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Impacts of Climate Variability and Moisture Stress; A Causal Factor of Transmision Covid-19 Pandemic and its Inducing Agricultural Productivity in Ethiopia: Review

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Abstract

The COVID-19 pandemic is a current outbreak in almost all parts of the world including Ethiopia influencing the socio-economy of people and mostly threatening the agriculture and food security of the least developed countries. Health crisis due to the pandemic, they could divert attention from agriculture sector and adversely affect the food and nutrition security of the country by disrupting food supply chains. The COVID-19 pandemic is wreaking havoc in countries across the globe, causing a global health emergency and forcing economies to slow down due to the strict quarantine measures. Suitable climate and weather environments are essential for the survival, reproduction, distribution and transmission of disease pathogens, vectors, and hosts. Ethiopia has a high incidence of climate-sensitive diseases and increased temperatures will likely expand the range of malaria to highland areas and increased flooding will facilitate the spread of waterborne diseases like diarrhea and moisture stress were significantly overcome COVID-19. Climate change currently contributes to the global burden of disease and premature deaths.

Keywords: Climate variability, COVID-19, Moisture, Agriculture, Production

Introduction

Background and Justification of the Study

Climate change entails changes in climate variability and in the frequency of extreme weather events. IPCC predicted an average temperature rise of 1.5–5.8 0C across the globe during the 21st century, accompanied by increased extreme and anomalous weather events including heat-waves, floods and droughts [1]. Responding to global changes by pursuing a sustainable development is a major challenge to human society [2,3]. Climate change can affect human health [4-6], especially when infectious diseases are concerned [7,8]. Three components are essential for most infectious diseases: an agent (pathogen), a host (vector) and transmission environment [9]. Some pathogens are carried by vectors or require intermediate hosts to complete their lifecycle. Appropriate climate and weather conditions are necessary for the survival, reproduction, distribution and transmission of disease pathogens, vectors, and hosts. Therefore, changes in climate or weather conditions may impact infectious diseases through affecting the pathogens, vectors, hosts and their living environment [9,10]. General circulation models (GCMs) are currently the most widely used tools for simulating the global climate system [11]. Long-term climate warming tends to favor the geographic expansion of several infectious diseases [12,7] and that extreme weather events may help create the opportunities for more clustered disease outbreaks (Epstein, 2000). MarkSim is currently used to downscale outputs from GCMs and generate daily future climate data at specific site [13,14]. Projected trends in climate-change-related exposures of importance to human health will increase malnutrition and consequent disorders, including those relating to child growth and development.The COVID-19 pandemic is wreaking havoc in countries across the globe, causing a global health crisis and forcing economies to slow down due to the strict quarantine measures. However, the outbreak has also impacted the environment in an intriguing way. As the pandemic spreads in different parts of the world, its consequences run farther than closed borders, scarce hand sanitizer, and social distancing protocols. The COVID-19 crisis has put a spotlight on the global health science community. Rapid requests for scientific evidence about the virus have spread and health scientists have become more publicly prominent. Future Climate for Africa programme, has the core objective of improving science in terms of climate processes, projections and climate impacts on the African continent to inform policy for more sustainable development and greater resilience to climate change. COVID-19 is affecting the lives of millions of people and, also, the environment. The CO2 emissions and human mobility have been reduced, which improves air quality and encourages wild animals to come out and explore the cities. The name “coronavirus,” coined in 1968, is derived from the “corona”-like or crown-like morphology observed for these viruses in the electron microscope [15].

Statement of problems appealing on the study area

Ethiopia has a high incidence of climate-sensitive diseases. Increased temperatures will likely expand the range of malaria to highland areas and increased flooding will facilitate the spread of waterborne diseases like diarrhea. Climate change currently contributes to the global burden of disease and premature deaths. Human beings are exposed to climate change through changing weather patterns (temperature, precipitation, sea-level rise and more frequent extreme events) and indirectly through changes in water, air and food quality and changes in ecosystems, agriculture, industry and settlements and the economy. Populations with high rates of disease and debility cope less successfully with stresses of all kinds, including those related to climate change. may be affected by climate change, causes around 1 million child deaths annually [16]. Emerging evidence of climate change effects on human health shows that climate change has: altered the distribution of some infectious disease vectors altered the seasonal distribution of some allergenic pollen species increased heatwave-related deaths. Cold of days, nights and frost days have become increment of in winter mortality; as improved

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home heating, prevention and treatment of winter infections have played a more significant role [17]. In 2019, 40 billion tons of CO_2 were emitted per $88 billions of the world's GDP. If this correlation persists, a decrease of the world's GDP due to the imminent economic recession might generate a reduction in the global CO_2 emissions in a similar proportion. Health-impact models are typically based on climatic constraints on the development of the vector and/or parasite and include limited population projections and non-climate assumptions. However, there are important differences between disease risk (on the basis of climatic and entomological considerations) and experienced morbidity and mortality. Economic scenarios cannot be directly related to disease burdens because the relationships between gross domestic product (GDP) and burdens of climate-sensitive diseases are confounded by social, environmental and climate factors [18-20]. The projected relative risks attributable to climate change in 2030 vary by health outcome and region, and are largely negative, with most of the projected disease burden being due to increases in diarrhoeal disease and malnutrition, primarily in low-income populations already experiencing a large burden of disease [16,21]. Absolute disease burdens depend on assumptions of population growth, future baseline disease incidence and the extent of adaptation. According to, Randolph Bell, Director of the Global Energy Center, explained in the Atlantic Council that the economic recession linked by the virus is likely to cause a drop in the carbon dioxide emissions for this year. NASA's satellite images have evidenced the pollution reduction in China right after the carbon emissions had dropped by 25% in four weeks of lockdown. COVID-19, as a zoonotic disease, is a harbinger of things to come in the absence of urgent global actions to tackle climate change. Models with incomplete parameterisation of biological relationships between temperature, vector and parasite often over-emphasise relative changes in risk, even when the absolute risk is small. Several modelling studies used the SRES climate scenarios, a few applied population scenarios, and none incorporated economic scenarios. Reductions in cold-related deaths due to climate change are projected to be greater than increases in heat-related deaths in the UK [22]. However, projections of cold related deaths, and the potential for decreasing their numbers due to warmer winters, can be overestimated unless they take into account the effects of influenza and season [21]. COVID-19 related lockdown measures will have negative economic effects and congested conditions with limited access to services particularly on the town and city residential community. In Dawa zone, prices of essential commodities have risen due to decreasing supplies coupled with anticipated lockdown. The Ethiopian Government, as most governments in Africa hosting major humanitarian operations, has imposed movement restrictions to avoid the spread of the virus and protect the population. The United Nations Economic Commission for Africa estimated that COVID-19 will shave 2.9 percentage points off of Ethiopia's economic growth for fiscal year 2020 [23]. Those problems are the major challeges and worriest diseases (COVID-19) that alarming, suffering and killing the the human being without separation of sex, age, religion and nations in the country and in the study area too. As COVID-19 pandemic is a recent outbreak throughout the world including Ethiopia, there is no as such organized study on the impacts of climate variability on this pandemic and agricultural productivity. Therefore, this study aims to fill the information gap on the affiliation among climate variables, on pandemic disease COVID-19 and agricultural productivity in Eastern Ethiopia.Therefore, the overall objective of this study was review and assess the impacts of climate variability fluctuation and moisture stress on Covid-19 pandemic and inducing agricultural productivity in Ethiopa.

Literature Review

Definition of climate and covid-19 related terms

COVID-19:- Coronavirus emerged in 2019 is an acute respiratory disease caused by a newly emerged zoonotic coronavirus. It is an acute respiratory disease caused by a newly emerged zoonotic coronavirus. A positive-sense enveloped single-stranded RNA virus, named Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), has been isolated from a patient with pneumonia, and connected to the cluster of acute respiratory illness cases from Wuhan (Figure 1).

Climate change

Climate change refers to a significant and sustained (over decades or longer) change from one climatic condition to another. Climate change is a normal component of the earth‟s natural variability and occurs in all time and space scales. The manifestation of climate change such as rising temperature, increasingly erratic rainfall, frequent and severe floods and droughts have serious consequences on the livelihood

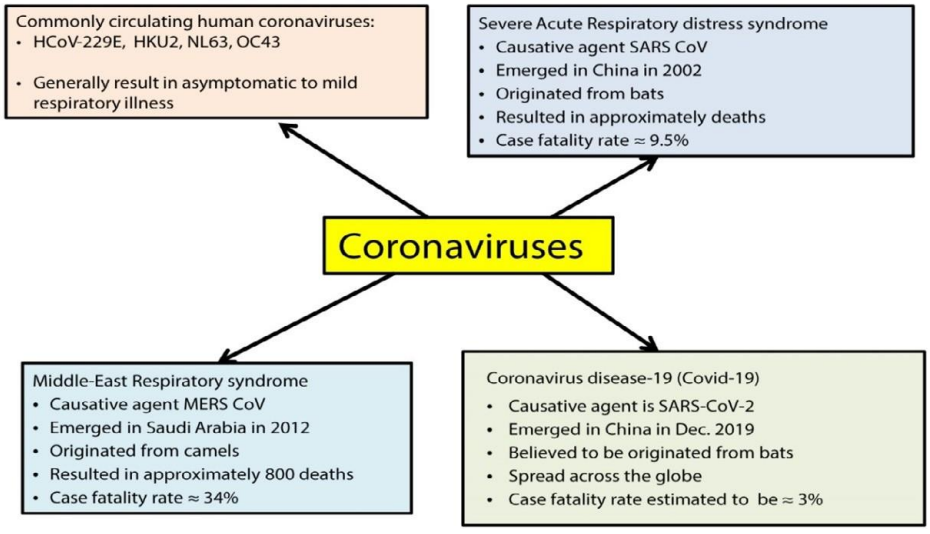

Figure 1: An Insight of COVID-19 into SARS-CoV-2 Pandemic Originated at Wuhan City in Hubei Province of China.

security of smallholder farming communities life standard in many African countries.

Climate variability

Climate variability is defined as a variations in the mean state and other statistics of the climate on all temporal and spatial scales, beyond individual weather events. It is often used to denote deviations of climatic statistics over a given period of time (month, season or year) when compared to long-term statistics for the same calendar period. El-Nino of Southern Oscillation (ENSO) is an example of climate variability through ocean-atmosphere interactions.

Overview of climate of Ethiopia

Ethiopia, located between 30 30‟ and 140 50‟ Northern latitude and 320 42‟ and 480 12‟ Eastern longitude in north-eastern Africa and characterized by diverse topography. National Meteorological Service Agency (1996) documented that the climate of the country is divided into 11 zones, broadly categorized as dry climate, tropical rainy climate, and temperate rainy climate. Most importantly, the varying topography across the country and the different atmospheric circulation patterns observed in the country, determine the rainfall patterns across the country. Climate system is largely determined by the seasonal migration of the intertropical convergence zone (ITCZ) and a complex topography. Mean annual rainfall distribution ranges from a maximum of more than 2,000 mm over the south-western highlands to a minimum of less than 300 mm over the south-eastern and north-western lowlands. The south-west and western areas of the country are characterized by a unimodal pattern whereas the remaining parts exhibit a bi-modal rainfall pattern [24,25]. The mean annual temperature varies widely, from lower than 15 0C in the highlands (>1500 m.a.s.l.) to more than 25 0C in the lowlands (< 1500 m.a.s.l.). In general, three seasons exist in Ethiopia, the first is the main rainy season from June to September, the second is the dry season from October to January and the third is the small rainy season from February to May, known locally as, kiremt, bega and belg respectively.

Rainfall and temperature variability in ethiopia

Agriculture is the most dominant sector of Ethiopia economy contributing 42 to 45% of GDP and 80% of employments [26]. Precipitation trend analysis on different spatial and temporal scales has been of great concern during the past century because of the attention given to global climate change by the scientific community. In Ethiopia, several studies have been carried out on rainfall and temperature trend and variability analysis based on historical data of some selected weather stations [27]over whole the country (Figure 2). However, mean annual temperature in Ethiopia has increased by 1.3

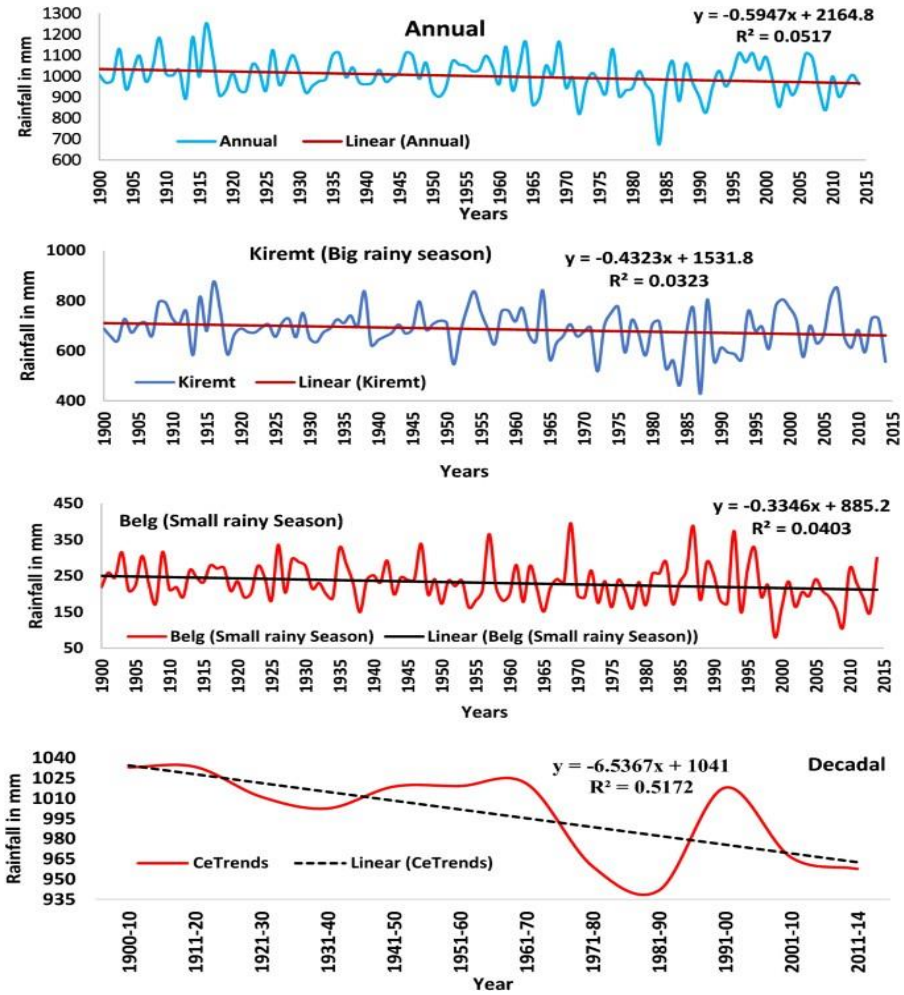

Figure 2: Spatiotemporal variability and trends of rainfall and temperature in the Northeastern Highlands of Ethiopia.

0C between 1960 and 2006, at an average rate of 0.28 0C per decade increased [28]. According to the study of past and future intra seasonal rainfall variability in terms of start date, end date and length of rainy season, number of rainy days, length of dry spell within the growing period and its trend is important for agricultural purposes in the dry land area than annual and seasonal totals.

Influence of climate change on the main rainy season in Ethiopia

The major rain and mpisture producing components during kiremt (JJAS) season are mainly seasonal migration of the Inter-Tropical Convergence Zone (ITCZ) and a complex local topography. It is ditacted primarly by El-Nino of Southern Oscillation (ENSO) and secondarly reinforced by more local climate indicators near Africa, Atlantic and Indians Oceans. On the other hand, development and persistence of the Arabian and Sudan thermal lows along 20‟N latitude, and the associated monsoon and development of tropical easterly jet (TEJ) and its persistence are weather producing system that influence the main rainy season [29,30].

The major impact of climate change and variability on agricultural production and food security

Droughts: remain one of the key drivers of food insecurity in Ethiopia. Since 1950, 12 major drought-induced food security crises have occurred. The main impacts of droughts include crop damage, loss of pasture and water sources, loss of animals, hunger, disease outbreaks, asset depletions, malnutrition and migration. Droughts can result in sharp reductions in agricultural output and related productive activity and employment, with multiplier effects on the monetary economy. Floods: both riverine and flash floods, regularly cause crop and infrastructure damage, contribute to farmland degradation and erosion and cause loss of life. Low productivity and social inequality: poverty, limited economic base and low levels of education hinder the ability of people to adapt. The productive systems of agriculture and livestock are the pillars of the economy. However, land shortages, limited resources and gaps in the dissemination of knowledge continue to limit the productivity of these systems. Land degradation: factors such as deforestation, erosion, poor agricultural practices, among others, have led to the degradation of soil. Under these circumstances, and combined with the intensification of the variability and climate change, the problems of soil degradation and water already jeopardize the sustainability of areas dedicated to subsistence. Fluctuations in water availability: natural sources of water include rivers, lakes, groundwater, streams, creeks and rainfall.

The implication of corona virus disease and climate change

Climate change affects the social and environmental determinants of health clean air, safe drinking water, sufficient food and secure shelter. Reducing emissions of greenhouse gases through better transport, food and energy-use choices can result in improved health, particularly through reduced air pollution. From the evidence so far, the COVID-19 virus can be transmitted in all areas, including areas with hot and humid weather. Regardless of climate, adopt protective measures if you live in, or travel to an area reporting COVID-19. The best way to protect yourself against COVID-19 is by frequently cleaning your hands. By doing this you eliminate viruses that may be on your hands and avoid infection that could occur by then touching your eyes, mouth, and nose.

The patterns of infection disease COVID-19

World Health Organization (WHO) declared that the outbreak of COVID-19 constituted a Public Health Emergency of International Concern (PHEIC) [31]. Based on the high levels of global spread and the severity of COVID-19, on 11 March 2020, the Director-General of the WHO declared the COVID-19 outbreak a pandemic [31]. Climatic conditions strongly affect water-air-borne diseases and diseases transmitted through insects, snails, metals, plastic or other cold-blooded animals. Changes in climate are likely to lengthen the transmission seasons of important COVID19-air borne disease and vector-borne diseases and to alter their geographic range. For example, climate change is projected to widen significantly the area of China where the snail-borne disease schistosomiasis occurs. The virus is transmitted from human to human via droplets coughed or exhaled by infected persons and by touching droplet-contaminated surfaces or objects and then touching the eyes, nose or mouth (European Centre for Disease Prevention and Control, 2020). The most commonly reported clinical symptom in laboratory-confirmed cases is fever (88%), followed by a dry cough (68%), fatigue (38%), sputum production (33%), dyspnoea (19%), sore throat (14%), headache (14%) and myalgia or arthralgia (15%) (WHO, 2020). Less common symptoms are diarrhoea (4%) and vomiting (5%). Around 80% of the reported cases in China had mild-to-moderate disease (including non-pneumonia and pneumonia cases), 13.8% had severe disease and 6.1% were critical (respiratory failure, septic shock, and/or multiple organ dysfunction/failure) [32,33].

Adaptation and mitigation measures to COVID-19

Measuring the health effects from climate change can only be very approximate. Nevertheless, a WHO assessment, taking into account only a subset of the possible health impacts, and assuming continued economic growth and health progress, concluded that climate change is expected to cause approximately 250 000 additional deaths per year between 2030 and 2050; 38 000 due to heat exposure. Climate change has already made conditions more favorable to the spread of some infectious diseases, including Lyme disease, waterborne diseases such as Vibrio parahaemolyticus which causes vomiting and diarrhea, and mosquito-borne diseases such as malaria and dengue fever. There is an urgent need for public health and health care to develop adaptation strategies for the impacts of climate change on infectious diseases [32,34,35]. The health sector is not a single entity, and adaptation options may need to be coordinated across institutions and agencies. Future risks are not easy to foretell, but climate change hits hard on several fronts that matter to when and where pathogens appear, including temperature and rainfall patterns. To help limit the risk of infectious diseases, should do all what can to vastly reduce greenhouse gas emissions and limit global warming to 1.5 degrees. Most of these diseases have entered into people from animals, especially wild animals. This trend has many causes and massive concentrations of people in cities where diseases transmitted by sneezing may find fertile ground. Mitigation actions include enhanced energy efficiency, especially in industrial, commercial and multifamily properties, utility-scale renewable energy and public transit investments. The potential health impacts of climate change from infectious diseases have been described elsewhere [36] shown in (Figure 3).

The impacts of COVID-19 on Livelihood based agricultural production and food security

COVID-19 hit the Eastern Africa subregion at a particularly critical time when the economies of a number of countries in the subregion were recovering from the impacts of recent droughts and severe flooding and dealing with the worst desert locust invasion in 25 years. In addition, conflict and climate-induced displacements are prominent in the subregion, with more than 7 million displaced people in camps

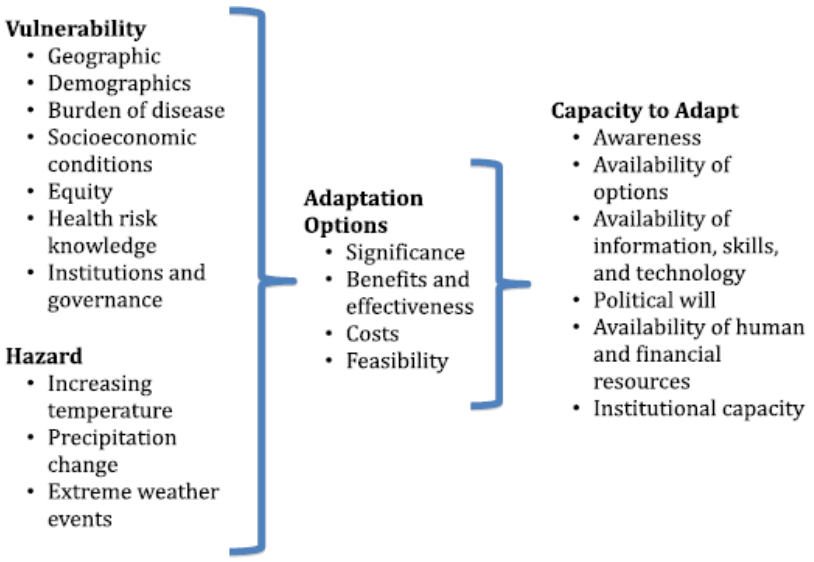

Figure 3: Determinant of climate change adaptation.

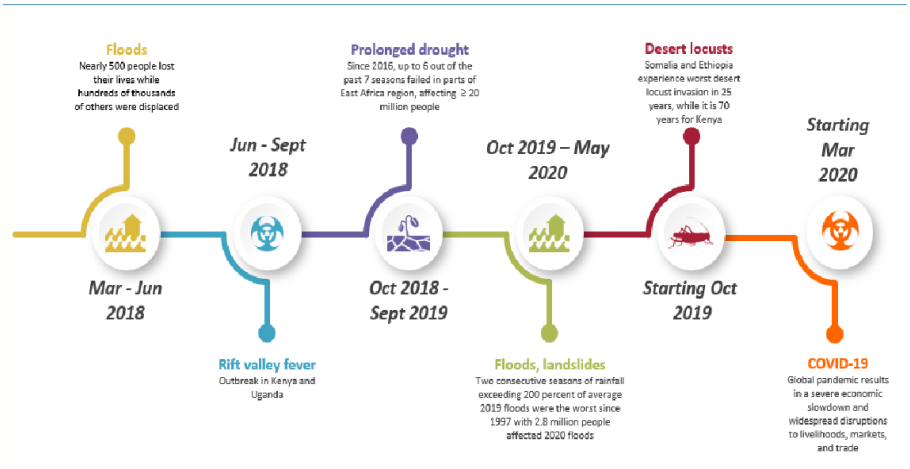

Figure 4: Timeline of recent shocks facing households in Eastern Africa (FAO, 2020).

or settlement situations in only four countries (1.78 million in Ethiopia, 1.67 million in South Sudan, 2.65 million in Somalia and 1.43 million in Uganda). (Figure 4) depicted that, the cumulative effect of these shocks has eroded the resilience of large segments of the population and strained governments and humanitarian agencies [37].Furthermore, transport along commodity routes have been interrupted by restrictions on cross-border movement. Truck drivers are increasingly reported in Rwanda, Tanzania and Uganda as a high-risk group for transmission of the disease ,which may lead to more measures on cargo transports that in turn could further disrupt the movement of agricultural goods. In Kenya, concerns over safety and requirements for COVID-19 tests for the long-distance truckers crossing borders in Eastern Africa resulted in a scarcity of food truck drivers.

Probable impact of covid-19 on agricultural production and potential mitigation and adaptation measures

According to FAO [38,39], food security scrutiny conducted in six regions of Ethiopia indicates that, an estimated 8 million people (27 percent of the 28.7 million people analyzed) were severely food insecure in Integrated Food Security Phase Classification (IPC) Phase 3 (Crisis) or worse between July and September 2019. Beside to thus, about 6.1 million people were classified in IPC Phase 3 (Crisis) and about 1.9 million people in IPC Phase 4 (Emergency). The similar report also showed that between October 2019 and January 2020, Ethiopia's food security situation is likely to improve slightly due to the seasonal (meher) harvests. Although, between February and June 2020, harvests from the Meher season will likely be dwindling and insufficient to sustain adequate food consumption through the lean season in areas that rely on belg (FMAM) agricultural and pastoral production. Furthermore, households relying on pastoral livelihoods classically depend on markets for food during this period. As food prices are expected to remain higher than previous years, these will most likely affect market access. About 8.5 million people are thus expected to be in Crisis (IPC Phase 3) or worse. Several factors exacerbate food insecurity in Ethiopia. Conflict and climatic factors have driven internal displacement in different parts of the country, disrupting

livelihood activities and distorting food market systems and prices.In consistently, Ethiopia is highly food-insecure, with 54 percent of the population (52 million people) consuming less than 2,100 calories a day [40]. According to the national official data about 26 percent of the rural people is already living below the national food poverty line [25,26]. The annual inflation rate in Ethiopia climbed further to 22.6 percent in March of 2020 (26.9 percent came from food prices). If food prices increased because of supply shocks and constrained imports related to COVID-19, the food insecure population could rise.

Impact on consumption of fruits and vegetables, animal products, seafood and fish products

As a consequence of COVID-19 related misinformation, the consumption of fruits and vegetables, animal products, seafood and fish products will be reduced in the short-term. It is necessary to provide the public with a transparent, stable, and reliable source of information regarding national markets, food supply and the safe consumption of such food items. In the medium and long-term, the accessibility of these food items might decline in the market due to less supply as producers are hard hit from the loss of earlier low prices. The government can ensure the continuous availability of such high-value food by making efforts at national and international levels.

Impact on dairy and fish industry

According to Ethiopia Country Commercial Guide (2020), in the last 15 years, the volume of milkproduction has tripled, and the government aims to double its production by 2020. An increasein production is a good opportunity for expansion of dairy processing industries to be able tosupply nutritious dairy products to the public. However, due to the occurrence of COVID-19, thelocal dairy demand and consumption has critically declined. This is mainly because of perceptionnot to consume raw and chilled animal products with the assumption that such foods are themain routes for the transmission of the virus. As a consequence, consumers in major marketdestinations have either reduced the amount they buy or completely avoided consumption ofraw fish, meat and chilled dairy products. This negatively affects the livelihood of producers,processors and value chain actors involved in the businesses.Decreased the production capacity of the fish and dairy industries could significantly hamper longterm growth of the sector due to high labor cost, especially if the work force is to be maintainedfor long period. This ultimately could lead to cessation of production and collapse of the industry (Figure 5) which can be manifested in terms of layoff of labor force, which in turn couldaggravate food and nutrition insecurity, and depression of the country's economy at large.

Climate change and COVID-19

In recent years, conversations about climate change have become increasingly urgent as governments and organizations around the world have gained a deeper understanding of the significant and irreversible negative impact that human activity is having on the planet. At the time the COVID-19 outbreak was declared a global pandemic, climate change was at the lead of political conversations and agendas. It was considered to be a crucial time to take decisive action to protect the future of the planet. However, the world's spotlight moved away from climate change as the impact of the pandemic wore on. At the time the COVID-19 outbreak was declared a global pandemic, climate change was at the forefront of political conversations and agendas. It was considered to be a crucial time to take decisive action to protect the future of the planet. However, the world's spotlight moved away from climate change as the impact of the pandemic wore on. According to, the finding of Science of the Total Environment revealed evidence that climate change may have played a direct causal role in the emergence of the virus responsible for the COVID19 pandemic, severe acute respiratory syndrome coronavirus 2 (SARSCoV2).Due to climate change, factors such as temperature, atmospheric carbon dioxide, and cloud cover are evolving. These factors have a direct impact on the growth of plants and trees. Therefore, climate change is affecting natural habitats and ecosystems via altering environmental factors. Even subtle adjustments can have a great impact on the species living within an ecosystem. The recent paper revealed that climatic changes directly fostered a favorable environment for many bat species to thrive, allowing for the emergence of novel coronaviruses including the SARSCoV2 strain. COVID-19 is not the only infectious disease linked to climate change. For many years the World Health Organization (WHO) has highlighted the link between changing environmental conditions and epidemic diseases. It is hoped that now, this link may take center stage, forcing policy makers to consider the wide-reaching impact of climate change and make calculated strategies to prevent further environmental damage and reverse, where possible, the damage that has already occurred (Figure 6).

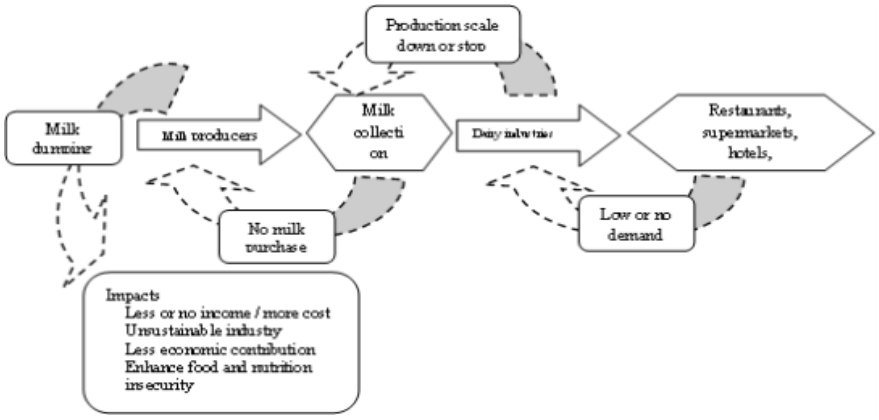

Figure 5: Contextualizing the impact of COVID-19 on dairy industry (impact of the disease indicated in broken arrows and the solid arrows show normal value chain path before occurrence of the disease).

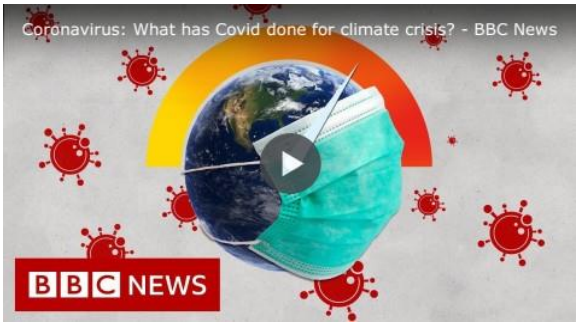

Figure 6: An overview of corona virus disease transmitted through air climatic condition.

Integrated socio-economic, political and health implications of COVID-19 and intervention strategies

COVID-19 has influenced behaviour, working conditions and business in many parts of the world, including increased digitalisation and decreased physical interactions and mobility, and will have long lasting effects on the built environment. A major challenge in responding to COVID is balancing reduced economic activity to control disease spread, and restored economic activity to avoid the harsh social and health consequences of the shutdown. An equally critical challenge is balancing a return to a pre-COVID "normal" condition versus resetting our economy to a new and better one, that avoids the health risks, inequities, and environmental depredations of recent decades. While this is a devastating moment, it is also an opportunity for transformative change that advances planetary health [31,41].

Conclusion

Succeeding the COVID-19 outbreak in China and spread to almost all countries in the world, governments and all concerned stakeholders are paying extreme attention on containing spread of the virus. Developing countries in general particularly in Ethiopia were implementing different policy measures including diverting large proportion of resources to the health sector, partial lockdowns, state of emergency, social distancing and avoiding crowds. Though, the procedures can help to reduce health crisis due to the pandemic, they could divert attention from agriculture sector and adversely affect the food and nutrition security of the country by disrupting food supply chains. The current assessment (experts' opinions and desk review) by the multi-disciplinary team of experts at Ethiopian region in different quarantine and station site highlights, in a comprehensive manner, the probable effects of COVID-19 and their respective adaptation and mitigation strategies on different functions. Again, stages of food supply chains including production, handling and storage, processing and packaging, distribution and marketing, and consumption were controlled under community engaged safety need priority taken. At production level, the pandemic outbreak is expected to negatively affect crop and livestock production inputs, labor, psychological aspects of producers, agricultural extension support system, supporters/service providers, local administration, control of desert locust, and pastoral movement. The COVID-19 pandemic is wreaking havoc in countries across the globe, causing a global health crisis and forcing economies to slow down due to the strict quarantine measures.Appropriate climate and weather conditions are necessary for the survival, reproduction, distribution and transmission of disease pathogens, vectors, and hosts. Long-term climate warming tends to favor the geographic expansion of several infectious diseases and extreme weather events may help create the opportunities for more clustered disease outbreaks. Ethiopia has a high incidence of climate-sensitive diseases. Increased temperatures will likely expand the range of malaria to highland areas and increased flooding will facilitate the spread of waterborne diseases like diarrhea. Climate change currently contributes to the global burden of disease and premature deaths. COVID-19, as a zoonotic disease is an indication of things to come in the absence of urgent global actions to tackle climate change. Climatic conditions powerfully affect water-air-borne diseases and diseases transmitted through insects, snails, metals, plastic or other cold-blooded animals. Changes in climate are probable to lengthen the transmission seasons of important COVID-19-air borne disease, vector-borne diseases and spotlight moved away from climate change as the impact of the pandemic wore on.Food security analysis conducted in six regions of Ethiopia indicates that, an estimated 8 million people (27 percent of the 28.7 million people) were severely food insecure in case of COVID-19 crisis. As a result of COVID-19 related misinformation, consumption of fruits and vegetables, animal products, seafood and fish products will be distorted in the short-term. Significantly, a major challenges in responding to COVID is balancing reduced economic activity to control disease spread, and restored economic activity to avoid the harsh social and health consequences of the shutdown in Ethiopian region. The foremost results, discussion and conclusion of climate variability on Covid-19 pandemic and agricultural productivity in Ethiopa drawn from this study were recommended as::

- ✓ Increase the awarreness of impacts of temperature and rainfall fluctuation on spreading of COVID-19.
- ✓ Show the relationship between COVID-19 and agricultutral productivity.
- ✓ Recommend adaptation and mitigation measures taken by conserned body on COVID-19.
- ✓ Provide information on climate variability impact on COVID-19 and agricultural productivity for individuals, societies, families, public health services and agricultural sectors.
- ✓ To generate information that may use by policy makers on public health and agriculture.

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