

A Global Survey of Technological Resources and Datasets on COVID-19

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Abstract—The application and successful utilization of technological resources in developing solutions to health, safety, and economic issues caused by COVID-19 indicate the importance of technology in curbing COVID-19. Also, the medical field has had to race against time to develop and distribute the COVID-19 vaccine. This endeavour became successful with the vaccines created and approved in less than a year, a feat in medical history. Currently, much work is being done on data collection, where all significant factors impacting the disease are recorded. These factors include confirmed cases, death rates, vaccine rates, hospitalization data, and geographic regions affected by the pandemic. Continued research and use of technological resources are highly recommendable—the paper surveys list of packages, applications and datasets used to analyse COVID-19.

Keywords—Vaccination; hospitalization; confirmed cases; datasets; data science; COVID-19

I. INTRODUCTION

COVID-19 pandemic has affected the world; data is being collected by agencies, organizations, institutions, and other bodies that are keen on providing insights [391]. Data collection includes conducting case surveillance to gather data on demographics, clinical factors, epidemiologic characteristics, illness course, care, and history on exposure and contact. This data is needed to assess where, when, and

who are most affected by the pandemic. The data available on COVID-19 is used by researchers in the medical field in evaluating different aspects of the virus. Statistical analysis tools estimate factors concerning the virus infectiousness obtained in growth rate and doubling time. Epidemiological models are used to group individuals based on their demographic data and apply mathematical formulas to find virus characteristics. Using machine learning, the time series prediction model is proposed to obtain the curve and forecast the epidemic's tendencies.

As a part of tackling the pandemic, different institutions, governments, organizations, and individuals have developed and adopted technological resources to manage the pandemic and support adherence to containment measures. Most of the technologies developed have utilized R programming, Python, Java, Kotlin, JavaScript, among other resources. Mobile applications were developed to help in contact tracing, notifications, and alerts to users if they interacted with a person infected. Dashboards have been used in visualizing COVID-19 cases across the world. This paper presents a survey of the technological resources and datasets been used by industry and academia to combat COVID-19.

Table I provide the name of the application; the details of the developer, institution, or academia; the summary of the application, its web link, and codebase link.

TABLE I. TECHNOLOGICAL RESOURCES SUMMARY TABLE

Application	Developer/industry/ Academia/University details	Application summary	Application weblink	Application code base link	References
Coronavirus tracker	Developed by John Coene.	Coronavirus tracker is an R Shiny app that tracks the spread of the coronavirus, based on three data sources, including John Hopkins, Weixin, and DXY Data. The app summarizes the coronavirus statistics such as deaths, confirmed, recovered, and suspected cases on a dashboard.	https://www.coronatracker.com/ [1]	https://github.com/JohnCoene/coronavirus.git [2]	[1] [2] [3]
COVID-19 Global Cases	Developed by Christoph Schoenenberger.	COVID-19 Global cases are a shiny app that displays the recent Covid-19 developments via key figures, plots, a map, and summary tables.	https://chschoenenberger.shinyapps.io/covid19_dashboard/ [4]	https://github.com/chschoenenberger/covid19_dashboard [5]	[3] [4] [5]
The 2019-20 Coronavirus Pandemic A timeline	Developed by Nico Hahn	Visualization of Covid-19 cases is a shiny application that uses leaflet, plotly, and data from Johns Hopkins University to visualize the novel coronavirus outbreak and show data for the entire world or particular countries.	https://nicohahn.shinyapps.io/covid19/ [6]	https://github.com/nicoFhahn/covid_shiny [7]	[3] [6] [7]

Modeling COVID-19 Spread vs Healthcare Capacity	Developed by Dr. Alison Hill from Johns Hopkins University	This application utilizes the epidemiological model based on the classic SEIR model to define the Covid-19 spread and clinical progression. The application provides different infection trajectories, clinical interventions to curb transmission, and a comparison to the current healthcare capacity.	https://alhill.shinyapps.io/COVID19seir/ [8]	https://github.com/alsnhll/SEIR_COVID19 [9]	[3] [8] [9]
COVID-19 Data Visualization Platform	Developed by Shubhram Pandey.	This is a shiny app that provides an elaborate visualization of the impact of Covid-19 across the globe. The application also applies natural language processing from Twitter to provide sentiment analysis.	https://shubhrampandey.shinyapps.io/coronaVirusViz/ [10]	https://github.com/shubhrampandey/coronaVirus-dataViz [11]	[3] [10] [11]
Coronavirus 10-day forecast	This application was developed by Spatial Ecology and Evolution Lab (SpEEL) from the University of Melbourne.	It is a shiny app that provides a ten-day forecast of likely coronavirus cases by country, giving individuals a sense of how the Covid-19 is spreading or progressing.	https://covid19forecast.science.unimelb.edu.au/ [12]	https://github.com/benflips/nCovForecast [13]	[3] [12] [13]
Coronavirus (COVID-19) across the world	This application was developed by Anisa Dhana.	It is a shiny app that uses a map visualization of cases confirmed to monitor the spread of Covid-19 across the world and graphs to visualize the growth of the disease.	https://dash.data-scienceplus.com/covid19/ [14]	https://github.com/CSSEGISandData/COVID-19 [15]	[16] [14] [15]
COVID-19 outbreak	Dr. Thibaut Fabacher developed this application in collaboration with the department of Public Health of the Strasbourg University Hospital and the Laboratory of Biostatistics and Medical Informatics of the Strasbourg Medicine Faculty.	The application displays an interactive map that indicates the worldwide monitoring of Covid-19 infection. The main area of focus of the app is on the evolution of the number of Covid-19 cases per country for a given period.	https://thibautfabacher.shinyapps.io/covid-19/ [17]	https://github.com/DrFabacher/Corona [18]	[3] [17] [18]
Corona trajectories	This application was developed by André Calero Valdez, from RWTH Aachen University.	The application uses two graphs to compare the number of confirmed cases and the deaths from Covid-19 with the country's trajectories. The application also allows users to compare the case number and growth rate of the Covid-19 pandemic per country using a table.	https://andrevalerovaldez.shinyapps.io/CovidTimeSeriesTest/ [19]	https://github.com/Sumidu/covid19shiny [20]	[3] [19] [20]
Flatten the curve	Tinu Schneider developed	this application. In an interactive way, the app illustrates the different scenarios behind the #FlattenTheCurve message.	https://tinu.shinyapps.io/Flatten_the_Curve/ [21]	https://github.com/tinuschneider/Flatten_the_Curve [22]	[3] [21] [22]
Explore the Spread of Covid-19	Joachim Gassen developed this application,	The application allows users to visualize confirmed, recovered cases and reported deaths for several countries via one summary graph.	https://jgassen.shinyapps.io/tidyCovid19/ [23]	https://statsandr.com/blog/top-resources-on-covid-19-coronavirus/#tidycovid19 [24]	[3] [23] [24]
COVID-19	Sebastian Engel-Wolf developed the application	The application visualizes elegantly collected Covid-19 data, including the confirmed cases, Maximum time of exponential growth in a row, deaths, populations, and Confirmed cases on 100,000 inhabitants, exponential growth, and the population.	https://sebastianwolf.shinyapps.io/Corona-Shiny/ [25]	https://github.com/zappingseb/coronashiny [26]	[3] [25] [26]
Simulation tool. COVID-19 epidemic in Togo - West Africa	Dr. Kankoé Sallah developed this application.	Uses SEIR metapopulation model with mobility between catchment areas to describe the country-level spread of COVID-19 and the impact of interventions in Togo, West Africa.	https://c2m-africa.shinyapps.io/togo-covid-shiny/ [27]		[3] [27]
Animating	Nathan Chaney	This application indicates a map animation of		https://www.nathanchaney.com/	[30] [29]

COVID-19 hotspots over time	developed this application	new Covid-19 cases in the U.S.A measured in a 7-day rolling average.		com/ [29]	
Covid-19-prediction	This application was developed by Manuel Oviedo and Manuel Febrero of Modesty research group of the University of Santiago de Compostela.	The application is a shiny app that provides a 5-day horizon prediction growth rate of Covid-19 using the evolution during the past 15-day growth rate. The prediction is performed using three functional regression models fitted and estimated on available data. Apart from the prediction values, the app provides an interactive table and plot for the expected number of accumulated cases and new daily confirmed and death cases.	http://modesty.us.es:3838/covid19prediction/ [33]	https://github.com/armimpdm/Covid-19-prediction [34]	[3] [33] [34]
Healthcare worker deaths from novel Coronavirus (COVID-19) in the US	Jonathan Gross developed this application	The application is a shiny app that visualizes the U.S. health workers' deaths from Covid-19 reported on media outlets or news. The application is developed using R code with a map on the main page using Leaflet with tabs for additional graphs, including time series, histograms, and bar charts.	https://jontheepi.shinyapps.io/hcwcoronavirus/ [35]	https://github.com/jontheepi/hcwcoronavirus [36]	[3] [35] [36]
Covid-19 Hospitalizations in Belgium	Jean-Michel Bodart developed this application	The dashboard indicates the hospitalizations related to Covid-19 in Belgium by province and region.	https://rpubs.com/JMBodart/Covid19-hosp-be [37]	https://github.com/jmbo1190/Covid19 [38]	[3] [37] [38]
Covidminer	This shiny app was developed by the Rensselaer Institute for Data Exploration and Applications	The application indicates the regional differences in determinants, medications, and outcome of the Covid-19 pandemic across the United but with a specific focus on New York.	https://covidminer.idea.rpi.edu/ [39]	https://github.com/TheRensselaerIDEA/COVIDMINER [40]	[41] [39] [40]
COVID-19 Canada Data Explorer	Petr Baranovskiy developed this application.	The application is a shiny app that analyses the official covid-19 dataset from the government of Canada and outputs the several indicators associated with the Covid-19 pandemic in the country.	https://dataentusiast.ca/apps/covid-ca/ [42]	https://milano-r.github.io/erum2020-covid-contest/petr-baranovskiy-covid-ca-data-explorer.html [43]	[3] [42][43]
PAGTANA: Philippine COVID-19 Case Forecasting Web Application	This application was developed by Jamal Kay Rogers and Yvonne Grace Arandela.	It is a shiny app that provides a 5-day forecast of Covid-19 cases in the Philippines include the confirmed new cases of infections, confirmed deaths, and recovery rate. Apart from forecasting, the application utilizes plots to visualize the disease's ten-day forecasts and the accumulated and confirmed data. The data used in this application is obtained from the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE).	https://jamalrogersapp.shinyapps.io/tforecast/ [44]	https://github.com/fsmosca/COVID-19-PH-dataset [45]	[3] [44] [45]
COVID-19 Case & Death Report Number Corrector	Matt Maciejewski developed this application.	This shiny application is developed and aligned to make corrections of underreported Covid-19 cases and death. The application applies a multiplicative estimator for total deaths and cases regarding the base country to perform this role.	https://pharmhax.shinyapps.io/covid-corrector-shiny/ [46]	https://github.com/pharmhax/covid19-corrector [47]	[48] [46] [47]
COVID19 forecast	Carlos Catania developed this application	This application applies the SEIR model to forecast the spread of Covid 19 in various European and South American countries.	https://harpomaxx.shinyapps.io/covid19/ [49]	https://github.com/harpomaxx/COVID19 [50]	[3] [49] [50]
Trafford Covid-19 monitor	This is a shiny application developed by Trafford Data Lab	The application provides trends in confirmed coronavirus cases in Trafford.	https://trafforddatalab.shinyapps.io/trafford-covid-19/ [54]	https://github.com/traffordDataLab/trafford-covid-19 [55]	[53] [54] [55]
Covid-19 Bulletin Board	Wei Su developed this application	The dashboard indicates the real-time Covid-19 visualization of the various covid-19 indicators in Japan, including the confirmed cases, hospital discharge and deaths, positive confirmed, and PCR test.	https://covid-2019.live/en/ [56]	https://github.com/swsoyee/2019-ncov-japan [57]	[3] [56] [57]
Covid-19 Statistics	Carl Sansaçon developed this	It is a WordPress plugin that applies the R {ggplot2} graphics with ARIMA forecast and	http://moduloinfo.ca/wordpress/ [58]	https://plugins.trac.wordpress.org/browser/covid-19-	[3] [58] [59]

Displayer	application	PHP coding to display or visualize the confirmed new cases of Covid-19 infection, deaths, and recovered cases in various countries. The data used in this application is sourced from the COVID-19 Data Repository by the Centre for Systems Science and Engineering (CSSE) at Johns Hopkins University.		statistics-displayer/ [59]	
CoronaMapper	This application was developed by Peter Gruber and Paolo Montemurro supported by OxyLabs.	The application visualizes the four-day average growth indicator of Covid-19 to indicate how the disease evolves after filtering out the noise. The visualizations are both interactive and intuitive.	http://coronamapper.com/ [60]	https://github.com/JayWelsch/coronamapper [61]	[3] [60] [61]
CoronaDash	This is a shiny app developed by Peter Laurinec.	This application applies visualization and data mining techniques in R to compare Covid-19 statistics for different countries. The Covid-19 statistics displayed are obtained by using exponential smoothing model to extrapolate total confirmed cases; creating death trajectories; using dendrogram and table of clusters averages to create a multidimensional clustering; developing aggregated views of the entire world; and applying hierarchical clustering to compare the Covid-19 case between countries.	https://petolau.shinyapps.io/coronadash/ [62]	https://github.com/PetoLau/CoronaDash [63]	[3] [62] [63]
Covidfrance	This is a shiny app developed by Guillaume Pressiat	The application indicates the changes in the number of Covid-19 deaths and recoveries, hospitalization, and intensive care units by the department in France	https://guillaumepressiat.shinyapps.io/covidfrance/ [64]	https://gist.github.com/Guil-laumePressiat/0e3658624e42f763e3e6a67df92bc6c5 [65]	[3] [64] [65]
COVID-19 Tracker	Dr Magda Bucholc developed this application from Ulster University	The application reports the number of reported Covid-19 cases at the local government district in Northern Ireland and county level across Ireland based on gender and growth rate.	https://nicovidtracker.org/ [66]	https://github.com/YouGov-Data/covid-19-tracker [67]	[68] [66] [67]
WHO COVID-19 Explorer	This application was developed by the World Health Organization (WHO)	This application provides timely updated data visualizations of Covid-19 cases, including confirmed cases and deaths by region and country.	https://worldhealth.org.shinyapps.io/covid/ [71]	https://github.com/WorldHealthOrganization/app [72]	[3] [71] [72]
COVID-19 Scenario Analysis Tool	The MRC Centre developed this application for Global Infectious Disease Analysis from the Imperial College London.	This application applies the squire R package to illustrate the Covid-19 pandemic trajectories, R_t & R_eff measures, and healthcare demand for different countries over time.	https://www.covid-sim.org/v6.20210915/ [73]	https://github.com/mrc-ide/squire [74]	[3] [73] [74]
Coronavirus Package	Rami Krispin developed this R package	This package provides a clean dataset of the Covid-19 pandemic and analytics, including the daily summary of the pandemic cases by state. The dataset is collected from the John Hopkins database.		https://ramikrispin.github.io/coronavirus/ [75]	[3] [75]
District Health Information Software (DHIS2)	The University of Oslo developed this application	The District Health Information Software has specific digital packages for Covid-19 that support the pandemic's surveillance and response activities.	https://www.dhis2.org/ [76]	https://github.com/dhis2/dhis2-covid19-doc [79]	[80] [76] [77] [78] [79]
Surveillance , Outbreak Response Management and Analysis System (SORMAS)	Helmholtz Centre for Infection Research developed this system.	The system performs the Covid-19 specific functions that are classified into aggregates and case-based functions. The aggregate functions include line listing, import, and export of data in CSV format; standard reporting of covid-19 cases including confirmed cases, deaths, and recoveries; and statistical analysis based on the reports provided by charts, maps, and graphs. The case-based functions include contact tracing, laboratory sample management, port of entry reporting, vaccination campaign, follow-up visit, and enrolling and tracing patients.	https://sormas.org/ [81]	https://github.com/hzi-braunschweig/SORMAS-Project [82]	[80] [81] [82]

Go.Data	This application was developed by WHO in collaboration with partners in the Global Outbreak Alert and Response Network (GOARN).	Since the outbreak of Covid-19 began, metadata packages have been prepared that match the most recent WHO Surveillance Guidance, including uniformity with all core metadata gathered as part of WHO Case Reporting Forms transmitted to COVID-MART / X-MART on a daily and weekly basis. If requested, this allows for streamlined IDSR reporting for countries. Other expanded metadata packages, such as the COVID First Few Hundred Cases (FFX) Protocol and the Unity Studies for HealthCare Workers, are available for countries conducting more extensive data collection or research inquiries.	https://www.who.int/godata [83]	https://github.com/godata-who/godata [84]	[80] [83] [84]
Epi Info	This application was developed by Centres for Disease Control and Prevention (CDC)	The Covid-19 specific functions include the development of COVID-19 Case Surveillance Forms that are customized for country, region, and local requirements. Epi Info is also applied in Covid-19 outbreak investigations, the development of small to mid-sized disease surveillance systems, the analysis, visualization, and reporting (AVR) components of larger systems, and continuing education in epidemiology and public health analytic methods at public health schools around the world.	https://www.cdc.gov/epiinfo/support/downloads.html [85]	https://github.com/Epi-Info/Epi-Info-Community-Edition [86]	[80] [85] [86]
Open Data Kit (ODK)	This application was developed by Get ODK, an organization majoring in data collection.	ODK software is being employed in the COVID-19 response for disease surveillance, fast diagnostics, and vaccine trials.	https://getodk.org/software/ [87]	https://github.com/getodk/collect [88]	[80] [87] [88]
CommCare	This software was developed by Dimagi, a firm providing digital data solutions	Dimagi created a set of pre-built COVID-19 template applications to help organizations and governments with their continuing COVID-19 response operations.	https://www.dimagi.com/covid-19/ [89]	https://github.com/dimagi/commcare-hq [90]	[80] [89] [90]
KoboToolbox	This software was developed by the Harvard Humanitarian Initiative, an organization working on the research and education of communities.	KoBoToolbox is a data collecting tool.	https://www.kobotoolbox.org/ [91][92]	https://github.com/kobotoolbox [93]	[80] [91] [92] [93]
Fast automated detection of COVID-19 from medical images	This application was developed by Shuang Liang & Huixiang Liu from School of Automation and Electrical Engineering, University of Science and Technology Beijing; Yu Gu from School of Automation, Guangdong University of Petrochemical Technology, Maoming; Xiuhua Guo, Zhiyuan Wu, Mengyang Liu & Lixin Tao From the Department of Epidemiology and Health Statistics,	The software utilizes deep learning framework (neural network) that identifies COVID-19 from medical images.		https://github.com/SHERLOCKLS/Detection-of-COVID-19-from-medical-images [94]	[95] [94]

	School of Public Health, Capital Medical University, Beijing, China; and Hongjun Li & Li from Beijing Youan Hospital, Capital Medical University, Beijing, China.				
The Oxford Covid-19 Government Response Tracker (OxCGRT)	This application was developed by the Blavatnik School of Government.	The Oxford Covid-19 Government Response Tracker (OxCGRT) compiles systematic data on policy responses taken by countries to combat COVID-19. Since January 1, 2020, the various policy reactions have tracked over 180 nations and are categorized into 23 indicators, such as school closures, travel restrictions, and vaccination policies. These policies are scored on a scale to represent the magnitude of government intervention, and the results are compiled into a set of policy indices. The data can improve attempts to combat the epidemic by allowing decision-makers and citizens to understand government responses uniformly.	https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker [96]	https://github.com/OxCGRT/covid-policy-tracker [97]	[98] [96][97]
COVID-19 Situazione Italia	This application was developed by the Department of Civil Protection (Dipartimento della Protezione Civile) Angelo Borrelli, Italy.	This application provides updated Covid-19 data and visualizations for Italy, including new confirmed infections, total confirmed infections, new confirmed deaths, total confirmed deaths, and recovered cases. The data and visualizations are provided for the whole country and the regions.	http://arcg.is/C1unv	https://github.com/pcm-dpc/COVID-19 [99]	[3] [99]
Covid Mobile data	This application was developed by COVID19 Mobility Task Force of the World Bank	The application uses the data from Mobile Network Operators (MNOs) to perform analytics.		https://github.com/worldbank/covid-mobile-data [100]	[3] [100]
Radar Covid-19	The Government of Spain developed this application	This application was designed to prevent the spread of Covid-19. The application anonymizes users if they have had any contact in the last 14 days with someone infected with Covid-19 via low-power Bluetooth technology.	https://radarcovid.gob.es/ [101]	https://github.com/RadarCOVID/radar-covid-android [103]	[104] [101] [102],[103]
CovidSafe	The University of Washington developed this application.	The application was developed to help prevent the spread of Covid-19 by alerting users about highly relevant public health announcements, exposure to COVID-19 and to assist contact tracing without compromising users' privacy.	https://covidsafe.csis.washington.edu/ [105]	https://github.com/CovidSafe [106]	[3] [105] [106]
Covid Alert	Volunteers originally developed COVID Alert. The Canadian Digital Service is currently developing its repository.	This application was developed to slow down Covid-19 infections in Canada. The app notifies users if someone they were near in the past 14 days tells the app they tested positive.	https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19/covid-alert.html [107]	https://github.com/cds-snc/covid-alert-app [109]	[110] [107] [108] [109]
erouska-android	A team of volunteers initially developed this application. The application is currently developed and maintained by the Ministry of Health in collaboration with the National Agency for Communication	To combat the COVID-19 epidemic, the app alerts users at risk of spreading the virus. The software delivers guidance on how to minimize the spread of the epidemic based on the user's history of exposure to other potentially contagious users.	https://erouska.cz/ [111]	https://github.com/covid19cz/erouska-android [112]	[113] [111] [112]

	and Information Technologies (NAKIT) of the Czech Republic as part of the Smart Quarantine concept.				
COVID-19 Dashboard	Johns Hopkins University Centre developed this application for Systems Science and Engineering.	This is the data repository for the Johns Hopkins University Centre for Systems Science and Engineering's 2019 Novel Coronavirus Visual Dashboard (JHU CSSE). The ESRI Living Atlas Team and the Johns Hopkins University Applied Physics Lab have also contributed to this project (JHU APL).	https://www.arcgis.com/apps/opsdashboards/index.html#/bda7594740fd40299423467b48e9ecf6 [114]	https://github.com/sidbannet/COVID-19_analysis [116]	[98] [114] [115] [116]
Corona-Warn-App	This application was developed as an open-source app by SAP and Deutsche Telekom under the directive by the government of Germany.	The Corona-Warn-App was developed with the goal of preventing the spread of Covid-19. The app serves as a digital complement to distancing, hygiene, and wearing masks. Additionally, it provides a functionality to add a user's digital vaccination certificate to prove their vaccination status.	https://www.coronawarn.app/en/ [117]	https://github.com/coronawarn-app/cwa-app-android [118]	[119] [117] [118]
TraceTogether	The Singapore Government Technology Agency developed this application.	Through community-driven contact tracing, TraceTogether supports Singapore's efforts to combat the spread of COVID-19. One can use the app to see or display their COVID Health Status based on their immunization and test results.	https://www.tracetgether.gov.sg/ [120]	https://github.com/OpenTrace-Community [121]	[122] [120] [121]
NZ COVID Tracer	The New Zealand Ministry of Health developed this application	The app helps contact tracing go faster by creating a private digital diary of the places you visit. Users Scan the official QR codes wherever they see them and add manual entries for their visits to other places.	https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-resources-and-tools/nz-covid-tracer-app [123]	https://github.com/minhealthnz/nz-covid-tracer-app [125]	[126] [123] [124] [125]
VigilantGantry	This an automated contactless gantry system developed by GovTech's Data Science and Artificial Intelligence Division (DSAD)	VigilantGantry is an open-source implementation of an AI-driven automated temperature screening gantry that improves the rate of contactless screening by augmenting existing thermal systems. VigilantGantry is excellent for automatically scanning high-traffic sites for symptomatic COVID-19 patients. It helps ground crews keep on the lookout for COVID-19.		https://github.com/dsaigo/vs/vigilantgantry [127]	[128] [127]
lancet-covid-19-database	Developed by Lancet	The Lancet COVID-19 Database gives users access to the most up-to-date information on COVID-19, such as cases, deaths, recoveries, testing, and other useful indicators for tracking the pandemic's spread and response.		https://github.com/sdsna/lancet-covid-19-database [130]	[131] [130]
Covid19Canada	SDSN developed this application	This shiny app provides a forecast of Covid-19 cases and Covid-19 information in Canada, including the confirmed new cases of infections, confirmed deaths, and recovery rate. Apart from forecasting, the application utilizes plots to visualize the disease's ten-day forecasts and the accumulated and confirmed data.	https://artbd.shinyapps.io/covid19canada/ [132]	https://github.com/ccodwg/Covid19Canada [133]	[3] [132] [133]
COVI-ML	This respiratory was developed by the Quebec Artificial Intelligence Institute	COVI-ML is the Risk model training code for the Covid-19 tracing application. Its repository provides models, infrastructure, and datasets for training deep-learning-based predictors of COVID-19 infectiousness as used in Proactive Contact Tracing.		https://github.com/milaiqia/COVI-ML [134]	[3][134]

Covid-19 model	Imperial College London developed this application/code.	This code was applied in modeling estimated deaths and infections for COVID-19 from the study "Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe "done by Flaxman et al. (2020) [136]		https://github.com/ImperialCollegeLondon/covid19model [135]	[136] [135]
The COVID Tracking Project	Alexis Madrigal created this project through a collaborative volunteer-run effort to track the ongoing COVID-19 pandemic	This project collects and publishes data required to understand the COVID-19 outbreak in the United States. All 50 states, five territories, and the District of Columbia participate in the Covid tracking project, which will collect data on COVID-19 testing and patient outcomes.	https://covidtracking.com/ [137]	https://github.com/COVID19Tracking [138]	[139] [137] [138]
Covidmx	Covidmx was developed by Federico Garza	The API was developed to handle Covid-19 open data provided by the Mexican Dirección General de Epidemiología.		https://github.com/FedericoGarza/covidmx [140]	[141] [140]
Covid19-Scenarios	Neherlab developed this tool	The Covid-19 Scenarios provide Models of generating trajectories for COVID-19 outbreak and hospital demand. The functioning of this tool is based on the SIR model, which simulates a COVID19 outbreak.	https://covid19-scenarios.org/ [142]	https://github.com/neherlab/covid19_scenarios [143]	[3] [142] [143]
covid-chest-imaging-database	This database was developed by NHSX and the British Society of Thoracic Imaging (BSTI). NHSX is a joint unit of National Health Service (NHS) England and the Department of Health and Social Care, supporting local NHS and care organizations.	The database was developed with a respiratory containing tooling related to the NHSX National COVID-19 Chest Image Database (NCCID) to promote research projects in response to the COVID-19 pandemic.		https://github.com/nhsx/covid-chest-imaging-database [144]	[145] [144]
Covid-pass-verifier	This is an application developed by NHSX	The COVID Pass Verifier app is the official NHS COVID Pass Verifier for England and Wales. The app is a safe and secure way to check if someone has been appropriately vaccinated against COVID-19, has had a negative test, or has recovered from COVID-19.	https://www.nhs.uk/covid-19-response/nhs-covid-pass-verifier-app/international-covid-pass-verifier-app-user-guide/ [146]	https://github.com/nhsx/covid-pass-verifier [148]	[145] [146] [147][148]
Covasim	The Institute for Disease Modelling developed this simulator	Covasim is a stochastic agent-based simulator for performing COVID-19 analyses.		https://github.com/InstituteforDiseaseModeling/covasim [149]	[150] [149]
covid-19 Dashboard	Greg Rafferty developed Covid-19 dashboard	This is a web dashboard developed to monitor the COVID-19 pandemic. The data used is obtained from Johns Hopkins Center for Systems Science and Engineering.	https://covid-19-raffg.herokuapp.com/ [151]	https://github.com/raffg/covid-19 [152]	[3] [152] [151]
Covid-19 R/Python scripts	Developed by QuKunLa; a Laboratory of Immunogenomics and Precision Medicine, University of Science and Technology of China	These are R/Python scripts to analyze single-cell RNA-sequence data from COVID-19 patients.		https://github.com/QuKunLab/COVID-19 [153]	[3] [153]
COVID-19-CT-CXR	COVID-19-CT-CXR was developed by Peng et al. and Intramural Research Programs of the	This is a public database of COVID-19 CXR and CT images, which are automatically extracted from COVID-19-relevant articles from the PubMed Central Open Access (PMC-OA)		https://github.com/ncbi-nlp/COVID-19-CT-CXR [154]	[155] [154]

	National Institutes of Health, National Library of Medicine and Clinical Centre.	Subst.			
covid19-healthsystemcapacity	This project was developed by the CovidCareMap organization	This application assists in better understanding, anticipating, and acting to support and ramp up our health systems' capacity (beds, staffing, ventilators, supplies) to effectively care for a rapidly growing number of active COVID19 patients in need of hospitalization and intensive (ICU) care.		https://github.com/covidcaremap/covid19-healthsystemcapacity [156]	[3] [156]
CV19 Index	The Global Loop team developed this model	The COVID-19 Vulnerability Index (CV19 Index) is a predictive model that identifies persons who are more susceptible to COVID-19 severe problems. The CV19 Index is designed to assist hospitals, federal, state, and local public health agencies, and other healthcare organizations in identifying, planning for, responding to, and reducing COVID-19's impact in their areas.	https://www.close.dloop.ai/covid-19-index [157]	https://github.com/closedloop-ai/cv19index [158]	[159] [157] [158]
OpenABM-Covid19	This model was developed by the Pathogen Dynamics Group of Oxford Big Data Institute.	OpenABM-Covid19 is an agent-based model (ABM) that was created to model the spread of Covid-19 in a city and investigate the impact of passive and active intervention measures.		https://github.com/BDI-pathogens/OpenABM-Covid19 [160]	[3] [160]
COVID-19 vaccination slot booking script	PythonRepo developed this script.	Is used to automate covid vaccination booking.	https://pythonrepo.com/repo/pallupz-covid-vaccine-booking [161]	https://pythonrepo.com/repo/pallupz-covid-vaccine-booking [162]	[159] [161] [162]

TABLE II. COVID-19 DATASETS SUMMARY TABLE

Developer/Industry/Academia/University/Organization Details	Dataset Summary	Dataset Usage	Weblink to the Dataset	References
Our World in Data	Data on COVID-19 vaccinations that include country-by country statistics of the COVID-19 vaccines administered to date.	Vaccine outreach program.	https://ourworldindata.org/covid-vaccinations . [164]	[163][164]
	Data on COVID-19 confirmed deaths per country.	Effects of testing, managing, hospitalization.	https://ourworldindata.org/covid-deaths . [165]	[362][165][394]
	Global data of confirmed COVID-19 cases	Effect on travel restriction, intervention programs.	https://ourworldindata.org/covid-cases . [166]	[393][166]
	Data on COVID-19 testing, i.e., positivity rate, contact tracing, tests performed per day	Pandemic preventive measures	https://ourworldindata.org/coronavirus-testing . [167]	[393][167]
	Data on COVID-19 hospitalization	Monitoring cases to improve impact on available resources.	https://ourworldindata.org/covid-hospitalizations . [168]	[392] [168]
	COVID-19 mortality risks	Segregation of age groups that may be at risk of dying from the disease.	https://ourworldindata.org/mortality-risk-covid . [169]	[393][169][170]
	Excess mortality due to COVID-19	Segregation of age groups that may be at risk of dying from the disease, and	https://ourworldindata.org/excess-mortality-covid . [171]	[393][171]

		other accelerating factors.		
	Policy responses to the COVID-19 pandemic	Government interventions to curb the spread of the virus.	https://ourworldindata.org/policy-responses-covid . [172]	[393][172][173]
The Johns Hopkins University Center for Systems Science and Engineering [JHU CCSE]	COVID-19 Epidemiological Data	For segmentation of COVID-19 cases based on epidemiological characteristics.	https://data.humdata.org/dataset/novel-coronavirus-2019-ncov-cases . [174]	[174]
OCHA	COVID-19 number of confirmed cases, deaths, and recoveries by the province in Indonesia	Mobility transmission analysis.	https://data.humdata.org/dataset/indonesia-covid-19-cases-recoveries-and-deaths-per-province . [175]	[175]
World Health Organization	COVID-19 cases and deaths	Mobility transmission and mortality analysis.	https://data.humdata.org/dataset/coronavirus-covid-19-cases-and-deaths . [176]	[176]
Blavatnik School of Government, University of Oxford	OXFORD COVID-19 Government Response Stringency index	Government measures	https://data.humdata.org/dataset/oxford-covid-19-government-response-tracker . [177]	[177]
HDX	COVID-19 Vaccinations	Rate of vaccine drives	https://data.humdata.org/dataset/covid-19-vaccinations . [178]	[178]
World Food Program	COVID-19 global airline information and travel restriction	Global Monitoring.	https://data.humdata.org/dataset/covid-19-global-travel-restrictions-and-airline-information . [179]	[179]
HDX	COVID-19 cases and deaths in the United States	Reporting cases at a national level.	https://data.humdata.org/dataset/nyt-covid-19-data . [180]	[180]
HDX	Total number of COVID-19 tests performed per country	Monitoring cases	https://data.humdata.org/dataset/total-covid-19-tests-performed-by-country . [181]	[181]
UNESCO	Global school closures	Area segmentation	https://data.humdata.org/dataset/global-school-closures-covid19 . [182]	[182]
Meta	FAIR COVID-19 US County Forecast	Country-level forecast.	https://data.humdata.org/dataset/fair-covid-dataset . [183]	[183]
CARE Bangladesh	District Wise Quarantine for COVID-19	Reporting cases at a national level.	https://data.humdata.org/dataset/district-wise-quarantine-for-covid-19 . [184]	[184]
HDX	COVID-19 Impact on Humanitarian Operations Data Viz inputs	Reporting humanitarian activities at a national level.	https://data.humdata.org/dataset/covid-19-data-visual-inputs . [185]	[185]
OCHA Venezuela	COVID-19 sub-national data	Reporting cases at a national level.	https://data.humdata.org/dataset/corona-virus-covid-19-cases-and-deaths-in-venezuela . [186]	[186]
OCHA FISS	Global Humanitarian Operational Presence Who, What, Where [3W] Portal	Reporting humanitarian activities at a global level.	https://data.humdata.org/dataset/ocha-global-humanitarian-operational-presence-who-what-where-3w-portal . [187]	[187]
ACAPS	COVID-19 Government Measures Dataset	Reporting government measures at a global level.	https://data.humdata.org/dataset/acaps-covid19-government-measures-dataset . [188]	[188]
HDX	Europe COVID-19 subnational cases	COVID-19 infected area segmentation.	https://data.humdata.org/dataset/europe-covid-19-subnational-cases . [190]	[190]
OCHA Philippines	Philippines COVID-19 response.	Reporting government measures at a national level.	https://data.humdata.org/dataset/philippines-covid-19-response-who-does-what-where . [191]	[191]

Code for Venezuela	COVID-19 education impact survey	Monitoring impact on a national level	https://data.humdata.org/dataset/open_one_time_covid_education_impact . [192]	[192]
iMMAP	Google mobility report	Mobility transmission analysis.	https://data.humdata.org/dataset/google-mobility-report . [193]	[193]
Humanitarian Emergency Report Africa [HERA]	Subnational data on Covid 19 cases per day	COVID-19 infected area segmentation.	https://data.humdata.org/dataset/nigeria_covid19_subnational . [194]	[194]
HDX	Worldwide geographic distribution of COVID-19 cases	COVID-19 infected area segmentation.	https://data.humdata.org/dataset/ecdc-covid-19 . [195]	[195]
World Health Organization	Immunization campaigns impacted due to COVID-19.	Mobility transmission analysis	https://data.humdata.org/dataset/immunization-campaigns-impacted . [196]	[196]
HDX	Excess mortality during COVID-19 pandemic	Segregation of age groups that may be at risk of dying from the disease.	https://data.humdata.org/dataset/financial-times-excess-mortality-during-covid-19-pandemic-data . [197]	[197]
HDX	COVID-19 subnational cases in Palestine	Reporting cases at a national level.	https://data.humdata.org/dataset/state-of-palestine-coronavirus-covid-19-subnational-cases . [198]	[198]
Meta	Impact survey and trends on COVID-19	Reporting cases at a national level.	https://data.humdata.org/dataset/covid-19-symptom-map . [199]	[199]
HDX	COVID-19 vaccine doses are given to humanitarian resource plan countries	Forecasts on dose availability and actual deliveries	https://data.humdata.org/dataset/covid-19-vaccine-doses-in-hrp-countries . [200]	[200]
World Bank Group	World Bank indicators of interest to the COVID-19 outbreak	Data for use in response, modeling analysis	https://data.humdata.org/dataset/world-bank-indicators-of-interest-to-the-covid-19-outbreak . [201]	[201]
Global Health 50/50	Gender and COVID-19 project	Exploring how gender may be driving the higher proportion of reported deaths in men among confirmed cases so far.	http://globalhealth5050.org/covid19 [202]	[202]
World Bank Group	Harmonized data on Household COVID-19 monitoring surveys	Data analysis and trend checking	https://data.humdata.org/dataset/harmonized-covid-19-household-monitoring-surveys [203]	[203]
Humanitarian Emergency Response Africa [HERA]	African continent Covid 19 cases	Data analysis and trendsetting	https://data.humdata.org/dataset/covid19_africa_contenital_infections-recoveries-deaths [204]	[204]
Dalberg	Developing countries' government action on COVID-19	non-pharmaceutical interventions	https://data.humdata.org/dataset/government-actions-on-covid-19 [205]	[205]
Meta	Survey on preventative health	Monitor and understand people's knowledge and practices about COVID-19 to improve communications and their response to the pandemic.	https://data.humdata.org/dataset/preventive-health-survey [206]	[206]
International Organization for Migration	Information on populations within the Far North region of Cameroon	Providing regular, accurate, and updated data to better support the response of the Government of Cameroon and the humanitarian	https://data.humdata.org/dataset/cameroon-baseline-assessment-data-iom-dtm [207]	[207]

		community.		
HDX	Covax round 6 allocations	Monitoring of Covax vaccine allocations	https://data.humdata.org/dataset/covax-round-6-allocations [208]	[208]
Humanitarian Emergency Response Africa	COVID-19 subnational data in Burkina Faso	Reporting Covid data at National level	https://data.humdata.org/dataset/burkinafaso_covid19_subnational [209]	[209]
Metabiota	Spatiotemporal data for COVID-19 deaths and cases.	Data analysis and monitoring	https://data.humdata.org/dataset/2019-novel-coronavirus-cases [210]	[210]
HDX	COVID-19 subnational data for Afghanistan	Data analysis and reporting on a national level	https://data.humdata.org/dataset/afghanistan-covid-19-statistics-per-province [211]	[211]
Cuebiq Inc	COVID-19 mobility data for Italy	Monitoring mobility changes in Italy since lockdown	https://data.humdata.org/dataset/covid-19-mobility-italy [212]	[212]
Humanitarian Emergency Response Africa	COVID-19 subnational cases in Africa	Reporting COVID-19 cases on a national level	https://data.humdata.org/dataset/africa-coronavirus-covid-19-subnational-cases [213]	[213]
Qatar Computing Research Institute	Twitter data geographic distribution of COVID-19	Geographical distribution of twitter users and tweets regarding COVID-19 pandemic.	https://data.humdata.org/dataset/covid-19-twitter-data-geographic-distribution [214]	[214]
ACAPS	Secondary impacts of Covid 19 on a global scale	Aid Decision-making on addressing wider effects of COVID-19	https://data.humdata.org/dataset/global-covid-19-secondary-impacts [215]	[215]
Humanitarian Emergency Response Africa	COVID-19 city level in Burkina Faso	Reporting Covid data at a city level	https://data.humdata.org/dataset/burkinafaso_covid19_city-level [216]	[216]
Hub Latin America	The COVID-19 mortality rate in Lima, Peru	Reporting, analysis of COVID-19 death rates in Lima	https://data.humdata.org/dataset/peru-covid19-mortality-rate-in-lima [217]	[217]
Infoculture	COVID-19 cases in Moscow	Statistics	https://data.humdata.org/dataset/covid-19-cases-data-in-moscow [218]	[218]
HDX	Social measures and public health applied during COVID-19	Analysis and reporting.	https://data.humdata.org/dataset/world-global-database-of-public-health-and-social-measures-applied-during-the-covid-19-pandemic [219]	[219]
Mobile Accord, Inc [GeoPoll]	Impact and perceptions of Coronavirus in Sub-Saharan African countries	Analysis and reporting	https://data.humdata.org/dataset/covid-19-impacts-africa [220]	[220]
HDX	Subnational COVID-19 cases for Iraq	Reporting Covid data at National level	https://data.humdata.org/dataset/iraq-coronavirus-covid-19-subnational-cases [221]	[221]
HDX	Covid 19 related funding from IATI	Monitoring of funding use in fighting COVID-19	https://data.humdata.org/dataset/iati-covid19-funding [222]	[222]
HDX	Gavi and World Bank COVID-19 vaccine funding	Fund disbursement and support for COVID-19	https://data.humdata.org/dataset/world-bank-and-gavi-vaccine-financing [223]	[223]
Code for Venezuela	Survey on COVID-19 impact	Data analysis and interpretation	https://data.humdata.org/dataset/open_one_time_covid_impact [224]	[224]
Humanitarian Emergency Response Africa	COVID-19 cases in Ethiopia	Reporting cases at a national level.	https://data.humdata.org/dataset/ethiopia-covid19-cases [225]	[225]
World Bank Group	High frequency indicators for COVID-19	Data analysis and interpretation	https://data.humdata.org/dataset/covid-19-high-frequency-indicators [226]	[226]

OCHA FISS	Global humanitarian response plan COVID-19 administrative boundaries and population-statistics	Reporting cases at a national level.	https://data.humdata.org/dataset/global-humanitarian-response-plan-covid-19-administrative-boundaries-and-population-statistics [227]	[227]
INFORM	Inform Risk Index for COVID-19, Version 0.1.4	Support prioritization of preparedness and early response actions for the direct impacts of the pandemic and identify countries where secondary effects are likely to have the most critical humanitarian consequences.	https://data.humdata.org/dataset/inform-covid-19-risk-index-version-0-1-4 [228]	[228]
Safeture	COVID-19 subnational cases in Kazakhstan	For data analysis and interpretation	https://data.humdata.org/dataset/kazakhstan-coronavirus-covid-19-subnational-cases . [229]	[229]
OCHA Philippines	COVID-19-operational presence risk communication and community engagement in the Philippines	Risk communication and community engagement	https://data.humdata.org/dataset/philippines-covid-19-operational-presence-risk-communication-and-community-engagement-rcce . [230]	[230]
Hub Latin America	Epidemiological and hospital indicators on COVID-19 in Ouro Preto, Brazil	For data analysis and interpretation	https://data.humdata.org/dataset/brazil-epidemiological-and-hospital-indicators-on-covid-19-in-ouro-preto . [231]	[231]
Safeture	COVID-19 subnational cases in Oman	Reporting cases at a national level.	https://data.humdata.org/dataset/oman-coronavirus-covid-19-subnational-cases . [232]	[232]
Humanitarian Emergency Response Africa	Coronavirus [COVID-19] City level cases for Mauritania	Reporting cases at a national level.	https://data.humdata.org/dataset/mauritania-coronavirus-covid-19-city-level . [233]	[233]
UNICEF Data and Analytics [HQ]	Tracking children's situation during COVID-19	Data analysis and interpretation	https://data.humdata.org/dataset/rapid-situation-tracking-for-covid-19-socioeconomic-impacts . [234]	[234]
Humanitarian Emergency Response Africa	COVID-19 recoveries in Africa on a national level	Data analysis and interpretation	https://data.humdata.org/dataset/africa-covid-19-recovered-cases . [235]	[235]
Mobile Accord, Inc. [GeoPoll]	COVID-19 vaccines and impacts accepted in Sub-Saharan Africa	Data analysis and interpretation	https://data.humdata.org/dataset/covid19-impacts-and-vaccine-acceptance-in-sub-saharan-africa . [236]	[236]
United Nations Development Coordination Office	UN Collective Results on the COVID-19 Socioeconomic Response in 2020	Monitor the progress and achievements of UNCT's collective actions in socio-economic response.	https://data.humdata.org/dataset/un-collective-results-on-the-covid-19-socioeconomic-response-in-2020 . [237]	[237]
Mobile Accord, Inc. [GeoPoll]	Economic impact of COVID-19 in Sub Saharan Africa	Data interpretation and analysis	https://data.humdata.org/dataset/economic-impact-of-covid-19-in-sub-saharan-africa . [238]	[238]
HDX	COVID-19 subnational cases in Myanmar	Reporting cases at a national level.	https://data.humdata.org/dataset/myanmar-coronavirus-covid-19-subnational-cases . [239]	[239]
Safeture	COVID-19 sub-national cases in Ghana	Reporting cases at a national level.	https://data.humdata.org/dataset/ghana-coronavirus-covid-19-subnational-cases [240]	[240]
Insecurity Insight	Covid 19 and Aid Security	To help aid agencies meet the duty of care obligations to staff and reach people in need.	https://data.humdata.org/dataset/aid-security-and-covid-19 . [241]	[241]
Infoculture	Registry of Russian NGO's affected by COVID-19	For data analysis and interpretation.	https://data.humdata.org/dataset/ngos-affected-by-covid19-russia . [242]	[242][243]

HDX	Facility Interim Distribution Forecast for Covax	For data analysis and interpretation.	https://data.humdata.org/dataset/covax-facility-interim-distribution-forecast . [244]	[244]
UNHCR - The UN Refugee Agency	Socio-economic impact of COVID-19 on refugees in Kenya	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-socioeconomic-impact-of-covid-19-on-pocs-in-kenya-v2-2 . [245]	[245]
Humanitarian Emergency Response Africa	COVID-19 city level cases in Togo	Reporting cases at a national level.	https://data.humdata.org/dataset/togo-coronavirus-covid-19-city-level . [246]	[246]
UNICEF Data and Analytics	Indicators of interest to COVID-19 data at UNICEF	For data analysis and interpretation.	https://data.humdata.org/dataset/unicef-indicators-of-interest-to-the-covid-19-outbreak . [247]	[247]
HDX	COVID-19 subnational cases in Mozambique	Reporting cases at a national level.	https://data.humdata.org/dataset/mozambique-coronavirus-covid-19-subnational-cases . [248]	[248]
HDX	COVID-19 subnational cases for Haiti	Reporting cases at a national level.	https://data.humdata.org/dataset/haiti-covid-19-subnational-cases [249]	[249]
OCHA HQ	COVID-19 Pandemic induced Humanitarian Access Constraints	For data analysis and interpretation.	https://data.humdata.org/dataset/constraints-faced-by-people-due-to-covid-19-outbreak . [250]	[250]
OCHA Philippines	2020 Significant events happening in Philippines	For data analysis and interpretation.	https://data.humdata.org/dataset/philippines-2020-significant-events . [251]	[251]
UNHCR - The UN Refugee Agency	Socio-economic impact of COVID-19 on refugees in Kenya round 5	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-covid-round5-v2-1 . [252]	[252][253]
OCHA Sudan	COVID-19 response and preparedness 4W in Sudan	COVID-19 response outcomes	https://data.humdata.org/dataset/sudan-covid-19-preparedness-and-response-4w . [254]	[254]
Indonesian Red Cross [PMI]	Community Feedback by Indonesian Red Cross [PMI]	COVID-19 response outcomes	https://data.humdata.org/dataset/community-feedback-by-indonesian-red-cross-pmi . [255]	[255]
Johns Hopkins Applied Physics Lab	Projected COVID-19 subnational cases in Sudan	For data analysis and interpretation	https://data.humdata.org/dataset/sudan-projected-covid-19-sub-national-cases . [256]	[256]
International Organization for Migration	IATA travel restriction monitoring	For data analysis and interpretation.	https://data.humdata.org/dataset/travel-restriction-monitoring-iata-covid-19-iom-dtm . [257]	[257]
OCHA ROWCA	COVID-19 situation in West and Central Africa	For data analysis and interpretation.	https://data.humdata.org/dataset/west-and-central-africa-coronavirus-covid-19-situation . [258]	[258]
Johns Hopkins Applied Physics Lab	Projected COVID-19 subnational cases for Somalia	For data analysis and interpretation.	https://data.humdata.org/dataset/somalia-projected-covid-19-sub-national-cases [259]	[259]
OCHA Ethiopia	COVID-19 sub-national cases for Ethiopia.	Reporting cases at a national level.	https://data.humdata.org/dataset/ethiopia-coronavirus-covid-19-subnational-cases [260]	[260]
Infoculture	COVID-19 cases in Russia	Reporting cases at a national level.	https://data.humdata.org/dataset/covid-19-cases-data-in-russia . [261]	[261]
Mobile Accord, Inc. [GeoPoll]	Ongoing impacts of COVID-19 in Sub-Saharan Africa	For data analysis and interpretation.	https://data.humdata.org/dataset/ongoing-impacts-of-covid-19-in-sub-saharan-africa . [262]	[262]
OCHA HQ	Global appeals and plans of COVID-19 around the globe	For data analysis and interpretation.	https://data.humdata.org/dataset/covid-19-global-appeals-and-plans . [263]	[263]
Mobile Accord, Inc. [GeoPoll]	Community perception and knowledge of Covid 19 in sub-Saharan Africa	For data analysis and interpretation.	https://data.humdata.org/dataset/coronavirus-in-sub-saharan-africa [264]	[264]
OCHA HQ	COVID-19 allocations for CERF and CBPF	Monitoring resource allocation	https://data.humdata.org/dataset/cerf-covid-19-allocations . [265]	[265]
INFORM	INFORM COVID-19 comparability and analysis tool	Identification of countries at risk from health and	https://data.humdata.org/dataset/inform-covid-analysis-v01 . [266]	[266]

		humanitarian impacts of COVID-19 that could overwhelm current national response capacity, and therefore lead to a need for additional international assistance		
OCHA HQ	Covid 19 impacts, mitigation, and humanitarian access constraint.	For data analysis and interpretation.	https://data.humdata.org/dataset/covid19-humanitarian-access . [267]	[267]
HDX	LSHTM COVID-19 Projections.	For data analysis and interpretation.	https://data.humdata.org/dataset/lshtm-covid-19-projections [268]	[268]
UNICEF ESARO	UNICEF COVID-19 response and situation in Eastern and Southern Africa	For data analysis and interpretation.	https://data.humdata.org/dataset/eastern-and-southern-africa-covid-19-unicef-situation-and-response [269]	[269]
OCHA Mali	COVID-19 subnational cases in Mali	Reporting cases at a national level.	https://data.humdata.org/dataset/mali-coronavirus-covid-19-subnational-cases . [270]	[270]
OCHA HQ	Economic exposure index for COVID-19	For data analysis and interpretation.	https://data.humdata.org/dataset/covid-19-economic-exposure-index . [271]	[271]
OCHA Somalia	COVID-19 sub-national cases for Somalia	Reporting cases at a national level.	https://data.humdata.org/dataset/somalia-coronavirus-covid-19-subnational-cases . [272]	[272][273]
Johns Hopkins Applied Physics Lab	Projected COVID-19 subnational cases for Afghanistan	Reporting cases at a national level.	https://data.humdata.org/dataset/afghanistan-projected-covid-19-sub-national-cases . [275]	[274][275]
UNHCR - The UN Refugee Agency	Testing, knowledge, and mask-wearing	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-bgd-2020-covid-mwtk-v2-1 . [276]	[276]
Uganda Red Cross Society	COVID-19 risk index	For data analysis and interpretation.	https://data.humdata.org/dataset/covid19_risk_index-zip . [277]	[277]
HDX	COVID-19 subnational cases for the Democratic Republic of Congo	Reporting cases at a national level.	https://data.humdata.org/dataset/democratic-republic-of-the-congo-coronavirus-covid-19-subnational-cases . [278]	[278]
HDX	COVID-19 subnational data for Libya	Reporting cases at a national level.	https://data.humdata.org/dataset/libya-coronavirus-covid-19-subnational-cases . [279]	[279]
UNHCR - The UN Refugee Agency	Round 2 Socio-economic impacts of COVID-19 on refugees in Kenya	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-socioeconomic-impact-of-covid-19-on-pocs-in-kenya-round2-v1-0 . [280]	[280]
International Organization for Migration	Cameroon COVID-19 Mobility Restriction - Point of Entries - [IOM DTM]	For data analysis and interpretation.	https://data.humdata.org/dataset/cameroon-covid-19-mobility-restriction-point-of-entries-iom-dtm . [281]	[281]
UNHCR - The UN Refugee Agency	A panel study of the socio-economic impacts of COVID-19 on refugees living in Kenya	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-covid-panel-v2-1 . [282]	[282]
Johns Hopkins Applied Physics Lab	Projected COVID-19 subnational cases for Iraq	Reporting cases at a national level.	https://data.humdata.org/dataset/iraq-projected-covid-19-sub-national-cases . [282]	[283]
UNHCR - The UN Refugee Agency	Assessment of COVID-19 socio-economic impacts on Persons of concern to UNHCR	Reporting cases at national level.	https://data.humdata.org/dataset/unhcr-nga-2020-sea-covid19-v2-1 . [284]	[284][285]
UNHCR - The UN Refugee Agency	Assessment of COVID-19 impact on livelihoods of refugees in Zambia	For data analysis and interpretation.	https://data.humdata.org/dataset/ddi-zam-unhcr-covid19-impact-assessment-on-refugee-livelihoods-zambia-july-2020 . [286]	[286]

Hub Latin America	symptomatology related to the coronavirus COVID-19 in Ecuador	Data exploration, analysis	https://data.humdata.org/dataset/symptomatology-ecu911-santa-cruz-monthly-2018-2021 . [287]	[287][288]
HDX	Health facilities by province in Afghanistan	For data analysis and interpretation.	https://data.humdata.org/dataset/afghanistan-covid-19-health-facilities-by-province . [289]	[289]
ACAPS	COVID-19 humanitarian exceptions	For data analysis and interpretation.	https://data.humdata.org/dataset/acaps-covid-19-humanitarian-exemptions-dataset [290]	[290]
International Organization for Migration	COVID-19 mobility and preparedness updates in South Sudan.	For data analysis and interpretation.	https://data.humdata.org/dataset/south-sudan-covid-19-mobility-and-preparedness-updates-iom-dtm . [291]	[291]
UNHCR - The UN Refugee Agency	Socio-economic impacts of COVID-19 on refugees living in Kenya, Round 1	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-covid-round1-v2-2 . [292]	[292]
UNHCR - The UN Refugee Agency	Socio-economic impacts of COVID-19 on refugees living in Kenya, Round 4	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-covid-round4-v2-1 . [293]	[293]
UNHCR - The UN Refugee Agency	Socio-economic impacts of COVID-19 on refugees living in Kenya, Round 3	For data analysis and interpretation.	https://data.humdata.org/dataset/unhcr-ken-2020-covid-round3-v2-1 . [294]	[294]
European Centre for Disease Prevention and Control	COVID-19 vaccination in the EU/EEA	Vaccine administration updates	https://www.ecdc.europa.eu/en/publications-data/data-COVID-19-vaccination-eu-eea . [295]	[295]
	Data on the daily number of new reported COVID-19 cases and deaths by EU/EEA country	Monitoring daily COVID-19 cases.	https://www.ecdc.europa.eu/en/publications-data/data-daily-new-cases-COVID-19-eueea-country . [296]	[296]
	Data on SARS-CoV-2 variants in the EU/EEA	Monitoring SARS-CoV-2 variants in the EU/EEA	https://www.ecdc.europa.eu/en/publications-data/data-virus-variants-COVID-19-eueea . [297]	[297]
	Data on 14-day notification rate of new COVID-19 cases and deaths	Monitoring and analysis of Data on 14-day notification rate of new COVID-19 cases and deaths	https://www.ecdc.europa.eu/en/publications-data/data-national-14-day-notification-rate-COVID-19 . [298]	[298][299]
	Data on the daily subnational 14-day notification rate of new COVID-19 cases	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/subnational-14-day-notification-rate-COVID-19 . [300]	[300][301]
	Data on hospital and ICU admission rates and current occupancy for COVID-19	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/download-data-hospital-and-icu-admission-rates-and-current-occupancy-COVID-19 . [302]	[302][303]
	Data on country response measures	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/download-data-response-measures-COVID-19 [304]	[304]
	Data on age-specific notification rate	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/COVID-19-data-14-day-age-notification-rate-new-cases . [305]	[305]
	Data on council recommendations for mapping the coordinated approach to the restriction of free movement in response to the COVID-19 pandemic in the EU/EEA	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/indicators-maps-support-council-recommendation . [306]	[306]
	Historical data on the COVID-19 daily number of cases and deaths by country, worldwide	Monitoring and analysis.	https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-COVID-19-cases-worldwide . [307]	[307]
Kaggle.com	Daily information on the number of COVID-19	Monitoring and analysis.	https://www.kaggle.com/sudalairajkumar/novel-coronavirus-2019-dataset [308]	[308]

	affected areas across the globe			
World Health Organization	Information on country reported public measures to curb COVID-19.	Monitoring and analysis	https://www.who.int/emergencies/diseases/novel-coronavirus-2019/phsm . [309]	[309]
Johns Hopkins' electronic medical record, Epic	Information on the patients that have been confirmed or are suspected of having contracted COVID-19	For retrospective analysis of COVID-19 patient populations	https://ictr.johnshopkins.edu/coronavirus/jh-crown/ [310]	[310]
National Patient-Centered Clinical Research Network	Data model tracking insights on patients infected with COVID-19	For understanding and defining demographics infected with SARS-CoV-2	https://pcorner.org/news/pcorner-COVID-19-common-data-model-launched-enabling-rapid-capture-of-insights/ [311]	[311]
Johns Hopkins COVID-19 collaboration platform	Publicizing protocols whose PIs are open to various levels of collaboration.	Protocol collaboration.	https://covidcp.org/ . [312]	[312]
National COVID Cohort Collaborative	Building a centralized national data resource that the research community can use to study COVID-19 and identify potential treatments as the pandemic continues to evolve.	Rapid collection and analysis of clinical, laboratory, and diagnostic data from hospitals and health care plans	https://ncats.nih.gov/n3c/about . [313]	[313]
4CE	COVID-19 positive cases and new death rates by country, overtime	For data analysis and interpretation	https://covidclinical.net/plots/paper-01/release-2020-04-11/dailycounts.html . [314]	[314]
4CE	COVID-19 number of patients by country, by gender	For data analysis and interpretation	https://covidclinical.net/plots/paper-01/release-2020-04-11/demographics.html [315]	[315]
4CE	COVID-19 lab values corresponding to 14 LOINC Codes	For data analysis and interpretation	https://covidclinical.net/plots/paper-01/release-2020-04-11/labs.html [316]	[316]
4CE	Comparison of data from CSSE JHU	For data analysis and interpretation	https://covidclinical.net/plots/paper-01/release-2020-04-11/change.html . [317]	[317]
4CE	Participating sites visualized on maps	For data analysis and interpretation	https://covidclinical.net/plots/paper-01/release-2020-04-11/sites.html [318]	[318]
4CE	Daily Count Data for International Electronic Health Record-Derived COVID-19 Clinical Course Profile	For data analysis and interpretation	https://figshare.com/articles/dataset/Daily_Count_Data_for_International_Electronic_Health_Record-Derived_COVID-19_Clinical_Course_Profile_The_4CE_Consortium/12152976/1 . [319]	[319]
4CE	Demographic data for International Electronic Health Record-Derived COVID-19 Clinical Course Profile.	For data analysis and interpretation	https://figshare.com/articles/dataset/Demographics_Data_for_International_Electronic_Health_Record-Derived_COVID-19_Clinical_Course_Profile_The_4CE_Consortium/12152973/1 [320]	[320]
4CE	Diagnosis data for International Electronic Health Record-Derived COVID-19 Clinical Course Profile.	For data analysis and interpretation	https://figshare.com/articles/dataset/Diagnosis_Data_for_International_Electronic_Health_Record-Derived_COVID-19_Clinical_Course_Profile_The_4CE_Consortium/12152967 [321]	[321]
4CE	Labs data for International Electronic Health Record-Derived COVID-19 Clinical Course Profile.	For data analysis and interpretation	https://figshare.com/articles/dataset/Labs_Data_for_International_Electronic_Health_Record-Derived_COVID-19_Clinical_Course_Profile_The_4CE_Consortium/12152766 [322]	[322]
4CE	Labs data for International Electronic Health Record-Derived COVID-19	For data analysis and interpretation	https://figshare.com/articles/dataset/Healthcare_Systems/12118911 [323]	[323]

	Clinical Course Profile.			
4CE	Time series COVID-19 confirmed cases	For data analysis and interpretation	https://github.com/CSSEGISandData/COVID-19/blob/dcd4181613f512a6f75249fc77b63286aeb7271/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_confirmed_global.csv [324]	[324]
Health and Retirement Study	2020 HRS COVID-19 project	For data analysis and interpretation	https://hrsdata.isr.umich.edu/data-products/2020-hrs-COVID-19-project . [325]	[325]
COVID-19 research database	Electronic health records, claims, and consumer data.	For data analysis and interpretation	https://covid19researchdatabase.org/ . [326]	[326]
COVID-19 Research Initiatives in the HRS International Network	HRS COVID-19 Data on questionnaires, surveys, interviews, and state policies	For data analysis and interpretation	https://hrs.isr.umich.edu/data-products/COVID-19 [327]	[327]
Center for Disease Control and Prevention	COVID-19 Case Surveillance Public Use Data with Geography	For analysis and interpretation	https://data.cdc.gov/Case-Surveillance/COVID-19-Case-Surveillance-Public-Use-Data-with-Geography . [328]	[328]
Center for Disease Control and Prevention	COVID-19 Case Surveillance Public Use Data	For analysis and interpretation	https://data.cdc.gov/Case-Surveillance/COVID-19-Case-Surveillance-Public-Use-Data /vbim-akqf. [329]	[329]
Center for Disease Control and Prevention	COVID-19 Case Surveillance Restricted Access Detailed Data	For analysis and interpretation	https://data.cdc.gov/Case-Surveillance/COVID-19-Case-Surveillance-Restricted-Access-Detailed-Data /mbd7-r32t. [330]	[330]
Center for Disease Control and Prevention	COVID-19 Vaccine Distribution Allocations by Jurisdiction – Janssen	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccine-Distribution-Allocations-by-Jurisdiction-Janssen [331]	[331]
Center for Disease Control and Prevention	COVID-19 Vaccine Distribution Allocations by Jurisdiction - Pfizer	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccine-Distribution-Allocations-by-Jurisdiction-Pfizer /saz5-9hgg [332]	[332][333]
Center for Disease Control and Prevention	United States COVID-19 Cases and Deaths by State over Time	For analysis and interpretation	https://data.cdc.gov/Case-Surveillance/United-States-COVID-19-Cases-and-Deaths-by-State-over-Time /o9mfq-cb36 [334]	[334]
Center for Disease Control and Prevention	COVID-19 Vaccine Distribution Allocations by Jurisdiction – Moderna	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccine-Distribution-Allocations-by-Jurisdiction-Moderna /b7pe-5nws. [335]	[335][336]
Center for Disease Control and Prevention	Provider Relief Fund COVID-19 Nursing Home Quality Incentive Program	For analysis and interpretation	https://data.cdc.gov/Administrative/Provider-Relief-Fund-COVID-19-Nursing-Home-Quality-Incentive-Program /bfqg-cb6d [337]	[337]
Center for Disease Control and Prevention	Indicators of Anxiety or Depression Based on Reported Frequency of Symptoms During Last 7 Days	For analysis and interpretation	https://data.cdc.gov/NCHS/Indicators-of-Anxiety-or-Depression-Based-on-Reported-Frequency-of-Symptoms-During-Last-7-Days /8pt5-q6wp [338]	[338]
Center for Disease Control and Prevention	Mental Health Care in the Last 4 Weeks	For analysis and interpretation	https://data.cdc.gov/NCHS/Mental-Health-Care-in-the-Last-4-Weeks /yni7-er2q [339]	[339][340]
Center for Disease Control and Prevention	Vaccine Hesitancy for COVID-19: County and local estimate	For analysis and interpretation	https://data.cdc.gov/Vaccinations/Vaccine-Hesitancy-for-COVID-19-County-and-local-estimate /q9mh-h2tw. [341]	[341]
Center for Disease Control and Prevention	Loss of Work Due to Illness from COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Loss-of-Work-Due-to-Illness-from-COVID-19 /qgkx-msw. [342]	[342]
Center for Disease Control and Prevention	COVID-19 Vaccinations in the United States by Jurisdiction	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccinations-in-the-United-States-by-Jurisdiction /unsk-b7fc. [343]	[343]
Center for Disease Control and Prevention	Provider Relief Fund & Accelerated and Advance Payments	For analysis and interpretation	https://data.cdc.gov/Administrative/Provider-Relief-Fund-Accelerated-and-Advance-Payments /v2pi-w3up [344]	[344]
Center for Disease Control and Prevention	Indicators of Reduced Access to Care Due to the Coronavirus Pandemic During Last 4 Weeks	For analysis and interpretation	https://data.cdc.gov/NCHS/Indicators-of-Reduced-Access-to-Care-Due-to-the-Coronavirus-Pandemic-During-Last-4-Weeks /Co/xb3p-q62w. [345]	[345]

Center for Disease Control and Prevention	Access and Use of Telemedicine During COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Access-and-Use-of-Telemedicine-During-COVID-19/8xy9-ubqz . [346]	[346][347]
Center for Disease Control and Prevention	COVID-19 Vaccination Trends in the United States, National and Jurisdictional data	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccination-Trends-in-the-United-States-N/rh2h-3yt2 [348]	[348]
Center for Disease Control and Prevention	Reduced Access to Care During COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Reduced-Access-to-Care-During-COVID-19/th9n-ghnr . [349]	[349]
Center for Disease Control and Prevention	Telemedicine Use in the Last 4 Weeks	For analysis and interpretation	https://data.cdc.gov/NCHS/Telemedicine-Use-in-the-Last-4-Weeks/h7xa-837u [350]	[350][351]
Center for Disease Control and Prevention	Provisional COVID-19 Death Counts in the United States by County	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-in-the-United-St/kn79-hsxy [352]	[352]
Center for Disease Control and Prevention	Provisional COVID-19 Deaths: Focus on Ages 0-18 Years	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-Focus-on-Ages-0-18-Yea/nr4s-juj3 [353]	[353]
Center for Disease Control and Prevention	COVID-19 Vaccination and Case Trends by Age Group, United States	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccination-and-Case-Trends-by-Age-Group-/gxj9-t96f . [354]	[354]
Center for Disease Control and Prevention	Excess Deaths Associated with COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Excess-Deaths-Associated-with-COVID-19/xkkf-xrst [355]	[355]
Center for Disease Control and Prevention	Indicators of Health Insurance Coverage at the Time of Interview	For analysis and interpretation	https://data.cdc.gov/NCHS/Indicators-of-Health-Insurance-Coverage-at-the-Tim/jb9g-gnvr . [356]	[356][357]
Center for Disease Control and Prevention	Provisional COVID-19 Death Counts by Week Ending Date and State	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Week-Ending-D/r8kw-7aab [359]	[358][359]
Center for Disease Control and Prevention	COVID-19 Vaccination Demographics in the United States, National data	For analysis and interpretation	https://data.cdc.gov/Vaccinations/COVID-19-Vaccination-Demographics-in-the-United-St/km4m-vcsb [360]	[360]
Center for Disease Control and Prevention	Nationwide Survey on Commercial Laboratory Seroprevalence	For analysis and interpretation	https://data.cdc.gov/Laboratory-Surveillance/Nationwide-Commercial-Laboratory-Seroprevalence-Su/d2tw-32xv [361]	[361]
Center for Disease Control and Prevention	Survey on COVID-19 Hospital Data from the National Hospital Care	For analysis and interpretation	https://data.cdc.gov/NCHS/COVID-19-Hospital-Data-from-the-National-Hospital-/q3t8-zr7t [362]	[362][363]
Center for Disease Control and Prevention	Provisional COVID-19 Death Counts by Age in Years, 2020-2021	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Age-in-Years-/3apk-4u4f [364]	[364]
Center for Disease Control and Prevention	Long-term Care and COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Long-term-Care-and-COVID-19/3j26-kg6d [365]	[365]
Center for Disease Control and Prevention	Provisional COVID-19 Deaths by Place of Death and State	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-by-Place-of-Death-and-/uggs-hy5q . [366]	[366]
Center for Disease Control and Prevention	Provisional COVID-19 Deaths by Week and Urbanicity	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-by-Week-and-Urbanicity/hkhe-f7hg . [367]	[367][368]
Center for Disease Control and Prevention	U.S. State and Territorial Stay-At-Home Orders: March 15, 2020 – August 15, 2021 by County by Day	For analysis and interpretation	https://data.cdc.gov/Policy-Surveillance/U-S-State-and-Territorial-Stay-At-Home-Orders-Marc/y2iy-8irm . [369]	[369]
Center for Disease Control and Prevention	U.S. State and Territorial Public Mask Mandates from April 10, 2020 through August 15, 2021 by County by Day	For analysis and interpretation	https://data.cdc.gov/Policy-Surveillance/U-S-State-and-Territorial-Public-Mask-Mandates-Fro/62d6-pm5i [370]	[370][371]

Center for Disease Control and Prevention	U.S. State, Territorial, and County Stay-At-Home Orders: March 15-May 5 by County by Day	For analysis and interpretation	https://data.cdc.gov/Policy-Surveillance/U-S-State-Territorial-and-County-Stay-At-Home-Order/qz3x-mf9n . [372]	[372]
NCHS	Provisional Death Counts for Influenza, Pneumonia, and COVID-19	For analysis and interpretation	https://data.cdc.gov/NCHS/Provisional-Death-Counts-for-Influenza-Pneumonia-a/ynw2-4viq . [373]	[373][374]
European COVID-19 data platform	Three data hubs reporting SARS-CoV-2, COVID-19, and Federated European Genome-phenome	For data exploration, analysis, and interpretation.	https://www.covid19dataportal.org/the-european-COVID-19-data-platform [375]	[375]
Open Safely	Computational resources and open access data to address COVID-19	For data exploration, analysis, and interpretation.	https://datascience.nih.gov/COVID-19-open-access-resources [376]	[376]
ImmPort Shared Data	Research data available to the public and mostly scientific community to improve research work around COVID-19	For data exploration, analysis, and interpretation.	https://www.immport.org/shared/search?filters=study_2_condition_or_disease.condition_preferred:COVID-19%20-%20DOID:0080600&utm_source=COVID-19&utm_medium=banner&utm_campaign=COVID-19 [377]	[377]
World Health Organization	Global COVID-19 situation for confirmed cases.	For data exploration, analysis, and interpretation.	https://covid19.who.int/ . [378]	[378]
World meter	Global COVID-19 cases including confirmed cases, deaths, active cases, and closed cases.	For data exploration, analysis, and interpretation.	https://www.worldometers.info/coronavirus/ [379]	[379]
The World Bank	COVID-19 household monitoring dashboard.	For data exploration, analysis, and interpretation.	https://www.worldbank.org/en/data/interactive/2020/11/11/COVID-19-high-frequency-monitoring-dashboard [380]	[380]
The World Bank Group	COVID-19 business pulse survey dashboard that contains data on the socio-economic impacts of COVID-19 in 76 selected countries.	For data exploration, analysis, and interpretation.	https://www.worldbank.org/en/data/interactive/2021/01/19/COVID-19-business-pulse-survey-dashboard . [381]	[381][382]
The World Bank Group	Guidance to World Bank Group vendors on COVID-19.	For data exploration, analysis, and interpretation.	https://www.worldbank.org/en/about/corporate-procurement/announcements/guidance_on_COVID-19 [383]	[383]
The World Bank Group	Harmonized COVID-19 household monitoring survey	For data exploration, analysis, and interpretation.	https://datacatalog.worldbank.org/search/dataset/0037769/Harmonized-COVID-19-Household-Monitoring-Surveys . [384]	[384]
Centers for Disease Control and Prevention	Effectiveness of COVID-19 vaccines	For data exploration, analysis, and interpretation.	https://www.cdc.gov/coronavirus/2019-ncov/vaccines/effectiveness.html . [385]	[385]
Centers for Disease Control and Prevention	COVID-19 integrated country view	For data exploration, analysis, and interpretation.	https://covid.cdc.gov/covid-data-tracker/#county-view . [386]	[386]
Centers for Disease Control and Prevention	Forecasting cases and deaths COVID-19 in the United States	For data exploration, analysis, and interpretation.	https://covid.cdc.gov/covid-data-tracker/#forecasting_weeklydeaths . [387]	[387]
Centers for Disease Control and Prevention	COVID-19 vaccinations in the U.S	For data exploration, analysis, and interpretation.	https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-total-admin-rate-total [388]	[388]
Centers for Disease Control and Prevention	Country-level vulnerability index in the United States	For data exploration, analysis, and interpretation.	https://covid.cdc.gov/covid-data-tracker/#pandemic-vulnerability-index [389]	[389]
Centers for Disease Control and Prevention	COVID-19 community profile report	For data exploration, analysis, and interpretation.	https://healthdata.gov/Health/COVID-19-Community-Profile-Report/gqxm-d9w9 [390]	[390]

II. CONCLUSION

The summary tables (Tables I and II) present the technological resources and datasets used in tackling covid-19. Most of the data collected with COVID-19 related to hospitalizations, vaccinations, government response measures, deaths, confirmed reported cases, as well as restrictions and policies are used in aiding the pandemic. The R resources have mainly been used to develop Shiny apps and dashboards. Java, Kotlin, and Perl resources have been used in developing Android and iOS applications for contact tracing, disease surveillance, fast diagnostics, and notifying users anonymously if they have had any contact with someone who has been infected with COVID-19 via low-power bluetooth technology [28][31][32][51][52][69][129]. Based on the benefits of utilizing these resources, continued research and application of technological resources are highly recommendable [70].

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