%), followed by furlough (6.7%), ill / quarantined (6.7%), and seasonal worker (6.7%). The reasons households were not able to work as usual vary according to gender, household educational level and household family size. For instance, for all females the only reason females were not able to work as usual was only because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (100%). While, for males, the reasons males were not able to work as usual was because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (75%), followed by furlough (8.3%), ill / quarantined (8.3%), and seasonal worker (8.3%). In addition, for all small size family and large size family the only reason small size family and large size family were not able to work as usual was only because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (100%). While, for medium size family the reasons medium size family were not able to work as usual was because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (72.2%), followed by furlough (9.1%), ill / quarantined (9.1%), and seasonal worker (9.1%). The impact of COVID-19 on employment also demonstrated from the weak employers' provision and contribution to social protection of workers. For instance, the majority and more than half of households indicate that employer did not provide contribution to paid sick leave (64.2%), pension fund (63.7%), paid annual leave (58.8%), and health insurance (54.1%). Moreover, nearly fifth of the households indicate that employer did not provide contribution to household family member not able to perform their usual paid job (19.5%), and more than a quarter of household member operate a business including a family business in 2020 (28.8%).

The impact of COVID-19 appears from declining or stagnating revenues from business sales. For instance, for the majority and more than half of the households the reported revenue from the business sales is less compared to [last month] (52.6%), while, more than a quarter of households reported same revenue from the business sales (25.1%), while, more than tenth of households reported no revenue from the business sales (16.4%), and less than tenth of households reported higher revenues from the business sales (5.9%) compared to [last month]. The impact of COVID-19 on revenues from business sales vary according to gender and household family size. The majority of households (69%), females (53.5%), males (69.8%), small size family (71.3%), medium size family (69.4%), and large size family (62.7%) reported either no revenue or less revenue from the business sales compared to [last month]. The main reasons for getting no revenue or less revenues from sales than in [last month] for households because usual place of business closed due to coronavirus legal restrictions (41.3%), while, other reasons because of no customers/ fewer customers (29.9%), other (14.3%), can't get inputs (6%), can't travel / transport goods for trade (6%), seasonal closure (2.2%), vacation (0.3%) and other (no fuel (8%)). The main reason for getting no revenue or

less revenue from sales than in [last month] for females because usual place of business closed due to coronavirus legal restrictions (65.2%), and no customers / fewer customers (34.8%). The main reason for getting no revenue or less revenues from sales than in [last month] for males because usual place of business closed due to coronavirus legal restrictions (43.9%), no customers/ fewer customers (29.3%), other (14.6%), can't travel/ transport goods for trade (4.9%), seasonal closure (7.3%), and other (no fuel (16.7%)). (See Table 9)

Table 9- Impact of COVID-19 on employment and sector of the work left: the main activity of the business or organization in which households were working in their main job before March 2020

Sector of the work left: the main activity of the business or organization in which households were working in their main job before March											
	Female	Male	Never At	Primary	Intermed	Secondar	Bachelor	Small	Medium	Large	Total
Buying & selling goods, repair of goods, hotels & restaurants	10.00%	23.70%	50.00%	9.10%	0.00%	30.30%	20.80%	34.80%	16.70%	28.60%	22.30%
Agriculture, hunting, fishing	10.00%	20.40%	50.00%	36.40%	75.00%	21.20%	9.40%	13.00%	19.70%	28.60%	19.40%
Personal services, education, health, culture, sport, domestic work, other	30.00%	16.10%	0.00%	18.20%	0.00%	18.20%	18.90%	21.70%	18.20%	7.10%	17.50%
Construction	0.00%	8.60%	0.00%	9.10%	0.00%	6.10%	9.40%	0.00%	10.60%	7.10%	7.80%
Transport, driving, post, travel agencies	0.00%	4.30%	0.00%	0.00%	0.00%	0.00%	7.50%	4.30%	3.00%	7.10%	3.90%
Professional activities: finance, legal, analysis, computer, real estate	10.00%	3.20%	0.00%	0.00%	0.00%	6.10%	3.80%	4.30%	1.50%	14.30%	3.90%
Mining, manufacturing	0.00%	3.20%	0.00%	9.10%	0.00%	6.10%	0.00%	0.00%	4.50%	0.00%	2.90%
Public administration	10.00%	1.10%	0.00%	0.00%	0.00%	3.00%	1.90%	0.00%	3.00%	0.00%	1.90%
Electricity, gas, water supply	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%	1.90%	0.00%	1.50%	0.00%	1.00%
Other	30.00%	18.30%	0.00%	18.20%	25.00%	9.10%	26.40%	21.70%	21.20%	7.10%	19.40%
Main activity of the business or organization of households current job and work											
Buying & selling goods, repair of goods, hotels & restaurants	17.90%	48.00%	39.30%	48.10%	43.90%	53.40%	39.60%	44.30%	46.20%	46.90%	45.90%
Personal services, education, health, culture, sport, domestic work, other	32.10%	11.00%	13.10%	9.40%	13.60%	8.30%	17.20%	14.20%	12.70%	8.40%	12.50%
Agriculture, hunting, fishing	15.10%	10.10%	26.20%	12.80%	12.10%	9.80%	7.70%	9.10%	10.20%	14.00%	10.40%
Professional activities: finance, legal, analysis, computer, real estate	17.00%	4.20%	2.40%	1.30%	3.00%	3.10%	9.00%	6.10%	4.70%	5.60%	5.10%
Construction	1.90%	4.40%	2.40%	3.80%	1.50%	4.60%	4.70%	3.90%	4.50%	3.40%	4.20%
Transport, driving, post, travel agencies	0.00%	3.00%	1.20%	3.80%	0.00%	2.70%	3.00%	3.90%	2.60%	2.20%	2.80%
Electricity, gas, water supply	1.90%	2.60%	1.20%	3.00%	3.00%	3.30%	1.80%	1.90%	2.80%	2.20%	2.50%
Mining, manufacturing	1.90%	2.40%	2.40%	3.00%	1.50%	1.70%	2.70%	3.60%	2.00%	2.20%	2.30%
Public administration	2.80%	2.10%	0.00%	0.90%	0.00%	2.90%	2.50%	1.60%	2.00%	3.90%	2.10%
Other	9.40%	12.30%	11.90%	14.00%	21.20%	10.40%	11.90%	11.30%	12.50%	11.20%	12.10%
Type and nature of main work,											
In household's own	29.30%	66.60%	61.80%	68.70%	66.00%	66.90%	57.00%	62.40%	62.80%	62.90%	62.70%

business											
Employee for someone else	49.50%	18.00%	13.90%	14.40%	15.00%	17.80%	27.90%	22.00%	21.10%	20.50%	21.20%
In a business operated by a household or family member	2.60%	7.50%	6.90%	7.80%	9.50%	7.80%	5.70%	5.40%	7.50%	6.60%	7.00%
Apprentice, trainee, intern	16.70%	4.10%	5.60%	3.70%	5.40%	4.10%	7.20%	7.00%	5.20%	3.60%	5.50%
In a family farm, raising family livestock or fishing	1.90%	3.80%	11.80%	5.50%	4.10%	3.50%	2.20%	3.20%	3.40%	6.30%	3.60%
Wage during the last seven days											
Households were not able to go to the place of work or work from home as usual for their paid job	23.10%	16.40%	20.00%	14.60%	45.50%	7.10%	22.80%	17.10%	17.40%	20.00%	17.60%
Households were able to go to the place of work or work from home as usual for their paid job	76.90%	83.60%	80.00%	85.40%	54.50%	92.90%	77.20%	82.90%	82.60%	80.00%	82.40%
Households were not able to work as usual were paid											
Partial payment	73.30%	37.50%	33.30%	50.00%	75.00%	50.00%	42.90%	42.90%	43.90%	62.50%	46.00%
Full normal	13.30%	41.70%	66.70%	16.70%	25.00%	37.50%	35.70%	35.70%	36.60%	25.00%	34.90%
No payment	13.30%	20.80%	0.00%	33.30%	0.00%	12.50%	21.40%	21.40%	19.50%	12.50%	19.00%
Reasons households were not able to work as usual											
Business / gov't closed due to coronavirus legal restrictions and / or for another reason	100.00%	75.00%	0.00%	100.00%	0.00%	100.00%	75.00%	100.00%	72.70%	100.00%	80.00%
Furlough	0.00%	8.30%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	9.10%	0.00%	6.70%
Ill / quarantined	0.00%	8.30%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	9.10%	0.00%	6.70%
Seasonal worker	0.00%	8.30%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	9.10%	0.00%	6.70%
Employer did not provide contribution to:											
Paid sick leave	47.70%	67.80%	86.70%	82.90%	81.80%	68.40%	54.80%	47.60%	68.40%	72.50%	64.20%
Pension fund	39.70%	68.80%	86.70%	77.50%	81.80%	68.50%	55.10%	54.90%	65.20%	73.70%	63.70%
Paid annual leave	43.10%	62.20%	80.00%	82.90%	90.90%	64.90%	46.30%	50.00%	60.70%	65.00%	58.80%
Health insurance	22.20%	60.80%	86.70%	75.00%	81.80%	56.80%	43.90%	42.70%	57.40%	57.90%	54.10%
Household family member not able to perform their usual paid job	20.80%	19.20%	89.90%	84.40%	84.30%	82.20%	75.40%	19.20%	19.60%	19.20%	19.50%
Household member operate a business including a family business in 2020	6.30%	34.80%	27.60%	31.90%	30.90%	31.70%	25.50%	28.70%	28.10%	33.40%	28.80%
Compared to [last month] the revenue from the business sales is											
Less	48.80%	52.80%	51.80%	50.30%	61.40%	57.60%	47.60%	58.30%	51.10%	51.50%	52.60%
The same	44.20%	24.30%	21.40%	24.60%	26.30%	19.00%	31.60%	23.30%	24.80%	29.90%	25.10%
No revenue	4.70%	16.80%	21.40%	20.70%	7.00%	17.50%	14.10%	13.00%	18.30%	11.20%	16.40%
Higher	2.30%	6.10%	5.40%	4.50%	5.30%	5.90%	6.80%	5.40%	5.80%	7.50%	5.90%
The main reason for getting no revenue or less revenues from sales than in [last month]											
Usual place of business closed due to coronavirus legal restrictions	65.20%	40.60%	43.90%	35.40%	38.50%	36.40%	50.00%	42.10%	41.00%	41.70%	41.30%
No customers / fewer customers	34.80%	29.70%	29.30%	26.80%	38.50%	33.40%	26.00%	31.40%	30.20%	25.00%	29.90%
Other	0.00%	14.80%	14.60%	18.90%	10.30%	15.70%	11.00%	15.10%	14.70%	10.70%	14.30%
Can't get inputs	0.00%	6.20%	0.00%	8.70%	7.70%	5.20%	6.30%	7.50%	5.50%	6.00%	6.00%
Can't travel / transport goods for	0.00%	6.20%	4.90%	7.10%	2.60%	7.20%	4.70%	3.80%	5.50%	13.10%	6.00%

trade											
Seasonal closure	0.00%	2.30%	7.30%	3.10%	2.60%	1.30%	2.00%	0.00%	2.90%	2.40%	2.20%
Vacation	0.00%	0.30%	0.00%	0.00%	0.00%	0.70%	0.00%	0.00%	0.20%	1.20%	0.30%
Other: no fuel	0.00%	1.80%	16.70%	0.00%	0.00%	0.00%	3.60%	4.20%	1.30%	0.00%	1.80%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.9. Impact of COVID-19 on households' mean of livelihood and source of income

The impact of COVID-19 on employment also demonstrated from the effects on households' means of livelihood or source of income. The majority and more than half of households indicate that the means of livelihood or source of income in the last 12 months are family farming, livestock or fishing (51.9%), while, nearly third of households depend on wage employment of household members (30.1%), and less than fifth of households depend on income from properties, investments or savings (14.7%). Whereas, less than tenth of households depend on non-farm family business (7.2%), pension (5.7%), remittances from outside Sudan (5.5%), and remittances within Sudan (3.6%), while, few households depend on assistance from the government (1.5%), assistance from NGOs/ charitable organization (0.9%), and other (3.2%) (See Table 10). The means of livelihood or source of income in the last 12 months vary according to gender, educational level and family size. For instance, the reported dependency on family farming, livestock or fishing and income from properties, investments or savings for males are higher than females, while, the reported dependency on wage employment of household members, non-farm family business, pension, and remittances from outside Sudan and remittances within Sudan for females are higher than males. Moreover, the reported dependency on family farming, livestock or fishing decreases with the increase of households' educational level. The reported dependency on family farming, livestock or fishing is high for small size family, followed by large size family and medium size family respectively (see Table 10).

The impact of COVID-19 on employment also demonstrated from the effects on the loss of households' means of livelihood or source of income. For instance, the majority and more than half of households indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from non-farm family business (53.3%) and other (90.6%), while, nearly half of households indicate loss and reduction in income from properties, investments or savings (47.5%), and assistance from the government (44.3%). More than third of households indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances within Sudan (40.3%), and from family farming, livestock or fishing (38.5%). While, more than a quarter of households indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances from outside Sudan (27.4%), assistance from NGOs / charitable organization (25.7%), and wage employment of household members (25.2%). Few and less than tenth of household indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from pension (8%) (See Table 10). The loss and reduction in income and means of livelihood or source of income since mid-March 2020 vary according to gender, household educational level and household family size. For instance, all females indicate loss and reduction in the means of livelihood or source of income, since mid-March 2020 from remittances within Sudan (100%). The majority and more than half of females indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from income from properties, investments or savings (84.2%), family farming, livestock or fishing (50%). While, nearly third of females indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances from outside Sudan (31.8%), and assistance from the government

(30.8%). While, less than fifth of females indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from wage employment of household members (16%), non-farm family business (11.1%), pension (4.5%), assistance from NGOs / charitable organization (0.1%), and other (0.2%) respectively. The majority and more than half of males indicate the loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances within Sudan (93.8%), and non-farm family business (55.9%). While, nearly half of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from assistance from the government (47.9%), and income from properties, investments or savings (45.9%). While, more than third of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from family farming, livestock or fishing (37.3%), whereas, more than a quarter of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from wage employment of household members (28.8%), and remittances from outside Sudan (25.5%). While, less than tenth of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from pension (9.4%), assistance from NGOs / charitable organization (0.1%), and other (0.2%) respectively, (see Table 10). The majority and more than half of the large size family indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from assistance from NGOs / charitable organization (66.7%), assistance from the government (60%) and from properties, investments or savings (55.9%) respectively. The majority of the medium size family indicates loss and reduction in the means of livelihood or source of income since mid-March 2020 from non-farm family business (54.2%), from properties, investments or savings (45%), and assistance from the government (44.2%) respectively. The majority of the small size family indicates loss and reduction in the means of livelihood or source of income since mid-March 2020 from non-farm family business (54.8%), from properties, investments or savings (52.3%), and from family farming, livestock or fishing (41.8%) respectively. (See Table 10)

The results in this section provide answer to Q1. regarding the effects of COVID-19 on household and individual income, labour market status, employment benefits, working conditions, unemployment, social insurance, the effects of COVID-19 on household enterprises, workers, workers' livelihoods, income, and the differences in the effects of COVID-19 on households in Sudan according to household characteristics (gender, education, and family size).

Table 10- Impact of COVID-19 on household's means of livelihood or source of income in the last 12 months and loss of income

Household's means of livelihood or source of income in the last 12 months	Female	Male	Never At	Primary	Intermed	Secondary	Bachelor	Small	Medium	Large	Total
Family farming, livestock or fishing	43.10%	53.00%	71.40%	58.60%	56.50%	50.30%	45.20%	61.80%	49.60%	51.80%	51.90%
Wage employment of household members	40.70%	27.20%	14.10%	20.50%	22.50%	27.00%	38.20%	29.20%	30.70%	27.30%	30.10%
Income from properties, investments or savings	9.60%	16.00%	15.10%	16.70%	10.50%	18.10%	11.80%	13.10%	15.10%	14.60%	14.70%
Non-farm family business	7.90%	7.10%	6.00%	5.70%	4.40%	7.00%	8.40%	7.10%	7.20%	7.10%	7.20%
Pension	8.00%	5.10%	2.00%	3.00%	5.20%	5.50%	7.20%	4.40%	6.00%	6.40%	5.70%
Remittances from outside Sudan	7.80%	4.80%	1.00%	2.80%	3.70%	3.80%	8.20%	5.30%	5.60%	4.50%	5.50%
Remittances within Sudan	4.00%	3.50%	1.50%	3.70%	5.80%	3.60%	3.50%	3.30%	3.60%	4.20%	3.60%
Assistance from the	1.50%	1.50%	0.50%	1.10%	3.70%	1.40%	1.70%	1.60%	1.50%	1.20%	1.50%

Government											
Assistance from NGOs / charitable organization	1.40%	0.80%	0.50%	1.10%	1.60%	0.80%	0.90%	0.90%	0.90%	0.70%	0.90%
Other	2.50%	3.40%	2.50%	5.60%	0.00%	4.20%	2.20%	2.10%	3.20%	5.70%	3.20%
Income loss: household's means of livelihood or source of income reduced since mid-March 2020											
Non-farm family business	11.10%	55.90%	66.70%	57.90%	60.00%	61.50%	44.30%	54.80%	54.20%	42.90%	53.30%
Income from properties, investments or savings	84.20%	45.90%	53.30%	49.50%	60.00%	48.50%	43.50%	52.30%	45.00%	55.90%	47.50%
Assistance from the Government	30.80%	47.90%	0.00%	33.30%	57.10%	44.40%	44.80%	38.50%	44.20%	60.00%	44.30%
Remittances within Sudan	100.00%	93.80%	33.30%	57.10%	63.60%	40.40%	30.60%	37.00%	41.00%	41.20%	40.30%
Family farming, livestock or fishing	50.00%	37.30%	48.60%	40.40%	30.80%	38.40%	35.10%	41.80%	35.80%	46.50%	38.50%
Remittances from outside Sudan	31.80%	25.50%	50.00%	12.50%	28.60%	26.00%	29.20%	30.20%	25.90%	33.30%	27.40%
Assistance from NGOs / charitable organization	0.10%	0.10%	0.00%	0.00%	0.00%	0.00%	50.00%	28.60%	20.00%	66.70%	25.70%
Wage employment of household members	16.00%	28.80%	42.90%	42.60%	30.20%	32.20%	17.40%	23.60%	25.70%	24.50%	25.20%
Pension	4.50%	9.40%	0.00%	18.80%	10.00%	5.60%	8.10%	11.10%	7.40%	7.70%	8.00%
Other	0.20%	0.20%	100.00%	87.50%	0.00%	92.60%	89.20%	88.20%	88.80%	100.00%	90.60%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4.10. Impact of COVID-19 on the status of employment of the head of household

The impact of COVID-19 on employment also demonstrated from the effects on the head of the household. For instance, although, during the last seven days more than third of the head of the household worked for paid work, any kind of business, farming or other activity to generate income, even if only for one hour (38.6%), however, the majority and nearly two-third of the head of the household did not do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour (61.4%) (See Table 11). The possibility that the head of the household do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour vary according to gender, educational level and family size. For instance, the possibility the head of the household do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour for males (39%) is higher than females (38%), and for the large size family (47.2%), is higher than the medium size family (39.4%) and small size family (29.4%) respectively, i.e., the possibility the head of the household do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour increases with the increase of family size (see Table 11). Moreover, the possibility that the head of the household did not do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour vary according to gender, educational level and family size. For instance, the possibility that the head of the household did not do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour for females (62%) is higher than males (61%) and for the small size family (70.6%), is higher than the medium size family (60.6%) and large size family (52.8%) respectively (see Table 11). The major reasons the head of household not currently working because of business / gov't closed due to coronavirus legal restrictions and or for another reason (64.6%), not able to go to farm due to movement restrictions and/ or due to lack of inputs (2.5%), not farming season (2%), Furlough (0.2%), ill / quarantined (0.9%), laid off while business continues (0.3%), need to

care for ill relative (0.2%), and other (14.2%) (including reduction in staff due to less business (1.4%), seasonal worker (7.7%), temporary absent (4.6%), retired (0.8%), and vacation (0.6%)) respectively (see Table 11).

The impact of COVID-19 on employment also appears from the sector of the work left and the main activity of the business or organization in which the household head is working in their main job before March 2020. For instance, for the majority and nearly third of the household head the sector of the work left and the main activity of the business or organization in which the household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (29.3%), followed by personal services, education, health, culture, sport, domestic work, and other (17.7%), agriculture, hunting, fishing (13.1%), professional activities: finance, legal, analysis, computer, real estate (10%), construction (6.1%), transport, driving, post, travel agencies (4.8%), mining, manufacturing (4.6%), public administration (2.5%), and electricity, gas, and water supply (1.8%) respectively (see Table 11). For the majority of females household head the sector of the work left and the main activity of the business or organization in which the females household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (22%), followed by personal services, education, health, culture, sport, domestic work, and other (21.4%), professional activities: finance, legal, analysis, computer, real estate (11.8%), and agriculture, hunting, fishing (9.6%), respectively (see Table 10). For the majority of males household head the sector of the work left and the main activity of the business or organization in which the males household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (36.6%), followed by agriculture, hunting, fishing (16.7%), personal services, education, health, culture, sport, domestic work, and other (13.7%), and professional activities: finance, legal, analysis, computer, and real estate (8.2%) respectively (see Table 11).

For the majority and nearly third of the household head in large size family the sector of the work left and the main activity of the business or organization in which the household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (31%), followed by agriculture, hunting, fishing (17.2%), personal services, education, health, culture, sport, domestic work, and other (13.8%), and professional activities: finance, legal, analysis, computer, and real estate (8.6%) respectively (see Table 11). For the majority of the household head in medium size family the sector of the work left and the main activity of the business or organization in which the household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (28.6%), followed by personal services, education, health, culture, sport, domestic work, and other (18.8%), agriculture, hunting, fishing (14%), and professional activities: finance, legal, analysis, computer, real estate (9.4%), respectively (see Table 11). For the majority of the household head in small size family the sector of the work left and the main activity of the business or organization in which the household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (31.3%), followed by personal services, education, health, culture, sport, domestic work, and other (15.2%), professional activities: finance, legal, analysis, computer, real estate (13.4%), and agriculture, hunting, fishing (7.1%), respectively (see Table 11).

The impact of COVID-19 on employment also appears from the effects on the main activity of the business or organization in which nearly a quarter of the household head was working before mid-March 2020 in their main job.

For instance, the main activity of the business or organization in which nearly a quarter of the household head was working before mid-March 2020 in their main job was agriculture, hunting, fishing (23.8%), construction (23.8%), mining, manufacturing (19%), professional activities: finance, legal, analysis, computer, real estate (9.5%), personal services, education, health, culture, sport, domestic work, and other (4.8%), buying & selling goods, repair of goods, hotels & restaurants (4.8%), electricity, gas, water supply (4.8%) and other (9.5%), respectively (see Table 11).

The main activity of the business or organization in which more than third of the females household head was working before mid-March 2020 in their main job was construction (36.4%) and mining, manufacturing (36.4%), followed by professional activities: finance, legal, analysis, computer, real estate (9.1%), personal services, education, health, culture, sport, domestic work, and other (9.1%) and other (9.1%) respectively. The main activity of the business or organization in which half of the males household head was working before mid-March 2020 in their main job was agriculture, hunting, fishing (50%), followed by tenth of males household head was working in construction (10%), professional activities: finance, legal, analysis, computer, real estate (10%), buying & selling goods, repair of goods, hotels & restaurants (10%), electricity, gas, water supply (10%) and other (10%), respectively (see Table 10). The only two activities of the business or organization in which the household head in small size family was working before mid-March 2020 in their main job were agriculture, hunting, fishing (66.7%), and construction (33.3%), respectively. The main activities of the business or organization in which the household head in medium size family was working before mid-March 2020 in their main job was construction (23.5%), mining, manufacturing (23.5%), agriculture, hunting, fishing (17.6%), professional activities: finance, legal, analysis, computer, real estate (11.8%), personal services, education, health, culture, sport, domestic work, and other (5.9%), electricity, gas, water supply (5.9%), and other (11.8%), respectively. The only activity of the business or organization in which the household head in large size family was working before mid-March 2020 in their main job was buying & selling goods, repair of goods, hotels & restaurants (100%). (See Table 11)

The impact of COVID-19 on employment also appears from the effects on the change of jobs of households head (see Table 11). For instance, although the majority of households head (96.7%), males household head (97.3%), and females household head (96%) indicate that the job they are working on is the same job they were doing before mid-March 2020, however, few of the household head (3.3%), males household head (2.7%), and females household head (4%) indicate that the job they are working on is not the same job they were doing before mid-March 2020. Although, the majority of the household head in small size family and medium size family (96.4%) and large size family (98.8%) indicate that the job they are working on is the same job they were doing before mid-March 2020, however, few of the household head in small size family and medium size family (3.6%) and large size family (1.2%) indicate that the job they are working on is not the same job they were doing before mid-March 2020. (See Table 11). The majority and nearly half of the household head indicate that the main reasons the household head change jobs because business / gov't closed due to coronavirus legal restrictions and / or for another reason (47.6%), while other reasons because not able to go to farm due to movement restrictions and / or not able to farm due to lack of inputs (4.8%), seasonal worker (19%), other (19%), not farming season (4.8%), and vacation (4.8%). The majority and more than third of males household head indicate that the main reasons the males household head change jobs because seasonal worker (40%), followed by business / gov't closed due to coronavirus legal restrictions

and / or for another reason (30%), not able to go to farm due to movement restrictions and / or not able to farm due to lack of inputs (10%), not farming season (10%), and vacation (10%). The majority and nearly two third of females household head indicate that the main reasons the females household head change jobs because business / gov't closed due to coronavirus legal restrictions and / or for another reason (63.6%), and other (36.4%). The only reason the household head in large size family change jobs because business / gov't closed due to coronavirus legal restrictions and / or for another reason (100%). The main reasons the household head in medium size family change jobs because business / gov't closed due to coronavirus legal restrictions and / or for another reason (52.9%), seasonal worker (17.6%), other (17.6%), not farming season (5.9%), and vacation (5.9%). The main reasons the household head in small size family change jobs because not able to go to farm due to movement restrictions and / or not able to farm due to lack of inputs (33.3%), seasonal worker (33.3%), and other (33.3%), respectively, (see Table 11).

Table 11- The impact of COVID-19 on the status of employment of the head of the household in Sudan 2020

During the last 7 days, that is from [DAY] to [DAY], did the head of the household do any work for pay, any kind of business, farming or other activity to generate income, even if only for one hour											
	Female	Male	Never At	Primary	Intermed	Secondar y	Bachelor	Small	Medium	Large	Total
Head of the Household did not do any work for pay and did not do any income generation activities	62.00%	61.00%	63.60%	67.90%	73.70%	53.60%	63.80%	70.60%	60.60%	52.80%	61.40%
Head of the Household did work for pay and did income generation activities	38.00%	39.00%	36.40%	32.10%	26.30%	46.40%	36.20%	29.40%	39.40%	47.20%	38.60%
Not currently working : Was											
Head of household did not working before March 2020?	27.10%	45.80%	37.10%	40.60%	60.70%	36.60%	36.50%	43.40%	36.00%	37.60%	37.60%
Head of household working before March 2020?	72.90%	54.20%	62.90%	59.40%	39.30%	63.40%	63.50%	56.60%	64.00%	62.40%	62.40%
Reasons head of household not currently working											
Business / gov't closed due to coronavirus legal restrictions and or for another reason	66.50%	62.70%	54.50%	54.00%	45.50%	60.70%	69.40%	69.60%	63.50%	63.80%	64.60%
Not able to go to farm due to movement restrictions and/ or due to lack of inputs	1.50%	3.50%	4.50%	0.00%	9.10%	3.00%	2.40%	0.00%	2.80%	5.20%	2.50%
Not farming season	1.50%	2.60%	9.10%	7.90%	0.00%	1.80%	0.80%	1.80%	2.10%	1.70%	2.00%
Furlough	0.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.30%	0.00%	0.20%	0.00%	0.20%
Ill / quarantined	0.90%	1.00%	0.00%	1.60%	0.00%	1.80%	0.50%	0.90%	1.10%	0.00%	0.90%
Laid off while business continues	0.30%	0.30%	0.00%	0.00%	0.00%	0.00%	0.50%	0.90%	0.20%	0.00%	0.30%
Need to care for ill relative	0.00%	0.30%	0.00%	0.00%	0.00%	0.00%	0.30%	0.00%	0.20%	0.00%	0.20%
Other (please specify)	15.70%	12.50%	13.60%	12.70%	45.50%	16.70%	12.40%	11.60%	14.80%	13.80%	14.20%
Reduction in staff due to less business	0.90%	1.90%	0.00%	0.00%	0.00%	1.80%	1.60%	2.70%	1.30%	0.00%	1.40%
Seasonal worker	6.20%	9.30%	18.20%	15.90%	0.00%	7.70%	5.90%	4.50%	7.90%	12.10%	7.70%
Temporary absent	4.00%	5.10%	0.00%	7.90%	0.00%	6.00%	3.80%	5.40%	4.70%	1.70%	4.60%

Retired	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	1.30%	1.80%	0.40%	1.70%	0.80%
Vacation	0.60%	0.60%	0.00%	0.00%	0.00%	0.60%	0.80%	0.90%	0.60%	0.00%	0.60%
Sector of the work left: the main activity of the business or organization in which the household head is working in their main job before March											
Buying & selling goods, repair of goods, hotels & restaurants	22.40%	36.60%	19.00%	32.30%	9.10%	25.90%	31.50%	31.30%	28.60%	31.00%	29.30%
Personal services, education, health, culture, sport, domestic work, other	21.40%	13.70%	4.80%	8.10%	18.20%	17.50%	20.10%	15.20%	18.80%	13.80%	17.70%
Agriculture, hunting, fishing	9.60%	16.70%	33.30%	22.60%	18.20%	11.40%	10.90%	7.10%	14.00%	17.20%	13.10%
Professional activities: finance, legal, analysis, computer, real estate	11.80%	8.20%	9.50%	6.50%	9.10%	7.80%	11.70%	13.40%	9.40%	8.60%	10.00%
Construction	5.60%	6.50%	9.50%	6.50%	9.10%	9.60%	4.10%	9.80%	5.20%	5.20%	6.10%
Transport, driving, post, travel agencies	5.90%	3.60%	9.50%	4.80%	0.00%	6.60%	3.80%	4.50%	4.80%	5.20%	4.80%
Mining, manufacturing	5.60%	3.60%	4.80%	0.00%	0.00%	6.00%	4.90%	8.00%	3.70%	5.20%	4.60%
Public administration	2.20%	2.90%	0.00%	0.00%	9.10%	3.00%	2.70%	1.80%	2.60%	3.40%	2.50%
Electricity, gas, water supply	2.20%	1.30%	0.00%	6.50%	9.10%	0.60%	1.40%	0.00%	2.20%	1.70%	1.80%
the household head change jobs											
Not the same job the household head was doing before mid-March 2020	4.00%	2.70%	0.00%	6.00%	0.00%	2.60%	3.60%	3.60%	3.60%	1.20%	3.30%
The same job the household head was doing before mid-March 2020	96.00%	97.30%	100.00%	94.00%	100.00%	97.40%	96.40%	96.40%	96.40%	98.80%	96.70%
Reasons the household head change jobs											
Business / gov't closed due to coronavirus legal restrictions and / or for another reason	63.60%	30.00%	0.00%	33.30%	0.00%	16.70%	66.70%	0.00%	52.90%	100.00%	47.60%
Not able to go to farm due to movement restrictions and / or not able to farm due to lack of inputs	0.00%	10.00%	0.00%	33.30%	0.00%	0.00%	0.00%	33.30%	0.00%	0.00%	4.80%
Not farming season	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	5.90%	0.00%	4.80%
Other (please specify)	36.40%	0.00%	0.00%	0.00%	0.00%	50.00%	8.30%	33.30%	17.60%	0.00%	19.00%
Seasonal worker	0.00%	40.00%	0.00%	33.30%	0.00%	16.70%	16.70%	33.30%	17.60%	0.00%	19.00%
Vacation	0.00%	10.00%	0.00%	0.00%	0.00%	16.70%	0.00%	0.00%	5.90%	0.00%	4.80%
Other (curfew)	00.00%	0.00%	0.00%	0.00%	0.00%	00.00%	00.00%	00.00%	00.00%	0.00%	00.00%
The main activity of the business or organization in which the household head was working before mid-March 2020 in their main job:											
Agriculture, hunting, fishing	0.00%	50.00%	0.00%	33.30%	0.00%	16.70%	25.00%	66.70%	17.60%	0.00%	23.80%
Construction	36.40%	10.00%	0.00%	33.30%	0.00%	50.00%	8.30%	33.30%	23.50%	0.00%	23.80%
Mining, manufacturing	36.40%	0.00%	0.00%	0.00%	0.00%	16.70%	25.00%	0.00%	23.50%	0.00%	19.00%
Professional activities: finance, legal, analysis, computer, real estate	9.10%	10.00%	0.00%	33.30%	0.00%	0.00%	8.30%	0.00%	11.80%	0.00%	9.50%
Personal services, education, health, culture, sport, domestic work,	9.10%	0.00%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	5.90%	0.00%	4.80%

other											
Buying & selling goods, repair of goods, hotels & restaurants	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	0.00%	100.00%	4.80%
Electricity, gas, water supply	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	5.90%	0.00%	4.80%
Other	9.10%	10.00%	0.00%	0.00%	0.00%	16.70%	8.30%	0.00%	11.80%	0.00%	9.50%

Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

4. 11. Impact of COVID-19 on women and gender inequality

The impact of COVID-19 on women and gender inequality in Sudan appears appear from several issues. For instance, knowledge and awareness about coronavirus, and knowledge about the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus and knowledge about the steps the government taken to curb the spread of the coronavirus in households' area varies according to gender. Mainly, females' show better knowledge compared to males concerning knowledge regarding the spread of COVID-19 and measures households taking to prevent getting infected by coronavirus. In addition, females show better knowledge compared to males concerning knowledge about the steps the government taken to curb the spread of the coronavirus in households' area. Moreover, females (88.2%) seem to be more satisfied than males (83.9%) regarding the government's response to the coronavirus crisis, i.e. males (16.1%) seem to be more dissatisfied compared to females (11.8%) concerning the government's response to the coronavirus crisis. Moreover, households' behaviour and commitment to social distancing implies that females are more committed compared to males regarding commitment to social distancing.

The impact of COVID-19 on women and gender inequality also appears from the effects on household's access to medicine, health services, education and financial services. The inability to buy Medicine, the need for medical treatment, and inability to access health services vary according to gender. For instance, the inability to buy Medicine for males is higher than females, the need for medical treatment and the inability to access health services for females is higher than males.

The impact of COVID-19 on women and gender inequality also appears from the effects on the incidence of food insecurity measured by food insecurity experience scale during the last 30 days that implies that females are more food insecure compared to males concerning food insecurity experience scale during the last 30 days, i.e. females are more than males were worried about the incidence of food insecurity during the last 30 days.

The impact of COVID-19 on women and gender inequality also demonstrated from the effects on farming, mainly, the effects on work on households farm growing crops, raising livestock, or fishing since the beginning of 2020 and the ability to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020. For instance, the probability of work on household farm for males are nearly twice higher than females, i.e. males are more active to work on household farm growing crops, raising livestock, or fishing since the beginning of 2020. While, the inability to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 for females are higher than males, i.e. more than half of females (53.3%) compared to nearly third of males (31.9%) have not been able to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020.

The impact of COVID-19 on women and gender inequality also appears from the effects on employment, mainly the status of employment that varies according to gender. For instance, the status of employment implies that the

probability of households were not working for paid work and income generation activities during the last seven days for females (87.1%) is higher than males (54.8%), the probability of households were not currently working and not working before March for females (67.8%) is higher than males (18.9%), and the probability of households were not currently working and working before March is higher for males (81.1%) compared to females (32.2%).

The structure and distribution of employment by sector vary according to gender. On hand, the majority and nearly half of males are working in the buying and selling goods sector repair of goods, hotels & restaurants (42%), followed by personal services, education, health, culture, sport, domestic work, and other (11.2%), agriculture, hunting, fishing (6.6%), professional activities: finance, legal, analysis, computer, real estate (5.9%) and construction (5.9%), transport, driving, post, travel agencies (3.6%), and mining and manufacturing (3%). On the other hand the majority and nearly half of females are working in personal services, education, health, culture, sport, domestic work, and other (42.9%), followed by professional activities: finance, legal, analysis, computer, real estate (22.8%), buying and selling goods sector repair of goods, hotels & restaurants (13.2%), transport, driving, post, travel agencies (3.7%), agriculture, hunting, fishing (3.2%), and mining and manufacturing (3.2%).

The impact of COVID-19 on women and gender inequality also appears from the effects on the change of jobs defined by gender. For instance, although the majority of males (93.3%) and females (90.8%) indicate no change in job, as they are working in the same job done before mid-March 2020, however, the other few males (6.7%) and females (9.2%) indicate change in job, as they are working in different and not the same job done before mid-March 2020. Females changed their jobs more than males. The majority and nearly half of males changing jobs because business/ gov't closed due to coronavirus legal restrictions (and/or for another reason) (40.9%), followed by not able to go to farm due to movement restrictions and/ or due to lack of inputs (3.2%), not farming season (3.2%), laid off while business continues (1.1%), other (17.2%), seasonal worker (24.7%), temporarily absent (6.5%), vacation (2.2%), and reduction in staff due to less business (2.2%) respectively. while, the majority and nearly three quarter of females changing jobs because business/ gov't closed due to coronavirus legal restrictions (and/or for another reason) (70%), followed by seasonal worker (10%), temporarily absent (10%), and vacation (10%) respectively.

The impact of COVID-19 on women and gender inequality also appears from the sector of the work left (the main activity of the business or organization in which households were working in their main job before March 2020) defined by gender, for instance the majority and nearly a quarter of males left the work at the buying and selling goods sector repair of goods, hotels & restaurants (23.7%), while, nearly fifth of males left working in agriculture, hunting, fishing (20.4%), personal services, education, health, culture, sport, domestic work, and other (16.1%). Whereas, less than tenth of males left working in construction (8.6%), transport, driving, post, travel agencies (4.3%), professional activities: finance, legal, analysis, computer, real estate (3.9%), mining, manufacturing (3.2%), and public administration (1.1%) respectively. The majority and nearly third of females left working in personal services, education, health, culture, sport, domestic work, and other (30%), and other sectors (30%), while tenth of females left working in the buying and selling goods sector repair of goods, hotels & restaurants (10%), agriculture, hunting, fishing (10%), professional activities: finance, legal, analysis, computer, and real estate (10%) respectively. The impact of COVID-19 on women and gender inequality also appears from the effects on wages, the households' ability to go to the place of work or work from home as usual for their paid job defined by gender, For instance, the

ability to go to the place of work or work from home as usual for paid job for males (83.6%) is higher than females (76.9%), the inability to go to the place of work or work from home as usual for paid job for females (23.1%) is higher than males (16.4%).

The impact of COVID-19 on women and gender inequality also demonstrated from the effects on the received payment defined by gender. The majority and more than third of males who were not able to work as usual received full payment (41.7%), compared to more than tenth of females who were not able to work as usual (13.3%); this implies that full payment for males who were not able to work as usual is more than three times higher than females who were not able to work as usual. The majority of females who were not able to work as usual received partial payment (73.3%), this implies that the partial payment received by females who were not able to work as usual is nearly twice higher than males who were not able to work as usual (37.5%). More than fifth of males who were not able to work as usual did not receive any payment (20.8%), which is higher than females who were not able to work as usual (13.3%). The reasons households were not able to work as usual vary according to gender, for instance, for all females the only reason females were not able to work as usual was only because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (100%). While, for males, the reasons males were not able to work as usual was because of business / gov't closed due to coronavirus legal restrictions and / or for another reason (75%), followed by furlough (8.3%), ill / quarantined (8.3%), and seasonal worker (8.3%).

The impact of COVID-19 on women and gender inequality also appears from the effects on the declining or stagnating revenues from business sales defined by gender, for instance, males (69.8%) were more than females (53.5%) reported either no revenue or less revenues from the business sales compared to [last month]. The main reason for getting no revenue or less revenue from sales than in [last month] for females because usual place of business closed due to coronavirus legal restrictions (65.2%), and no customers / fewer customers (34.8%). The main reason for getting no revenue or less revenues from sales than in [last month] for males because usual place of business closed due to coronavirus legal restrictions (43.9%), no customers/ fewer customers (29.3%), other (14.6%), can't travel/ transport goods for trade (4.9%), seasonal closure (7.3%), and other (no fuel) (16.7%).

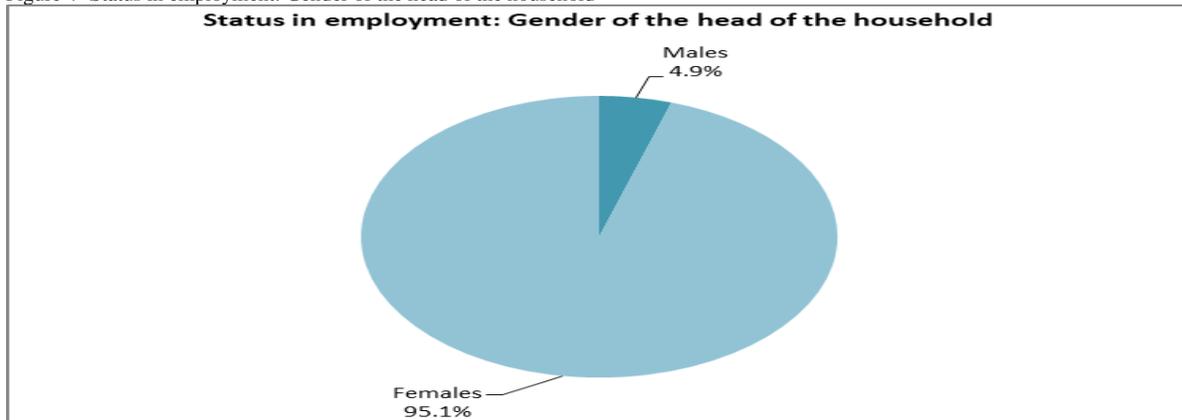
The impact of COVID-19 on women and gender inequality also appears from the effects on households' means of livelihood or source of income, for instance, the reported dependency on family farming, livestock or fishing and income from properties, investments or savings for males are higher than females, while the reported dependency on wage employment of household members, non-farm family business, pension, remittances from outside Sudan and remittances within Sudan for females are higher than males.

The impact of COVID-19 on women and gender inequality also demonstrated from the effects on the loss of households' means of livelihood or source of income since mid-March 2020 defined by gender. For instance, all females indicate loss and reduction in the means of livelihood or source of income, since mid-March 2020 from remittances within Sudan (100%). The majority and more than half of females indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from income from properties, investments or savings (84.2%), family farming, livestock or fishing (50%). While, nearly third of females indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances from outside Sudan (31.8%), and assistance from the government (30.8%). While, less than fifth of females indicate loss and

reduction in the means of livelihood or source of income since mid-March 2020 from wage employment of household members (16%), non-farm family business (11.1%), pension (4.5%), assistance from NGOs / charitable organization (0.1%), and other (0.2%) respectively. The majority and more than half of males indicate the loss and reduction in the means of livelihood or source of income since mid-March 2020 from remittances within Sudan (93.8%), and non-farm family business (55.9%). While, nearly half of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from assistance from the government (47.9%), and income from properties, investments or savings (45.9%). While, more than third of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from family farming, livestock or fishing (37.3%), whereas, more than a quarter of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from wage employment of household members (28.8%), and remittances from outside Sudan (25.5%). While, less than tenth of males indicate loss and reduction in the means of livelihood or source of income since mid-March 2020 from pension (9.4%), assistance from NGOs / charitable organization (0.1%), and other (0.2%) respectively.

The impact of COVID-19 on women and gender inequality also demonstrated from the effects on the status in employment defined by the gender of the head of the household implies that the majority of the head of the households are males (95.1%), whereas few of the head of households are females (4.9%) (See Figure 4).

Figure 4- Status in employment: Gender of the head of the household



Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 on women and gender inequality also demonstrated from the effects on the head of the household defined by gender. The possibility that the head of the household do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour vary according to gender. For instance, the possibility the head of the household do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour for males (39%) is higher than females (38%). Moreover, the possibility that the head of the household did not do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour vary according to gender. For instance, the possibility that the head of the household did not do any paid work, any kind of business, farming or other activity to generate income, even if only for one hour for females (62%) is higher than males (61%).

The impact of COVID-19 on women and gender inequality also appears from the sector of the work left by the household head defined by gender. For the majority of females household head the sector of the work left and the main activity of the business or organization in which the females household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (22%), followed by personal services, education, health, culture, sport, domestic work, and other (21.4%), professional activities: finance, legal, analysis, computer, real estate (11.8%), and agriculture, hunting, fishing (9.6%), respectively. For the majority of males household head the sector of the work left and the main activity of the business or organization in which the males household head is working in their main job before March 2020, is buying & selling goods, repair of goods, hotels & restaurants (36.6%), followed by agriculture, hunting, fishing (16.7%), personal services, education, health, culture, sport, domestic work, and other (13.7%), and professional activities: finance, legal, analysis, computer, and real estate (8.2%) respectively.

The impact of COVID-19 on women and gender inequality also appears from the effects on the main activity of the business or organization in which nearly a quarter of the household head was working before mid-March 2020 in their main job defined by gender. The main activity of the business or organization in which more than third of the females household head was working before mid-March 2020 in their main job was construction (36.4%) and mining, manufacturing (36.4%), followed by professional activities: finance, legal, analysis, computer, real estate (9.1%), personal services, education, health, culture, sport, domestic work, and other (9.1%) and other (9.1%) respectively. The main activity of the business or organization in which half of the males household head was working before mid-March 2020 in their main job was agriculture, hunting, fishing (50%), followed by tenth of males household head was working in construction (10%), professional activities: finance, legal, analysis, computer, real estate (10%), buying & selling goods, repair of goods, hotels & restaurants (10%), electricity, gas, water supply (10%) and other (10%), respectively.

The impact of COVID-19 on women and gender inequality also appears from the effects on the change of jobs of households head defined by gender. For instance, although the majority of males household head (97.3%), and females household head (96%) indicate that the job they are working on is the same job they were doing before mid-March 2020, however, few of the males household head (2.7%), and females household head (4%) indicate that the job they are working on is not the same job they were doing before mid-March 2020. The majority and more than third of males household head indicate that the main reasons the males household head change jobs because seasonal worker (40%), followed by business / gov't closed due to coronavirus legal restrictions and / or for another reason (30%), not able to go to farm due to movement restrictions and / or not able to farm due to lack of inputs (10%), not farming season (10%), and vacation (10%). The majority and nearly two third of females household head indicate that the main reasons the females household head change jobs because business / gov't closed due to coronavirus legal restrictions and / or for another reason (63.6%), and other (36.4%).

The impact of COVID-19 on women and gender inequality also appears from the effects on the households' mental health: households feeling, feeling worried and feeling a substantial or a moderate threat due to the coronavirus outbreak defined by gender. For instance, more than tenth of females (12.8%) more than males (12.7%) believe that they will live much worse or somewhat worse and the dissatisfaction (not satisfied) with life in general at the present

time for males (6.8%) is higher than females (5.2%). The feeling worried (very worried or somewhat worried) about the possibility that household or someone in household's immediate family might become seriously ill from coronavirus for females (86.4%) is higher than males (80.6%). The feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances for females (93.6%) is higher than males (91.3%).

The impact of COVID-19 on women and gender inequality also appears from the effects on household's access to Internet services defined by gender. For instance, the majority of males (74.7%) more than females (73.8%) indicate that they have access to Internet at home, this implies that the lack of access to Internet at home for females (26.2%) is higher than for males (25.3%), this also implies the incidence of the gender digital divide during the lockdown period. The impact of COVID-19 on women and gender inequality also appears from the effects on the households' welfare measured by the ownership of Laptop/Desktop Computer/Tablet and access to electricity defined by gender. Less than tenth of females and males indicate they have ownership of Laptop/Desktop Computer/Tablet; the ownership of Laptop/Desktop Computer/Tablet for females (9.9%) is more than males (8.8%). The majority of males (81.7%) more than females (79.9%) indicate that they have access to electricity.

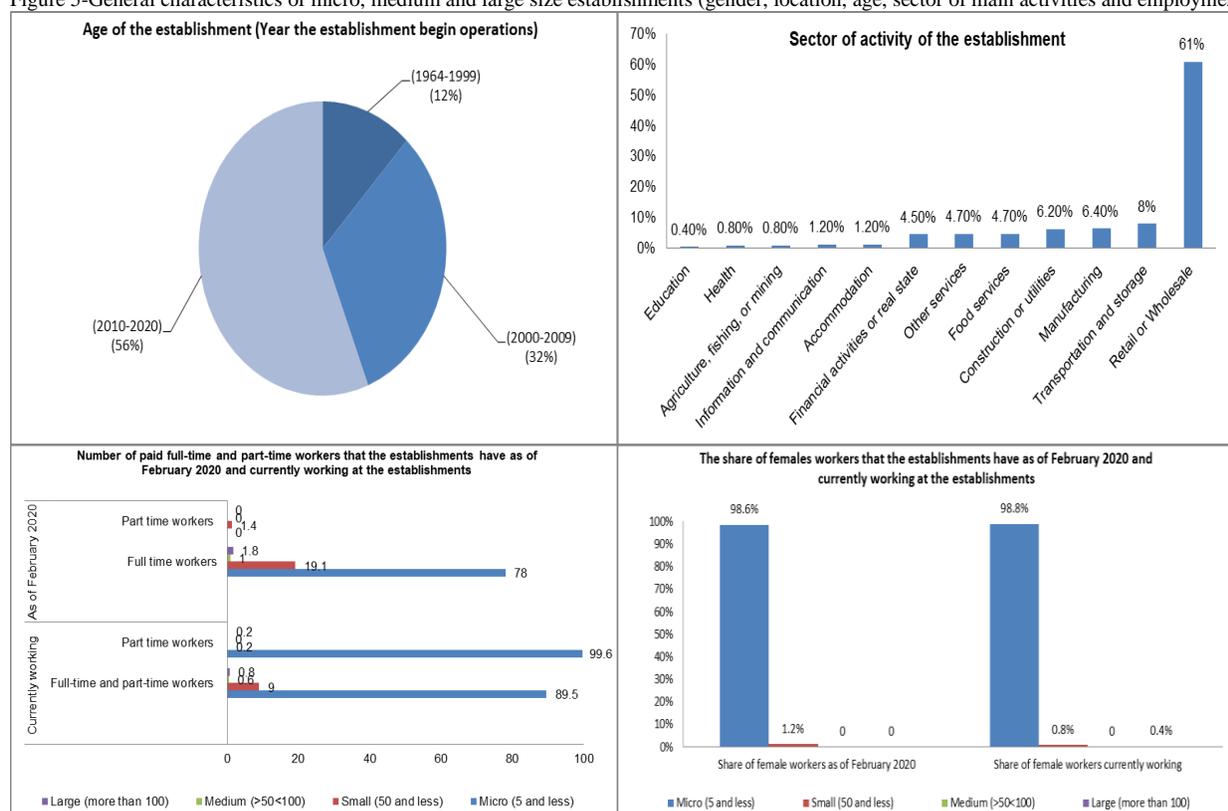
The results in this section provide answer to Q 9 concerning the impact of COVID-19 on gender inequality and women in Sudan. In addition, the impact of COVID-19 on gender inequality and women is also observed from the effects on the time women spent on activities of caregiving, including caring for children, caring for children during schools closing, doing housework and household activities. The extension of the duration of the lockdown period and school closing implies further pressures on women's time spent on activities of caregiving, including caring for children, caring for children during schools closing, doing housework and household activities.

5. The impact of COVID-19 on micro, small and medium size enterprises (MSME) (Firms survey)

The basic information from the firm survey indicates that the majority of the respondents are males (99%), and very few are females (1%). Regarding the location, the majority and nearly half of the establishments are located in Khartoum (45.4%), while the other half are located in Omdurman (29.4%) and Bahri (25.3%) respectively. Concerning the sector of main activities, the majority and more than half of the establishments are working in retail or wholesale sector (61%), followed by transportation and storage (8%), manufacturing (6.4%), construction or utilities (6.2%), food services (4.7%), other services (4.7%), financial activities or real state (4.5%), accommodation (1.2%), information and communication (1.2%), agriculture, fishing, or mining (0.8%), health (0.8%) and education (0.4%) respectively. Regarding, the age of establishments, defined by the year the establishment begin operations, the majority and more than half of the establishments started working in recent time during the past ten years in the period (2010-2020) (56%), while, nearly third of the establishments begin operations in the period (2000-2009) (32.1%), and nearly tenth of the establishments begin operations in the period (1964-1999) (11.9%). (See Figure 4) Regarding the size of the establishments defined by the number of workers (number of full-time and part-time paid workers) hired by the establishments as of February 2020, the majority of full time workers are hired by micro size establishments (78%), this implies that the majority of the establishments are micro size establishments (78%), followed by small size establishments (19.1%), large size establishments (1.8%), and medium size establishments (1%) respectively. Moreover, regarding part time workers, the majority of part time workers are hired by micro size

establishments (98.2%), followed by small size establishments (1.4%), and large size establishments (0.4%) respectively. Regarding paid full-time and part-time workers currently working in the establishments the majority, of paid full-time and part-time workers currently working in the establishments are employed in micro size establishments (89.5%), followed by small size establishments (9%), large size establishments (0.8%), and medium size establishments (0.6%) respectively. The majority of part time workers are currently employed in micro size establishments (99.6%), followed by small size and large size establishments respectively. Concerning, female workers as of February 2020, the majority of females workers are employed at micro size establishments (98.6%), followed by small size establishments and medium size establishments respectively. The share of females workers currently working implies that the majority of women are currently employed in micro size establishment (98.8%), followed by small size establishments and large size establishments respectively.⁷ (See Figure 5)

Figure 5-General characteristics of micro, medium and large size establishments (gender, location, age, sector of main activities and employment)



Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 on the operation and current status of the establishments is demonstrated from the fact that although few of the establishments are opened (6.2%), and the majority and nearly two third of the establishments are only partially opened (64.3%) (cannot operate normally due to government regulations), but nearly fifth of the establishments are temporary closed (either mandated by government or closed by own choice) (21.4%), and nearly tenth of the establishments are permanently closed (8.2%) (See Figure 6). The impact of

⁷ For the purpose of this research we use the definition and classification of firms by the number of workers that indicate that the micro size establishments hired 5 and less workers, small size establishments hired 50 and less workers, medium size establishments hired between 50 and 100 workers, and large size establishments hired more than 100 workers.

COVID-19 on the operation and current status of the establishments also appears from the duration of lockdown period as measured by the number of weeks that the establishment has been closed. For instance, the majority and nearly half of the establishments have been closed for 10-12 weeks (47%), while, more than a quarter of the establishments have been closed for 13-20 weeks (26.5%), and more than a quarter of the establishments have been closed for 3-8 weeks (26.5%). Despite the impacts of COVID-19 on the operation status and current status of the establishment, however, the majority of the establishments indicate optimistic expectations that the establishments will resume operation (90%). For instance, the expected time period for the business to resume operations implies that the majority and nearly third of the establishments expected to resume operations in more than 6 months (32.6%), while, nearly third of the establishments expected to resume operations in less than 2 weeks (31.5%), whereas, nearly fifth of the establishments expected to resume operations between 3 and 6 months (20.2%), some of the establishments expected to resume operations between 1 and 2 months (14.6%), and finally, few of the establishments expected to resume operations between 2 and 4 weeks (1.1%). (See Figure 6)

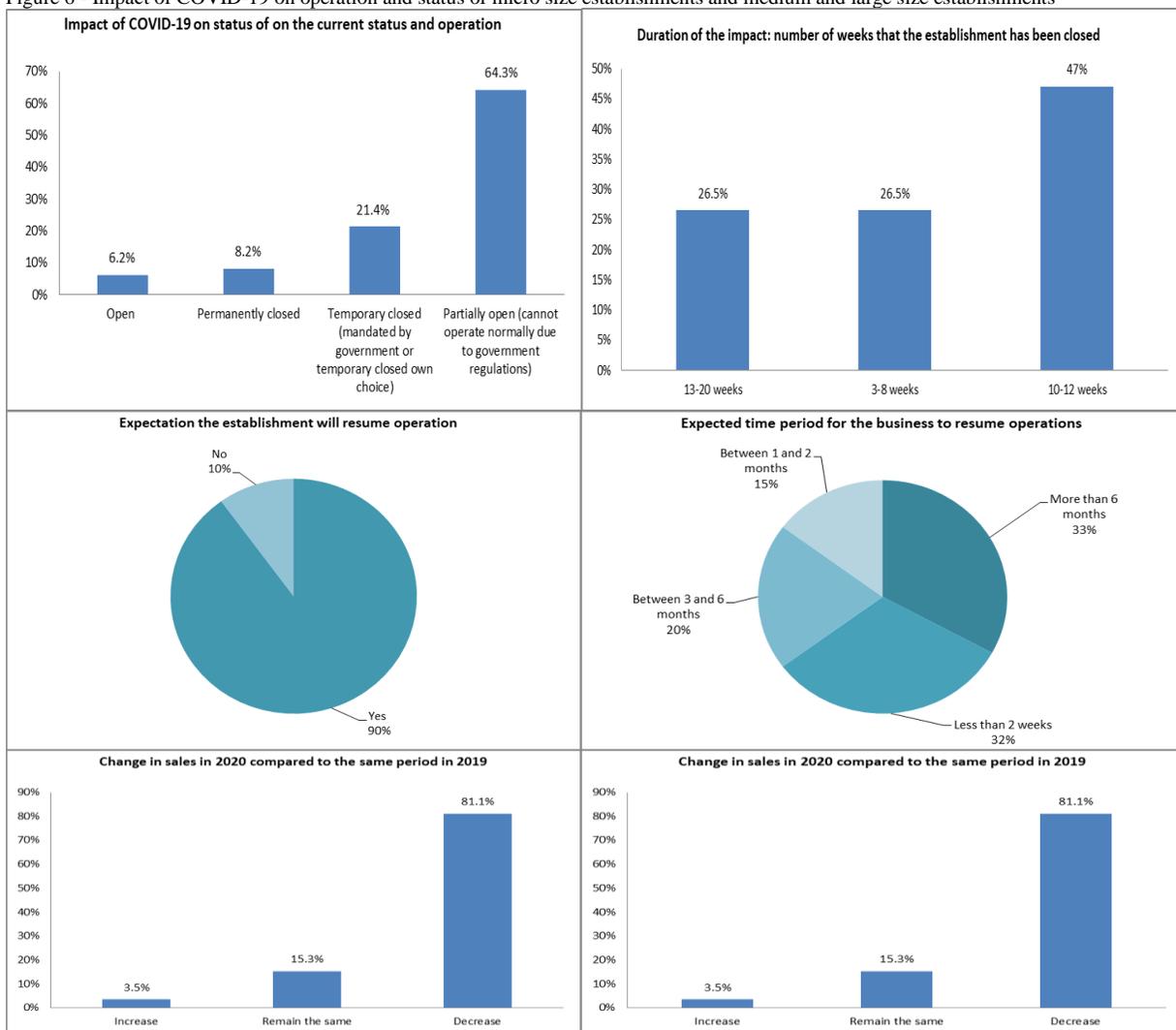
The impact of COVID-19 on the operation and current status and the sales of the establishments also appear from comparison of the establishment sales for the last 3 months (before August 2020) with the same period in 2019. For instance, the majority of the establishments reported decrease in sales (81.1%), some of the establishments indicated that the sales remain the same (15.3%), and few of the establishments indicated increase in sales (3.5%). The majority of the establishments indicate high rate of decrease in sales (87.6%). The majority of the establishments indicated substantial rate of decrease (by 50%-100%) (70.8%), some of the establishments indicated moderate rate of decrease (by 25%-45%) (20.2%), few of the establishments indicated small rate of decrease (by 5%-20%) (6.6%), and few of the establishments showed serious substantial rate of decrease (by 150%-200%) (2%) (See Figure 6).

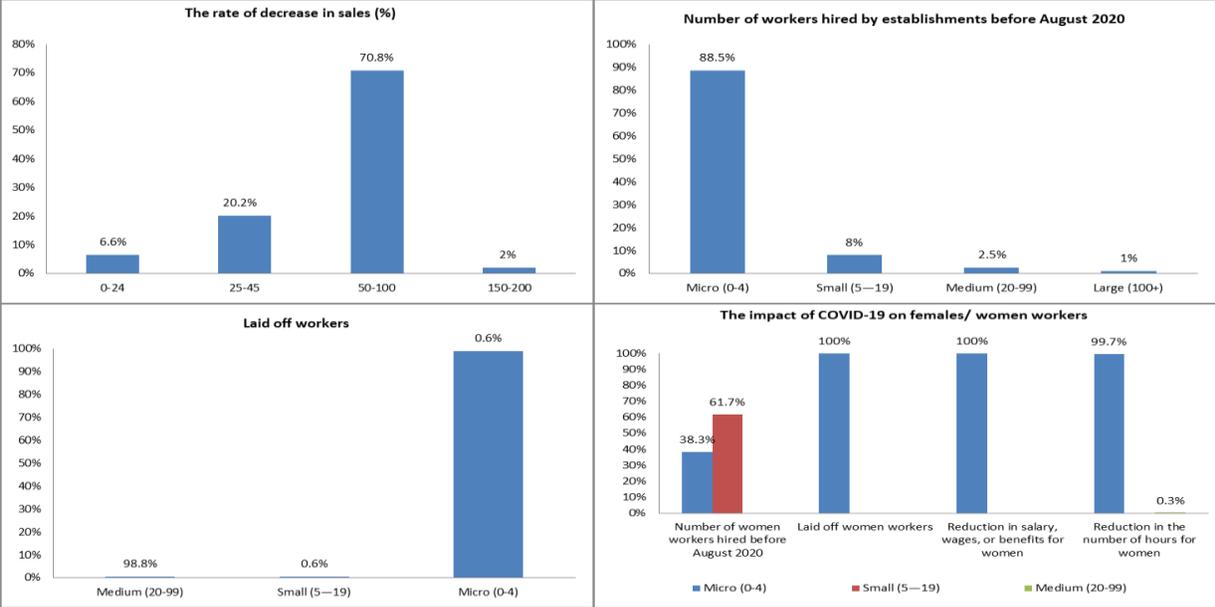
The impact of COVID-19 on the operation and current status and employment of the establishments also appears from the distribution of employment in the last 3 months (before August 2020), for instance, the majority of full time and part time workers were hired by micro size establishments (0-4) (88.5%), few were hired by small size establishments (5-19) (8%), by medium size establishments (20-99) (2.5%) and by the large size establishments (100+) (1%) (See Figure 4). In addition, the majority and nearly two third of women were hired by medium size establishments (20-99) (61.7%), while more than third of women were hired by micro size establishments (0-4) (38.3%). The impacts of COVID-19 on the operation and current status and employment of the establishments appears from the laid off workers. For instance, the majority of laid off workers were hired by micro size establishments (0-4) (98.8%), very few were hired by small size establishments (5—19) (0.6%), and were hired by medium size establishments (20-99) (0.6%). All laid off women were hired by micro size establishments (0-4) ((100%) see Figure 6). The impact of COVID-19 on the operation and current status, salary, wages, and benefits in the establishments is demonstrated from the reduction in salary, wages, or benefits. For instance, the highest reduction in salary, wages, or benefits is reported at the micro size establishments (0-4) (98.8%), while, minor reduction reported at the small size establishments (5-19) (0.6%) and at the large size establishments (100+) (0.6%). For all women all the reduction in salary, wages, or benefits were reported at the micro size establishments (0-4) (100%) (See Figure 6). The impact of COVID-19 on the operation and current status, salary, wages, and benefits in the establishments is demonstrated from the reduction in the number of hours. For instance, the substantial reduction

in the number of hours was reported at the micro size establishments (0-4) (98.8%), while, minor reduction in the number of hours was reported at the small size establishments (5—19) (0.9%) and the medium size establishments (20-99) (0.6%) respectively. For the majority of women the reduction in the number of hours was reported at the micro size establishments (0-4) (99.7%), and minor reduction in the number of hours was reported at the medium size establishments (20-99) (0.3%) (See Figure 6).

The results in this section provide answer to Q5 regarding the effective and impacts of firms commitment of firms to lockdown in Sudan and the differences according to firms characteristics (firms size). The survey provide no information regarding firms commitment to social distance and physical distancing measures in Sudan and also no information on other suggested public health measures to enhance commitment to social distance and physical distancing measures in Sudan.

Figure 6 - Impact of COVID-19 on operation and status of micro size establishments and medium and large size establishments

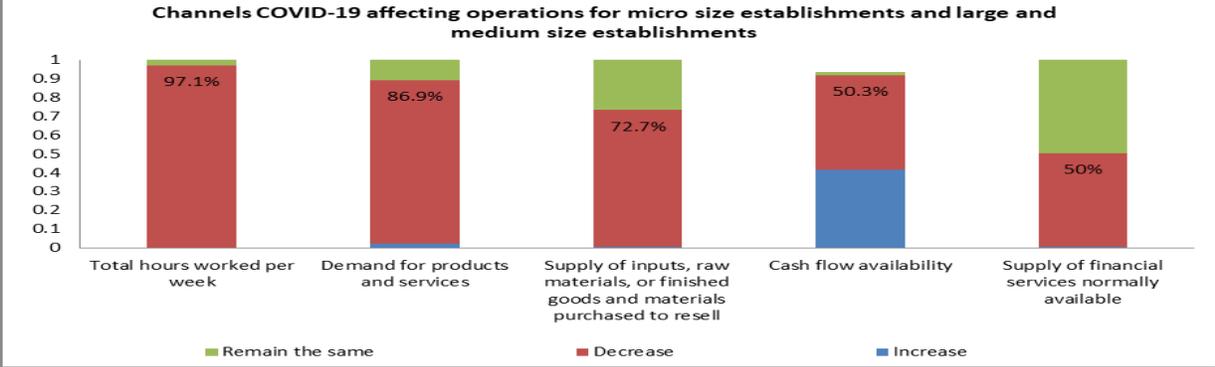


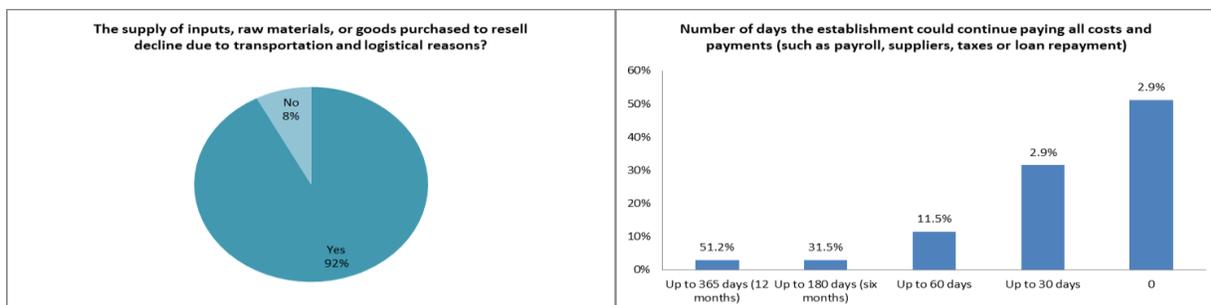


Source: Author’s calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 also appears from the impacts on the channels affecting operations in the establishments with respect to the change in total hours worked per week, demand for products and services, and supply of inputs and raw materials. For instance, in the last three months [before August 2020], the majority of the establishments indicate decrease in total hours worked per week (97.1%), decrease in the demand for products and services (86.9%), decrease in the supply of inputs, raw materials, or finished goods and materials purchased to resell (72.7%), of the establishments indicate decrease in cash flow availability (50.3%), and decrease in the supply of financial services normally available (50%). In addition, the majority of the establishments indicate decline in the supply of inputs, raw materials, or goods purchased to resell due to transportation and logistical reasons (92.3%). The impact of COVID-19 also appears from the impacts on the number of days the establishment could continue paying all costs and payments (such as payroll, suppliers, taxes or loan repayment), for instance, less than third of the establishments indicate up to 30 days (one month) (31.5%), while, few of the establishments indicate up to 60 days (two months) (11.5%), few of the establishments indicate up to 180 days (six months) (2.9%) and few of the establishments indicate up to 365 days (12 months) (one year) (2.9%) (See Figure 7).

Figure 7- Channels affecting operations for micro size establishments and large and medium size establishments



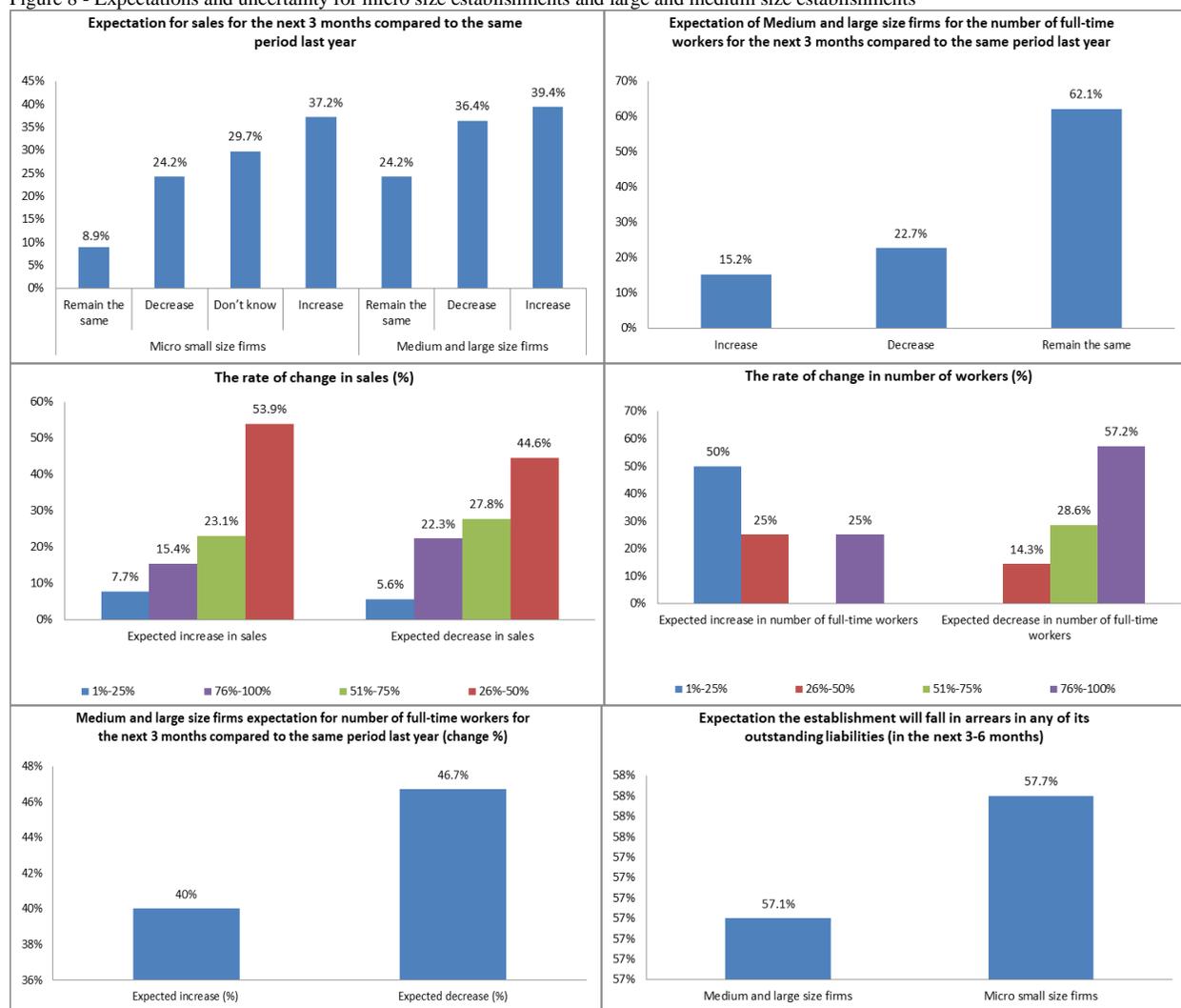


Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 is also demonstrated from the reported expectations and uncertainty in total sales defined by firm size for micro size and medium and large size firms. For instance, for the next 3 months compared to the same period last year the expectation of the decrease in total sales that reported by more than third of the medium and large size establishments (36.4%) is higher than that reported by nearly a quarter of the micro small size establishments (24.2%). While, the expectation of the increase in total sales that reported by more than third of the medium and large size establishments (39.4%) is higher than that reported by more than third of the micro size establishments (37.2%). Whereas, the expectation that the total sales will remain the same that reported by more than tenth of the medium and large size establishments (24.2%) is higher than that reported by less than tenth of the micro establishments (8.9%) (See Figure 8). Moreover, the impact of COVID-19 is also demonstrated from the reported expectations and uncertainty in total number of workers defined by firm size for micro size and large and medium size firms. For instance, the expectation of the decrease in the number of full-time workers is reported by more than fifth of the medium and large size establishments (22.7%), while the expectation of the increase in the number of full-time workers is reported by more than tenth of the medium and large size establishments (15.2%), whereas, the expectation that the number of full-time workers will remain the same is reported by nearly two third of the medium and large size establishments (62.1%). In addition, for the next 3 months compared to the same period last year the expectation for number of full-time workers rate of decrease by (46.7%) for medium and large size firms. Moreover, the impact of COVID-19 is also demonstrated from the reported expectations and uncertainty in the rate of decrease in sales defined by firm size for micro size and medium and large size firms. For instance, the expectation for the next 3 months compared to the same period last year (%), mainly the expectation of the rate of serious substantial decrease in sales (by 76%-100%) is reported by more than fifth of the medium and large size establishments (22.3%), and also the rate of substantial decrease in sales by (51%-75%) is reported by more than fifth of the medium and large size establishments (22.8%), whereas, the moderate rate of decrease in sales (by 26%-50%) is reported by nearly half of medium and large size establishments (44.6%), and the small rate of decrease in sales (by 1%-25%) is reported by less than tenth of the medium and large size establishments (5.6%). Furthermore, the impact of COVID-19 is also demonstrated from the reported expectations and uncertainty in the rate of decrease in the number of full-time workers defined by firm size for micro size and medium and large size firms. For instance, the expectation for the next 3 months compared to the same period last year (%), mainly the expectation of the rate of serious substantial decrease in the number of full-time workers (by 76%-100%) is reported by more than half of the medium and large size establishments (57.2%), while, the rate of substantial decrease in the number of

full-time workers (by 51%-75%) is reported by more than a quarter of the medium and large size establishments (28.6%), whereas, the moderate rate of decrease in the number of full-time workers (by 26%-50%) is reported by more than tenth of medium and large size establishments (14.3%). In addition, the impact of COVID-19 appears from the expectation that the establishment will fall in arrears in any of its outstanding liabilities in the next 3 months which is expected by more than half of the micro size establishments (57.7%) compared to the medium and large size establishments (57.1%) in the next 6 months (see Figure 8).

Figure 8 - Expectations and uncertainty for micro size establishments and large and medium size establishments



Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

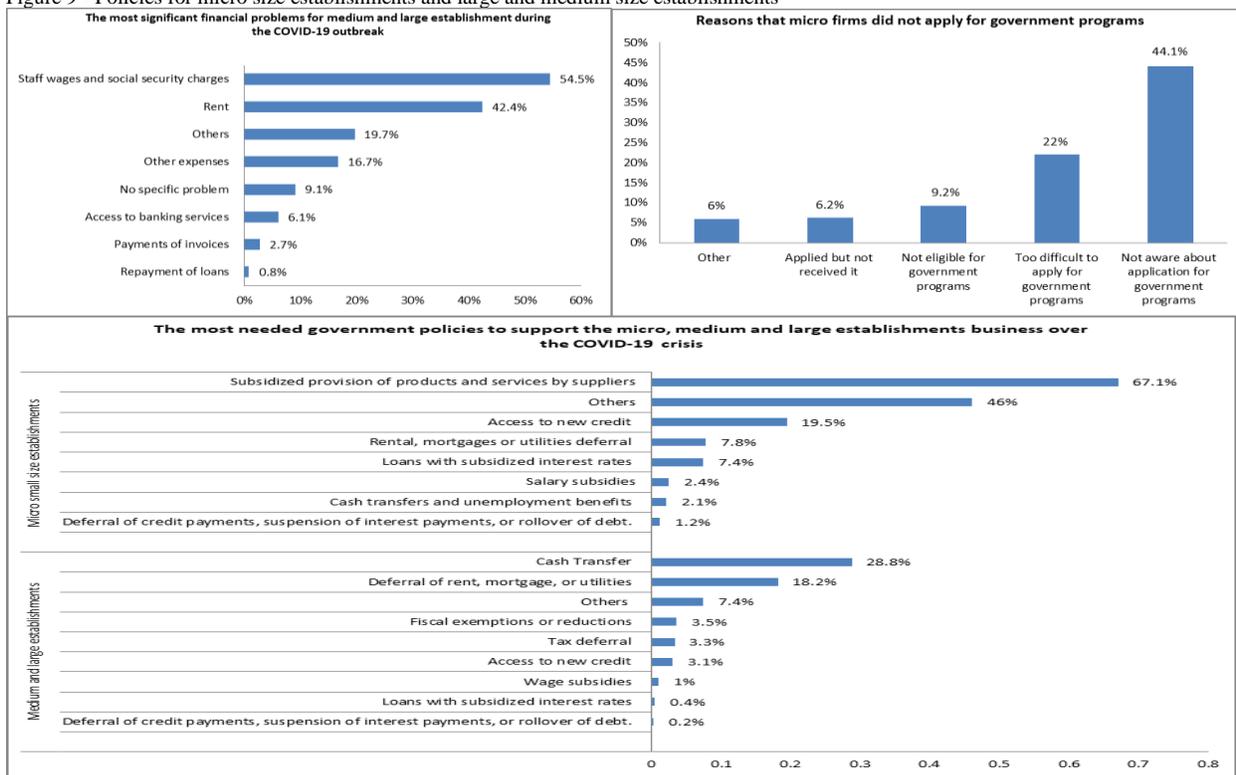
From the perspective of the medium and large size establishments the most significant financial problems confronting the medium and large establishments during the COVID-19 outbreak include staff wages and social security charges (54.5%), rent (42.4%), other expenses (16%), banking services (6.1%), payments of invoices (2.7%), repayment of loans (0.8%), and others (19.7%) respectively. (See Figure 9)

From the perspectives of the medium and large size establishments the most needed government policies to support the business over the COVID-19 crisis are cash transfer (28.8%), deferral of rent, mortgage, or utilities (18.2%),

fiscal exemptions or reductions (3.5%), tax deferral (3.3%), access to new credit (3.1%), wage subsidies (1.0%), loans with subsidized interest rates (0.4%), deferral of credit payments, suspension of interest payments, or rollover of debt (0.2%), and others (7.4%) respectively. From the perspective of the micro size establishments the most needed policies to support the micro size establishments or business over the COVID-19 crisis are subsidized provision of products and services by suppliers (67.1%), access to new credit (19.5%), rental, mortgages or utilities deferral (7.8%), loans with subsidized interest rates (7.4%), salary subsidies (2.4%), cash transfers and unemployment benefits (2.1%), deferral of credit payments, suspension of interest payments, or rollover of debt (1.2%), and other (46%) respectively.

Since the outbreak of COVID-19, none of the medium and large size establishments received any government support measures issued in response to the crisis. None of the medium and large size establishments' reported that they were able to keep workers due to the government support. None of the medium and large size establishments explain the reasons why they did not receive any government support in response to the crisis. None of the micro size establishments applied for any government programs to support establishments in regions/industries that they operate in. The reasons that micro size establishments did not apply for government programs because nearly half of the micro size establishments were not aware about application for government programs (44.1%), nearly fifth of the micro size establishments find it too difficult to apply for government programs (22%), nearly tenth of the micro size establishments were not eligible for government programs (9.2%), less than tenth of the micro size establishments have applied but not received government programs supports (6.2%), and others (6%) respectively. (See Figure 9)

Figure 9 - Policies for micro size establishments and large and medium size establishments



Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The adjustment mechanisms for micro size establishments and medium and large size establishments, implies that nearly tenth of the medium and large size establishments started using or increased the use of internet, online social media, specialized applications, or digital platforms in response to COVID-19 outbreak (10.6%). In particular, 3% of the medium and large size establishments started using the internet, online social media, specialized applications, or digital platforms in response to COVID-19 outbreak, whereas, 7.6% of the medium and large size establishments increased the use of internet, online social media, specialized applications, or digital platforms in response to COVID-19 outbreak (see Figure 10).

The medium and large size establishments started using or increased the use of internet, online social media, specialized applications or digital platforms in response to COVID-19 outbreak to do some business functions, mainly, nearly half of the medium and large size establishments started using or increased the use of internet, online social media, specialized applications or digital platforms for marketing (57.1%), sales (42.9%), and few using for business administration (0.6%) respectively. None of the medium and large size establishments started using or increased the use of internet, online social media, specialized applications or digital platforms to do production planning, supply chain management, payment methods and service delivery. In the last 3 months the use of digital platforms lead to change in the share of sales of all medium and large size establishments (either increased or decreased) (100%). (See Figure 10)

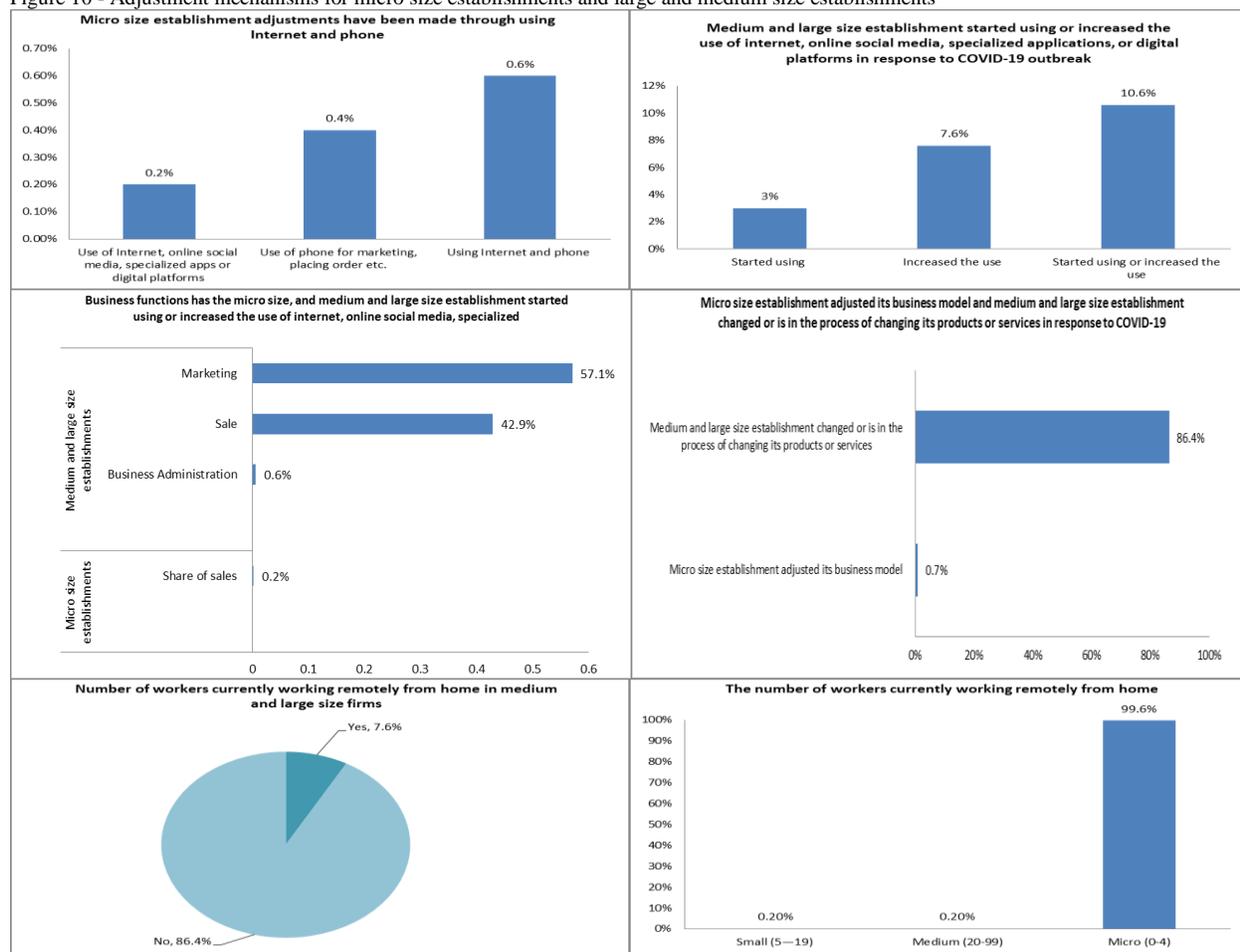
Only few of the medium and large size establishments invested in any new equipment, software or digital solution in response to COVID-19 (1.5%). Only few of the workers are currently working remotely from home in medium and large size establishments (7.6%), while, the majority of the workers are not currently working remotely from home in medium and large size establishments (86.4%) (See Figure 8). The majority of workers currently working remotely from home are working at the micro size establishments (99.6%), while; only few of workers currently working remotely from home are working in small size establishments (0.2%) and medium size establishments (0.2%). In the last 3 months, none of the medium and large size establishments reported increase or decrease in the share of workers working from home. (See Figure 10)

Few of the medium and large size establishments indicate that they did not changed or are not in the process of changing its products or services in response to COVID-19 (13.6%). None of the medium and large size establishments reported main change in the product or service mix in medium and large size establishments. Only few of the micro size establishments indicate that they adjusted its business model in response to the COVID-19 outbreak (0.7%). For only few of the micro size establishment adjustments have been made through (0.6%): the use of phone for marketing, placing order etc. (0.4%), and the use of Internet, online social media, specialized applications or digital platforms (0.2%), for only few of the micro size establishments, in the last 3 months (before August 2020), the share of sales of micro size establishments using phone, email, or online services increased (0.2%). These results imply the incidence of the digital disparity in access to ICT between the micro and small size establishments and the medium and large size establishments in Sudan. (See Figure 10)

The results in this section give answer to Q. 10 regarding the potential opportunities and challenges for the use of ICT and digital solutions in workplace in Sudan to manage the impact of COVID-19. The major policy implication from this result is that although the use of ICT and digital solutions provides potential opportunities to manage the

impact of COVID-19 in micro, small, medium and large size establishments in Sudan, but the lack of access to ICT and digital solutions implies potential challenges related not only to the limited use of ICT and digital solutions in micro, small, medium and large size establishments in Sudan, but also possibility of the incidence of the digital disparity and impact on widening digital disparities in access to ICT in workplace between the micro and small size establishments and the medium and large size establishments in Sudan.

Figure 10 - Adjustment mechanisms for micro size establishments and large and medium size establishments



Source: Author own calculation based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

The impact of COVID-19 also appears from the impact on revenue and investment for micro size establishments and large and medium size establishments. For instance, the value of total sales of the establishments in 2019 for micro size firms (34.8%) is more than twice higher than medium and large size (16.7%) (See Figure 11).

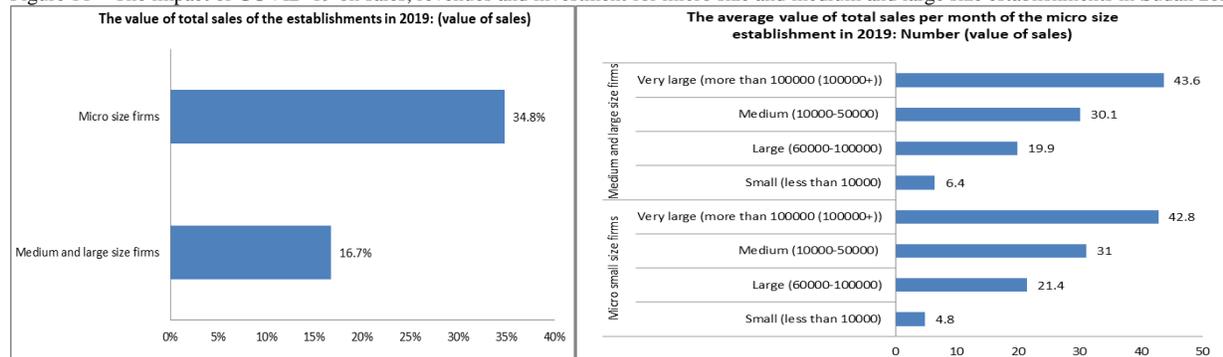
The average value of total sales per month for the micro size establishments in 2019 implies that the majority and nearly half of the micro size establishments (42.8%) and medium and large size establishments (43.6%) reported very large average value of total sales per month. While, less than third of the micro size establishments (31%) and medium and large size establishments (30.1%) reported medium average value of total sales per month. Whereas, more than fifth of the micro size establishments (21.4%), and nearly fifth of the medium and large size establishments (19.9%) reported large average value of total sales per month. And less than tenth of the micro size

establishments (4.8%) and medium and large size establishments (6.4%) reported small average value of total sales per month (see Figure 11).

The results in this section provide answer to Q. 3 concerning the effects of COVID-19 on firms' current status of work and business operations, sales, revenue, workers, and access to inputs in Sudan, and the differences in the effects of COVID-19 on firms according to firms' characteristics (firm size) in Sudan.

The findings in this section provide answer to Q. 4 regarding the main challenges, mainly financial problems facing firms due to COVID-19 in Sudan. The effects of COVID-19 on firms' expectations for the future in Sudan, the effects of the lockdowns or the stringency of policy measures on firms in Sudan, and the main policy response and absence of government support for firms in Sudan.

Figure 11 – The impact of COVID-19 on sales, revenues and investment for micro size and medium and large size establishments in Sudan 2020



Source: Author's calculations based on World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020)

Our results in Sections 4-5 regarding the impact of coronavirus (COVID-19) on households and firms are consistent with the findings in the MEAN literature concerning the economic impact of COVID-19 in households and firms in the MENA countries (e.g. Jordan, Egypt, Morocco and Tunisia) (cf. recent studies based on the Economic Research Forum (ERF) COVID-19 MENA Monitor Data, 2020-2021) and in the international literature concerning the impact of coronavirus (COVID-19) on households and firms (cf. Morgan and Trinh, 2021).

6. Conclusion

This paper discusses the impacts of COVID-19 pandemic on households and firms in Sudan as a case study of the MENA region. Mainly, it aims to explain COVID-19 economic impacts on household (household income, labour market status, employment benefits, working conditions, and unemployment), and social impacts (on social protection for workers) in Sudan defined by household characteristics (gender, education, and family size), and policy measures to manage the impacts on workers in Sudan. It aims to investigate the impact of COVID-19 on micro, small and medium size enterprises (MSME) and firms' current status of work and business operations defined by firms' characteristics (defined by firm size). The research uses the descriptive and comparative approaches, uses qualitative and quantitative analysis and uses new primary data obtained from the World Bank and Sudan Central Bureau of Statistic Sudan High Frequency Survey on COVID-19 (2020).

This research is organized in six sections. Section 1 provides Introduction, including the statement of the research problem and value added; the research questions and data, methodology and structure of the research. Section 2

presents the literature review. Section 3 shows an overview of the incidence and spread of Corona Virus Pandemic (COVID-19) in Sudan. Section 4 discusses the impact of COVID-19 on households in Sudan (using Household Survey). Section 5 discusses the impact of COVID-19 on micro, small and medium size enterprises (MSME) in Sudan (using Enterprises Survey). Finally, section 6 provides the conclusion.

We discuss the impact of COVID-19 on food security, mainly on intensifying the incidence and severity of food insecurity and the impact of COVID-19 on farming activities, mainly, the inability to perform the normal activities on the farm, raising livestock, or fishing since mid-March 2020 (32.8%), and the inability to sell any products from farms during the last seven day (31.7%).

We discuss the impact of COVID-19 on employment status, and explain that the loss of jobs for the majority and nearly two third of households who were not working for paid work and income generation activities during the last seven days (61.6%), and were not currently working and working before March 2020 (66.6%). The business / gov't closed due to coronavirus legal restrictions was reported as the main reason that the households either not currently working (69.5%), or did not do any paid work, business, farming or other activity to generate income (61.4%), and even changing jobs (43.7%). We show that the impact of COVID-19 on employment also demonstrated from the effects on the received payment. The majority and nearly half of households who were not able to work as usual received partial payment (46%), while, nearly fifth did not receive payment (19%). We explain that the impact of COVID-19 on employment also demonstrated from the effects on the loss and reduction of households' means of livelihood or source of income since mid-March 2020 from non-farm family business (53.3%), income from properties, investments or savings (47.5%), and income from family farming, livestock or fishing (38.5%). The impact of COVID-19 also appears from declining (52.6%), or stagnating (25.1%) revenues from business sales.

We show the differences in the status of employment according to gender, household educational level and household family size. We show the impact of COVID-19 on women and gender inequality that implies large impacts of COVID-19 on females compared to males. The probability of not working for paid work and income generation activities during the last seven days is higher for females (87.1%) compared to males (54.8%), the probability of not currently working and not working before March 2020 is higher for females (67.8%) compared to males (18.9%), and the probability of not currently working and working before March 2020 is higher for males (81.1%) compared to females (32.2%), we find that females changed their jobs more than males. We find that full payment for households who were not able to work as usual for males (41.7%) is more than three times higher than females (13.3%).

We find that the impact of COVID-19 on the operation and current status of the micro, small and medium size enterprises (MSME) appears from temporary closed establishments (21.4%), and permanently closed establishments (8.2%). And also from the reported decrease in sales (81.1%), stagnation in sales (15.3%), and reported substantial rate of decrease in sales (70.8%).

The results in section 4 show the impact of COVID-19 on health (healthcare system, health services), household mental health, and impacts on education and higher education in Sudan. The findings indicates that the impact of COVID-19 appears from the effects on household's access to medicine, health services, and impact on the households mental health (the majority of household feeling worried (very worried or somewhat worried) about the

possibility that household or someone in household's immediate family might become seriously ill from coronavirus (81.8%) and the majority of household feeling a substantial or a moderate threat would the coronavirus outbreak to household's finances (81.9%). The findings also indicate that the impact of COVID-19 on education appears from the serious effects on limiting the access to education, and limited use of ICT to facilitate access to education during the lockdown period in Sudan. The results explain the potential opportunities and challenges for the use of ICT and digital solutions in education and higher education in Sudan to manage the impact of COVID-19. The major policy implication from this result is that although the use of ICT and digital solutions provides potential opportunities to manage the impact of COVID-19 in education and higher education in Sudan, but the lack of access to ICT and digital solutions implies potential challenges related not only to the limited use of ICT and digital solutions in education and higher education in Sudan, but also possibility of widening digital disparities in access to education and higher education in Sudan. This implies the importance of improving access to ICT in Sudan.

The results in sections 4-5 show the impact of COVID-19 on MSME defined by firm size and the effects of COVID-19 on household labour market status, employment benefits, working conditions, unemployment, social protection, effects of COVID-19 on household enterprises, workers, workers' livelihoods, income, and differences in the effects of COVID-19 on households in Sudan according to household characteristics (gender, education, and family size).

Our results in this research regarding the impact of coronavirus (COVID-19) on households and firms are consistent with the findings in the MEAN literature concerning the economic impact of COVID-19 in households and firms in the MENA countries (e.g. Jordan, Egypt, Morocco and Tunisia) (cf. recent studies based on the Economic Research Forum (ERF) COVID-19 MENA Monitor Data, 2020-2021) and in the international literature concerning the impact of coronavirus (COVID-19) on households and firms (cf. Morgan and Trinh, 2021).

Based on the above results on the impacts of COVID-19 on households, micro, small and medium size enterprises in Sudan, and in view of the limited government support, we recommend the government to provide full support for households and micro, small and medium size enterprises (MSME) to manage the impact of COVID-19 in Sudan.

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