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Research Article

Chirps Amidst Coronavirus Disease-2019 (COVID-19) Transmission and Prevention in Ethiopia in 2020

Sahilu Assegid [1*]

[1] MD, MPH, Associate Professor of Epidemiology Jimma University, Jimma, Ethiopia

*** Correspondence:** Sahilu Assegid, MD, MPH, Associate Professor of Epidemiology Jimma University, Jimma, Ethiopia, P. O. Box 378

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Abstract

Background: Ethiopia confirmed its 1st case of COVID-19 on Friday 13th February 2020. The burden increased dramatically by August/2020. The conditions that led to this rise were not reviewed.

Objective: To explore COVID-19 related phenomena in Ethiopia during 2019-2020.

Materials and Methods: Review of journals, books, and letters to editors, e-sources, news, personal experiences, observations, and communications.

Results: The zoonotic source of SARS- CoV-2 (Severe Acute Respiratory Distress Syndrome- Coronavirus-2) is not confirmed. The precedent events; and exact mechanism of COVID-19 is not clear. Dynamic models were required on the time line of dynamics of COVID-19; dynamics of infectiousness of COVID-19, and mechanism of transmission of COVID-19. Incubatory carriers might have been missed. Screening based on temperature had been problematic. The time spent in the development of diagnostic test for COVID-19 might have contributed to the early spread.

Uninterrupted flights to China during the epidemic by Ethiopian Airlines as well as uninterrupted domestic flights; IDP (Internally Displaced People); and others put Ethiopia (and other countries) at great risk. Demographic adjustment may not be applicable for Ethiopia due to lack of census which had to be conducted every 10 year, was conducted only in 2007. This adds to the problem of error projection. The impact of HIV (Human Immuno-Deficiency Virus Disease) and war in Ethiopia before 2000 might have had affected people who would be now old age and who would be at the most risk of death. This made the impact of COVID-19 to appear low as revealed by the lower number of COVID-related deaths in Ethiopia. There were also hesitations inconsistencies in case definitions; implementations of quarantine; and burial regulations.

Conclusion: Even though uninhibited foreign flight to China as well as domestic flights; inconsistencies in the implementation of regulations pertaining to COVID-19 have contributed to COVID- 19

emergence in Ethiopia, the absence of census; the demographic impact of HIV and war before 2000 might have made the impact of COVID-19 to appear low as revealed by the lower number of COVID-related deaths in Ethiopia.

Recommendation: Accurate and current evaluation of the impact of COVID-19 in Ethiopia may require the absence of census; demographic consequences of HIV; and war before 2000 into consideration.

Keywords:
COVID-19

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Introduction

The famous Chinese philosophe Confucius wisely advised "Study the past if you would divine the future". [1]

In 430 B.C. a great plague struck Athens and its great leader was killed. The Athenians sought guidance from the Oracle at Delos who said that the god Apollo was angry and if his cubical altar was doubled in size the plaque would be abolished. The Athenians built a new altar doubling the width, height, and depth. The plague worsened so they went to the Oracle and found that Apollo wanted the volume doubled whereas the Athenians had octupled it. The plague continued until 423 B.C. [2] to control a rat infestation, colonial rulers in Hanoi in the 19th century passed a law: for every dead rat handed in to the authorities, the catcher would receive a reward. When it was realized that the infestation worsened, they ordered its investigation. The investigators reported that many rats were destroyed, but many were also bred specially for this purpose. [3], pp. 18

Coronavirus disease-2019 (COVID-19) emerged in early December [4] or identified in late December in Wuhan, and WHO (World Health Organization) declared COVID-2019 a Public Health Emergency of International Concern on Thursday, 30 January 2020, and the number of cases imported into other countries increased, and the epidemiological map was changing rapidly. [5] According to preprint of April 2020, COVID-19 has been spreading rapidly across the world, and was recognized as a pandemic by the WHO and on March 11 2020. [6]

The Origin and Transmission of COVID-19

According to an article made available online on April 15, 2020, the novel coronavirus originated from the Hunan seafood market at Wuhan, South China where raccoon dogs, bats, snakes, palm civets, and other animals are sold, and rapidly spread up to 109 countries. The zoonotic source of SARS- CoV-2 is not confirmed, however, the sequence-based analysis suggested bats as the main reservoir. [7]

A perspective published in January 2019 remarked that R_0 (the basic reproduction number), also called the basic reproduction ratio or rate or the basic reproductive rate, is an epidemiologic metric used to describe the contagiousness or transmissibility of infectious agents. R_0 is an estimate of contagiousness that is a function of human behavior and biological characteristics of pathogens. R_0 is not a measure of the severity of an infectious disease or the rapidity of a pathogen's spread through a population. R_0 can be misrepresented, misinterpreted, and misapplied in a variety of ways that distort the metrics. [8]

In an article published online 9 March 2020, body temperature screening (fever) was the major test performed at points of entry, i.e., airports, in the returning travelers in most of the countries with limited resources. However, the recent report on asymptomatic contact transmission of COVID-19 and travelers who passed the symptoms-based screening and tested positive for COVID-19 using RT-PCR (reverse transcription polymerase chain reaction) challenges this approach as body temperature screening may miss travelers incubating the disease or travelers concealing fever during travel. Travel restrictions to and from high risk areas and/or 14 days quarantine of travelers coming from high risk areas are recommended to prevent possible importation of COVID-19. The paper stated 'currently, RT-PCR is a reliable test' in detecting both symptomatic and asymptomatic COVID-19. [5]

According to letter to editor made Available online 9 April 2020, in March 2020, 40,887 patients attended a hospital in Taiwan for medical services. Only 5 patients were found to have fever (>38^0C) at the outdoor quarantine station. However, a further 37 patients were identified with fever when a 2nd temperature recording was made inside. It was recommended that medical institutions with outpatient services should take patients' body temperature for a 2nd time after they have acclimatized to being indoors and that this intervention could play an important role in hospital infection prevention and control. [9]

A publication on April 09, 2020, the theory behind our healthcare model has been refuted with the COVID-19 pandemic. The dominant health model and the theory that supported it until before COVID-19 are refuted or invalidated by observing the current tragically situation, which also implies lasting changes in that new medical model. Consequently, once the urgency of the epidemic is over, the conceptual and organizational building of medical care can no longer be rebuilt in the same way. Based on the COVID-19 experience, it is necessary to rethink what kind of knowledge can emerge. [10]

An article published online April 20/2020 said "… Optimal mitigation policies (combining home isolation of suspect cases, home quarantine of those living in the same household as suspect cases, and social distancing of the elderly and others at most risk of severe disease) might reduce peak healthcare demand by 2/3 and deaths by half. However, the resulting mitigated epidemic would still likely result in hundreds of thousands of deaths …." And especially when the model predictions that 500,000 people may die from severe COVID-19 infections using a value of $R_0 = 2.4$ in the model with no interventions, had to be drastically revised to a possible 20,000 people dying from severe infection, and an increased R_0 to be closer to 3 reported recently. The conclusion was: Mathematical modeling is a powerful tool for understanding transmission of Covid-19 and exploring different scenarios. But, instead of focusing on which model is correct, we should accept that "one model cannot answer it all" and that we need more models that answer complementary sub questions that can piece together the jigsaw and halt COVID-19 spread. [11]

As of April 17, 2020, across the 10 countries with most COVID-19 deaths the total number of infected to be approximately 4, 95% CI (2, 10) times the number of confirmed cases. However, uncertainty and high country-specific variations were raised. The study added that as many countries lack population based sero- prevalence studies, straightforward demographic adjustment can be used to deliver useful estimates of the total number of infected cases, and said that although these estimates are uncertain and vary across countries, they indicate that the COVID-19 pandemic was much more broadly spread than what confirmed cases would suggest, and the number of asymptomatic cases or cases with mild symptoms may be high and suggested that in cases in which estimates from local sero- prevalence studies or from simulation models exist, our approach can provide a simple benchmark to assess the quality of those estimates. [12]

An article received: 6 March 2020 Accepted: 18 June 2020 published online July 2020 concluded that the lockdown of Hubei province significantly reduced the basic reproduction number ($R_{0)}$. The large-

scale case-screening also showed the effectiveness in the epidemic control. They concluded that this study provided experiences that could be replicated in other countries suffering from the epidemic. Although the epidemic is subsiding in China, the controlling efforts should not be terminated before May. [13]

A paper accepted 5 April 2020 on the study done in Brazil suggested that accuracy of commercially available tests for COVID-19 in Brazil remains unclear. The study identified 16 tests registered, mostly rapid-tests. Pooled diagnostic accuracy measures [95% CI] were: for IgM (Immunoglobulin M) antibodies Se(Sensitivity) = 82% [76–87]; Sp. (Specificity) = 97% [96–98]; DOR = 168 [92–305] and SROC (Receiver Operator Curve) = 0.98 [0.96–0.99]; for IgG (Immunoglobulin G) antibodies Se = 97% [90–99]; Sp. = 98% [97–99]; DOR = 1994 [385–10334] and SROC = 0.99 [0.98–1.00]; and for detection of SARS-CoV-2 by antigen or molecular assays in naso/oropharyngeal swabs Se = 97% [85–99]; Sp. = 99% [77–100]; DOR = 2649 [30–233056] and SROC = 0.99 [0.98–1.00]. They concluded that while these tests can be helpful for emergency testing during the COVID-19 pandemic in Brazil, however, it was important to highlight the high rate of false negative results from tests which detect SARS-CoV-2 IgM antibodies in the initial course of the disease and the scarce evidence-based validation results published in Brazil. The study recommended that future studies addressing the diagnostic performance of tests for COVID-19 in the Brazilian population were urgently needed. [14]

Publication on Apr 07, 2020 reported that children can play an important role as asymptomatic transmitter of COVID-19. [18] Concerning the Interpretation of Diagnostic Tests for SARS-CoV-2 JAMA (Journal of American Medical Association) of June 9, 2020 concluded that using available evidence, a clinically useful timeline of diagnostic markers for detection of COVID-19 has been devised. Most of the available data are for adult populations who are not immune-compromised. The time course of PCR positivity and sero- conversion may vary in children and other groups, including the large population of asymptomatic individuals who go undiagnosed without active surveillance. Many questions remain particularly how long potential immunity lasts in individuals, both asymptomatic and symptomatic, who are infected with SARS-CoV-2. [15]

Ethiopian Airlines and the COVID-19 Situation

According to the news in January 30/2020; Ethiopian Airlines suspended all flights to China, where an outbreak of coronavirus has killed at least 170 people. As the carrier runs 6 flights to China daily across 5 Chinese destinations, the suspension of its service was expected to significantly disrupt air travel. An Ethiopian Airlines spokesman declined to comment. Ethiopia's state minister for Health said that tests for coronavirus on 4 Ethiopians at a lab in South Africa came back negative. [16]

On the other hand, according to February 8, 2020 news, the Ethiopian government has been reluctant to curtail its Ethiopian Airlines flights to avoid a falling out with the Chinese government due to the deep economic and political ties between both countries. Ethiopian's top executive told that the company had no intention of stopping all flights. "It will not be morally acceptable to stop flying to China today because they've a temporary problem," Skeptics of the continent's preparedness to address a pandemic such as coronavirus have good reasons for their doubts. WHO said this week it is scaling up preparedness in 13 top priority African countries, including Ethiopia. As of Thursday February 2020, only 6 labs on the continent can actually test for coronavirus. [17]

Ethiopia confirmed its 1st case of COVID-19 on Friday 13th February 2020. [18] The 1st COVID-19 case in Ethiopia was detected and reported on March 13, 2020. [19] Ethiopia, with about 107 million people, confirmed its 1st case of COVID-19 on March 13. [20] Ethiopia had ludicrous definitions on COVID-19 [21]

On June 18, Ethiopia's confirmed COVID-19 cases reached 3,954 after 195 new COVID-19 positive cases were confirmed. The Ministry of Health also disclosed that 2 COVID-19 patients succumbed to the disease on Thursday, eventually bringing the total number of COVID-19 related deaths to 65. On June 19 2020 the Ethiopian Ministry of Foreign Affairs called for boosting China-Africa solidarity in fighting against the COVID-19 pandemic and added that the solidarity between Africa and China can overcome the socio-economic challenges posed by the COVID-19 pandemic and chart out a better way forward. "Ethiopia appreciates China for successfully curbing the spread of the COVID-19 disease

and for its unyielding support to Ethiopia's fight against the scourge," he said. "Ethiopia hopes the conference would create opportunities for concerted efforts in containing, mitigating and defeating the global threat from the pandemic that has severely affected developing countries." [22] From June 15 – 20, the National Emergency Coordination Center (NECC) in cooperation with humanitarian partners conducted a multi-cluster assessment in quarantine centers (QCs) and points of entries (POEs) in 7 regions and one city council. [23]

As of 13 July, the number of confirmed cases in Ethiopia has risen to 7,969 compared to 3,954 on 18 June, indicating that the COVID-19 outbreak was gaining pace in Ethiopia, with cases and fatalities continuing to rise. On 19 June, the Government eased quarantine regulations by announcing that "all travelers arriving at Bole International Airport in Addis Ababa carrying a certificate of negative PCR SARS-CoV-2 test, done up to 72 hours before arrival, will be able to follow the 14-day quarantine at home after giving sample upon arrival. Travelers and returnees with no certificate of negative PCR SARS-CoV-2 test results will be quarantined for 7 days in the designated sites, tested, and then able to self-isolate for additional 7 days at home." Government's movement restrictions related to COVID-19 have been eased allowing inter-regional movements throughout the country. Partners have expressed concern on the risk of relocating IDPs during COVID-19. As of 13 July, nearly 24,000 IDPs who were displaced by inter-communal conflict in 2017/ 2018 were returned by the government. [23]

On August 06, 2020 CDC (Centers for Disease Control) recommended travelers avoid all nonessential international travel to Ethiopia. Travelers at increased risk for severe illness from COVID-19 should consider postponing all travel, including essential travel, to Ethiopia. COVID-19 risk in Ethiopia is high. [24]

As of 15 August, Ethiopia has 28,894 confirmed COVID-19 cases, representing an increase of around 70% over the 15,810 cases reported. The rate of positive cases is 7.4% as per the data released on 15 August by the Ethiopian Public Health Institute (EPHI). A total of 589,694 samples have been tested as of that date. The number of tests conducted per day varies but has continued to show an increasing trend compared to the situation of the previous reporting period. The daily test trend in the period of 1-15 August, ranged from 6,900 to 22,200 and the testing capacity has surpassed 10,000 tests per day on 7 occasions and conducted in 46 laboratory facilities with 59 laboratory machines across the country. [25]

The news on Aug. 15/2020 said that Ethiopia's confirmed COVID-19 cases reached 28,894 after 1,652 new COVID-19 positive cases were confirmed on Saturday, the country's Ministry of Health said. This is so far the highest daily increase in the Horn of Africa country. The ministry, in a statement issued on Saturday, revealed that from a total of 22,252 medical tests that were conducted within the last 24 hours, some 1,652 of them tested positive for COVID-19, eventually bringing the total number of positive cases to 28,894. Seventeen more patients succumbed to illnesses related to the COVID-19 pandemic on Saturday, bringing the total number of COVID-19 related deaths to 509; 12,037 patients who tested positive for COVID-19 had so far recovered, including 377 in the last 24 hours period. A total of 16,346 COVID-19 patients were still undergoing medical treatment, out of which 199 were in severe condition. On Thursday, Ethiopia reported more than 1,000 daily COVID-19 cases for the first time since the first case of the virus was announced in March. On Thursday and Friday reported 1,086 and 1,038 daily COVID-19 positive cases, respectively. Ethiopia, had so far conducted some 589,694 COVID-19 medical tests. Amid the rapid spread of the virus across the East African country, the Ethiopian government is intensifying its mass COVID-19 testing campaign as the number of COVID-19 cases rises rapidly in recent weeks. Earlier this month, the East African country officially launched a nationwide month-long testing campaign, which the Ethiopian government said "will determine the next steps to undertake in the new year," which will start on Sept. 11. The Ethiopian government is currently mobilizing resources to ensure there's no shortage of laboratory materials and quarantine centers. Ethiopia is also boosting its COVID-19 testing capacity at border points with neighboring countries. As the East African country strengthened the fight against the COVID-19 pandemic, Chinese engagement has injected much-needed momentum in Ethiopia's anti-pandemic efforts. On Monday, the Chinese technology and social media giant, ByteDance, donated 100,000 COVID-19 testing kits in support of Ethiopia's anti-COVID-19 pandemic efforts. [20]

The Chirps

One regulation on public transport in one town, which is still applied, is halving the carrying capacity of taxis and Bajaj's by doubling the cost/trip/person. This was reversed on 9/62020.

During the month of July, a long-distance driver of fuel-carrying truck from Djibouti port was recaptured in the town after unloading the fuel nearby town and in a mad furry was taken to the capital with the truck remaining on site of check point for some days. The rumors added, after giving samples for COVID-19 test in the capital and release, he turned out to be positive for COVID-19.

About the 'First case' in that town the local radio announced the 1st case and her address as from the same town; the following day the same local radio reported her address to be from elsewhere. According to the rumors her test was done in other Hospital which had not begun testing before that town's hospitals, a friend of mine, who is a microbiology expert, told me that he made a call to his professional colleague working at other hospital and got a response that COVID-19 test was not yet initiated. Then rumors circulated her test was done in capital. Soon PCR machine here was said to have failed. In an interview that on local radio and she said that she had been in the Gulf country some months ago and that she was also at site of holy water (traditional) in near the capital, and that she was/and still on anti TB treatment. The woman complained that while still in her isolation site and that no one health care provider had come to see her. No interview of health professionals as to why.

In 2020 a person on isolation was said to have threatened escape and return to his community unless mobile phone was bought for him. In the month of April 2020 the Protestant church, preacher foresaw and preached the congregation the abolishment of COVID-19 by the end of June/2020. In hindsight, it is tantamount to abolishment/miracle- a fortunate outcome that prevails despite overwhelming odds against it. Traditional healers also promised and submitted their 'medicine to MOH (Ministry of Health). Much news about it has been transmitted on TV. Other relevant issues amidst COVID-19 to be mentioned one previous zone in the south became region- implying change in geographic boundary as well as administrative change; the opponents extreme urge for National Election; release of prisoners; and the concomitant imprisonment of new; variable burial regulations, case definitions.

Results and Discussion

By April 15/2020 the zoonotic source of SARS- CoV- 2 had not been confirmed, however, the sequence-based analysis suggested bats as the main reservoir. [7] A publication on April 09, 2020, the theory behind our healthcare model has been refuted with the COVID-19 pandemic which also implies lasting changes in that new medical model. [10] The theory about the genesis of COVID-19 and bat to man transmission had not been substantiated.

An article published online April 20/2020 "… Optimal mitigation policies might reduce peak healthcare demand by 2/3 and deaths by half. And resulted in hundreds of thousands of deaths …. Drastic revision of R_0 was called for. [11] The virulence or death/cases had been underestimated. Definition of R_0 had undermined non-contact e.g. direct projection, or indirect transmission.

But, instead of focusing on which model is correct, we should accept that "one model cannot answer it all" and that we need more models that answer complementary sub questions that can piece together the jigsaw and halt COVID- 19 spread. [11] There can be methodology that can be applied to any form of model, e.g. the expansion method in diffusion studies- model that does not presuppose invariance of model parameters

As of April 17, 2020, across the 10 countries with most COVID-19 deaths the total number of infected to be approximately 4, 95% CI (2, 10) times the number of confirmed cases. [12] in short the ratio covert/overt cases or concealed/revealed, or 1/pathogenicity had been were underestimated.

April 2020 recommendations said that future studies addressing the diagnostic performance of tests for COVID-19 in the Brazilian population were urgently needed. [14]. A letter to the editor published online March 9/2020 stated 'currently, RT-PCR is a reliable test' in detecting both symptomatic and asymptomatic COVID-19. [5] As to asymptomatic detection only occurs if patients are followed up proactively from the time of exposure. [15]

Screening and testing depend on, among others, timing, type of test, site from where specimen was taken, symptoms. Also the time spent in the development of diagnostic/screening test for COVID-19 might have contributed to the early spread.

Body temperature screening may miss travelers incubating the disease or travelers concealing fever during travel. [5] Incubatory carriers might have been missed. Screening based on body temperature, and the time spent development of non-contact measurement of body temperature might have added to the problem of early detection.

It will not be morally acceptable to stop flying to China today because they've a temporary problem. [21] Even though the Ethiopian Airline planes evolved into cargos, early in the pandemic COVID- appeared a temporary problem.

Different sources gave different information on the onset of COVID-in Ethiopia, for instance Ethiopia confirmed its 1st case of COVID-19 on Friday 13th February 2020. [18] The 1st COVID-19 case in Ethiopia was detected and reported on March 13, 2020. [19] Ethiopia, with about 107 million people, confirmed its 1st case of COVID-19 on March 13. [20]

Nevertheless, between COVID-2019 emergence in December 2019 in Wuhan, [2] and the time of the WHO's declaration COVID-2019 a Public Health Emergency of International Concern on Thursday, 30 January 2020, [5] the Ethiopian Airlines might already have had several flights to China. The Ethiopian government was said to have displayed remarkable reluctance to curtail its Ethiopian Airlines flights and an executive said "It will not be morally acceptable to stop flying to China today because they've a temporary problem." [17] Furthermore on June 19 2020 the Ethiopian official on Friday called for boosting China-Africa solidarity in fighting against the COVID-19 pandemic. [22] These issues together with others put Ethiopia- and other countries at great risk.

Although on June 18, Ethiopia appreciated China for "successfully curbing the spread of the COVID-19 disease and for its unyielding support to Ethiopia's fight against the scourge." [22] This shows people have no good advisees. The flights were scourge. In earlier time of the pandemic, concerned with the continued flight, the BBC Africa focus had interviewed the same foreign minister he said the health system can cope it. Rather the impact of HIV and war in Ethiopia before 2000 might have had affected the would be now old age which is COVID-19's stronghold, making COVID-19's impact upon Ethiopia lower as revealed by the number of deaths, which is the most fraught outcome, lower.

On 19 June, the Government eased quarantine regulations by announcing that "all travelers arriving at Bole International Airport in Addis Ababa carrying a certificate of negative PCR SARS-CoV-2 test, done up to 72 hours before arrival, will be able to follow the 14-day quarantine at home after giving sample upon arrival. [23] Certificate is no guarantee about the future.

Travelers and returnees with no certificate of negative PCR SARS-CoV-2 test results will be quarantined for 7 days in the designated sites, tested, and then able to self-isolate for additional 7 days at home." [23] This statement is elusive. In the month of June 2020, the radio broadcast of one region announced in Amharic that all returnees (likely this is related to movements via borders), who arrived to that region during the previous 2 months had to report in personally to the regional office.

Government's movement restrictions related to COVID-19 have been eased allowing inter-regional movements throughout the country. [23] There were deep rooted problems with ethnic federalism.

Although it was reported that Ethiopia had about 107 million people, [20] and, an article in April said that, as many countries lack population based sero- prevalence studies, straightforward demographic adjustment can be used to deliver useful estimates of the total number of infected cases, [12] Demographic adjustment and may not be applicable for Ethiopia due to reluctance on census which had to be conducted every 10 year was conducted only in 2007. This adds to the problem of error projection. Also it has to be noted that COVID-19 was not responsible for all deaths during the previous 9 months of 2020.

Conclusions

• The genesis/bat to man transmission had not been confirmed. The precedent events; and exact mechanism of COVID-19 is not clear.

• Dynamic models and mechanism of transmission of COVID-19 were not complete

• The time spent in the development of diagnostic test for COVID-19 might have contributed to the early spread.

• Incubatory carriers might have been missed. Screening based on temperature had been problematic

• Uninterrupted International; domestic flights and IDP during 2020 had put Ethiopia- and other countries at great risk.

• Demographic adjustment may not be applicable for Ethiopia due to lack of census which had to be conducted every 10 year was conducted only in 2007 adds to the problem of error projection. The impact of HIV and war in Ethiopia before 2000 might have had affected those who would be now in old age were they to survive, and who would be at most risk of COVID-19 related deaths. COVID-19's impact on Ethiopia as revealed by the number of deaths appeared lower for possibly for these conditions.

Recommendation

Accurate and current evaluation of the impact of COVID-19 in Ethiopia may require the absence of census; demographic consequences of HIV; and war before 2000 into consideration.

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