



# Data analysis in uncertain times: rapid working to adapt to research needs during a pandemic

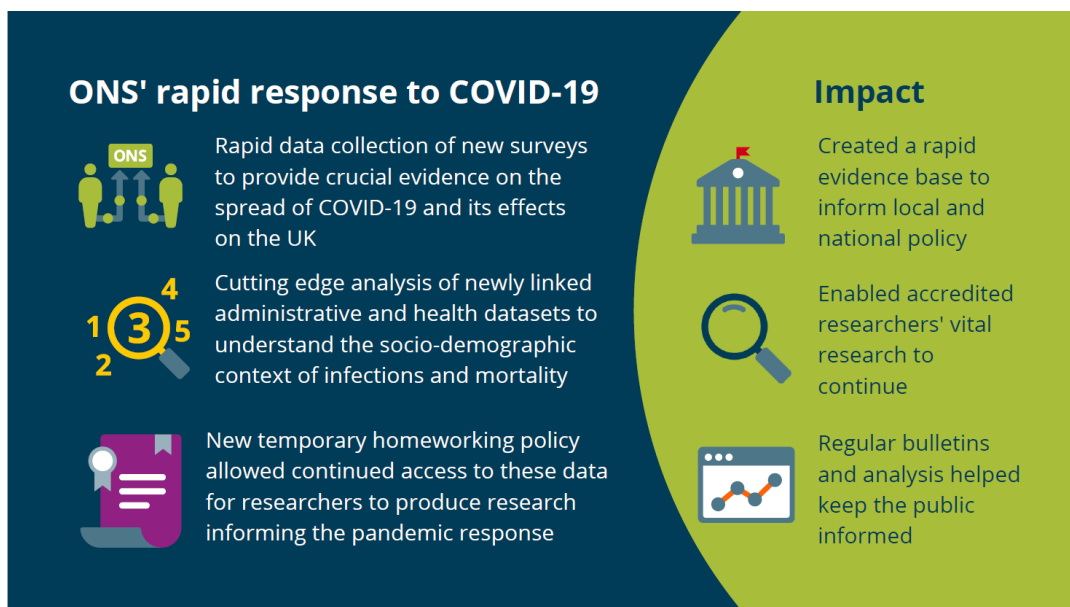
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## Summary

The outbreak of the coronavirus (Covid-19) pandemic in early 2020 created widespread uncertainty with unknown impacts on society, the economy, and the world around us. As a result, the need for rapid analysis based on trustworthy data to be able to plan and forecast had never been greater. The Office for National Statistics (ONS) and its partners have led the way in making high-quality data available for critical analysis through the ONS Secure Research Service (SRS).




New and renewed partnerships with Administrative Data Research UK (ADR UK), Health Data Research UK (HDR UK) and the Joint Biosecurity Centre (JBC) allowed for cutting-edge analysis of time-critical data on the effects of the pandemic. The innovative linking of existing administrative and health datasets along with the rapid roll-out of new surveys available and analysed within the SRS, such as the Coronavirus Infection Survey (CIS), has enabled researchers to provide an indispensable evidence base for policymakers and service planners.



**ONS' rapid response to COVID-19**

-  Rapid data collection of new surveys to provide crucial evidence on the spread of COVID-19 and its effects on the UK
-  Cutting edge analysis of newly linked administrative and health datasets to understand the socio-demographic context of infections and mortality
-  New temporary homeworking policy allowed continued access to these data for researchers to produce research informing the pandemic response

**Impact**








-  Created a rapid evidence base to inform local and national policy
-  Enabled accredited researchers' vital research to continue
-  Regular bulletins and analysis helped keep the public informed






## Rapidly sourcing and linking data

To understand the impact of the pandemic on the UK economy and society, ONS rapidly rolled-out several surveys to collect data as well as curating new public data sources. From economic and social indicators to the prevalence of Covid-19 in the community,

these new datasets were made available for accredited researchers along with over 100 other existing datasets within the SRS. Many of these datasets were updated regularly to allow for real-time weekly policy analysis on the state of the pandemic in the UK with over 2000 datasets ingested in the SRS in 2020 alone.

### Covid-19 related datasets

	Dataset	Description	Data owner
	The Coronavirus Infection Survey (CIS)	This <a href="#">dataset</a> seeks to understand the prevalence of Covid-19 in the UK population and includes test results from nose and throat swabs, antibody test results and key demographic information.	Office for National Statistics
	Covid-19 Schools Infection Survey (SIS)	This <a href="#">dataset</a> investigates the prevalence of Covid-19 infections and the presence of antibodies to Covid-19 among pupils and staff within a sample of primary and secondary schools in England.	Office for National Statistics
	Business Insights and Conditions Survey (BICS)	This <a href="#">dataset</a> collects real-time information on important events affecting businesses and the economy in the UK through a voluntary survey of approximately 39,000 businesses from various industries and regions in the UK.	Office for National Statistics
	Coronavirus and the social impacts on Great Britain	This <a href="#">dataset</a> provides indicators from the <a href="#">Opinions and Lifestyle Survey (OPN)</a> to understand the impact of coronavirus on people, households and communities in Great Britain.	Office for National Statistics
	NHS Test and Trace data	This <a href="#">dataset</a> is updated weekly with NHS Test and Trace data in England and provides valuable information about positive cases, particularly within care homes and hospitals which are not included in the CIS sample of private households.	Department of Health and Social Care
	Covid-19 wastewater dataset	This dataset captures both the provisional data and quality assured data of wastewater treatment plants across England.	Department of Health and Social Care
	Covid immunisation data	This dataset contains record level data of people in England who have received a Covid-19 vaccination, including details of the vaccine type and date of vaccination.	NHS England

	Linked 2011 Census and Mortality Dataset	This is a bespoke linked dataset encompassing Census 2011 records and death registrations in England and Wales. 2011 Census dataset was linked to NHS Patient Register between 2011 and 2013 to add NHS numbers to matching Census records. This dataset is now being replaced with the Public Health Research Database (see below).	Office for National Statistics
	Provisional Monthly Mortality	This dataset contains monthly death registration data, collected as part of civil registration and provides information on deaths that occur in and then are registered in England and Wales.	Office for National Statistics
	Public Health Research Database (PHRD)	This is a linked asset which currently includes Census 2011; Mortality Data; Hospital Episode Statistics (HES); GP Extraction Service (GPES) Data for Pandemic Planning and Research data.	Office for National Statistics and NHS Digital
	CIS linked to Value Office Agency (VOA) and Energy Performance Certificates (EPC)	This dataset links CIS households in England and Wales, where a match can be found, to VOA and EPC data to provide additional information on property attributes.	Office for National Statistics, HMRC and Ministry of Housing, Communities and Local Government
	CIS linked with vaccination data	This dataset contains ONS deprived vaccination information for CIS participants across the UK and vaccination data from the National Immunisation Management Service (NIMS)	Office for National Statistics and NHS England

*Note: some datasets are currently only available to certain research teams.*

The Covid-19 datasets are unsurprisingly popular with researchers using the SRS. In particular, the [Business Insights and Conditions Survey](#) (BICS), formerly known as the Business Impact of Covid-19 Survey, which has been the most used and requested of all the Covid-19 datasets. Providing users with data on the impact of the pandemic on business operations, the BICS was also one of the top ten most used of all SRS datasets in 2020, alongside longstanding social surveys such as the Labour Force Survey and the Annual Population Survey. The [Coronavirus and social impacts on Great Britain](#) and the Linked 2011 Census and Mortality datasets were also among the most highly requested Covid-19 datasets.

Cutting-edge data linkage within the SRS of administrative and health data has also further helped to build a picture of the pandemic. These data assets include:

- the Linked 2011 Census and Mortality dataset which allowed for powerful analysis of the socio-demographic characteristics of Covid-19 by creating a

retrospective cohort study to estimate the differences in Covid-19 mortality by [ethnic groups](#), occupation, and other socio-demographics.

- the linking of the CIS with Energy Performance Certification (EPC) data and the Valuation Office Agency (VOA) data which can provide insights on the impact of overcrowding and multigenerational housing on household transmission.
- linkage between the CIS and the National Immunisation Management System administrative data (which holds data on vaccines given including by type and date) provides a richer source of vaccination information for CIS respondents and enables analysis on vaccine efficacy.

Accredited researchers using the SRS are also analysing variations in longstanding data sources. The datasets being used by Covid-19 projects in the SRS include a wide variety of new and old, survey, business, administration, and health data and often in combination with one another.



### The most popular datasets currently being used by Covid-19 projects within the SRS

#### Adapting to a new safe setting



Safe people



Safe Projects



Safe settings



Safe data



Safe outputs

The SRS uses the [Five Safes Framework](#), a set of principles adopted by secure labs to ensure the safe use of data. The safe setting element uses a restricted trusted research environment (TRE) that limits

researchers' access to ONS data; either through access via a safe room at an ONS site or through remote access at an organisation's premises using the ONS Assured Organisational Connectivity (AOC). While national travel restrictions affected researchers visiting safe rooms and offices, ONS worked rapidly to ensure that

important analyses, particularly that supporting Covid-19 response, could continue while maintaining the core elements of the Five Safes Framework.

Early in March 2020, ONS provided access to the SRS to accredited researchers from other locations, allowing important research to continue while maintaining security. For vital research projects, home access was granted for researchers using an AOC's VPN and a corporate device. Home access must also be approved by the relevant data owner and only for projects prioritised as urgent for the public good. In 2020, 163 projects were authorised for homeworking, distributed across sectors with 82 academic institutions, 55 private organisations and 26 public bodies producing valuable insights on the pandemic.

### Timeline of ONS developments in response to Covid-19

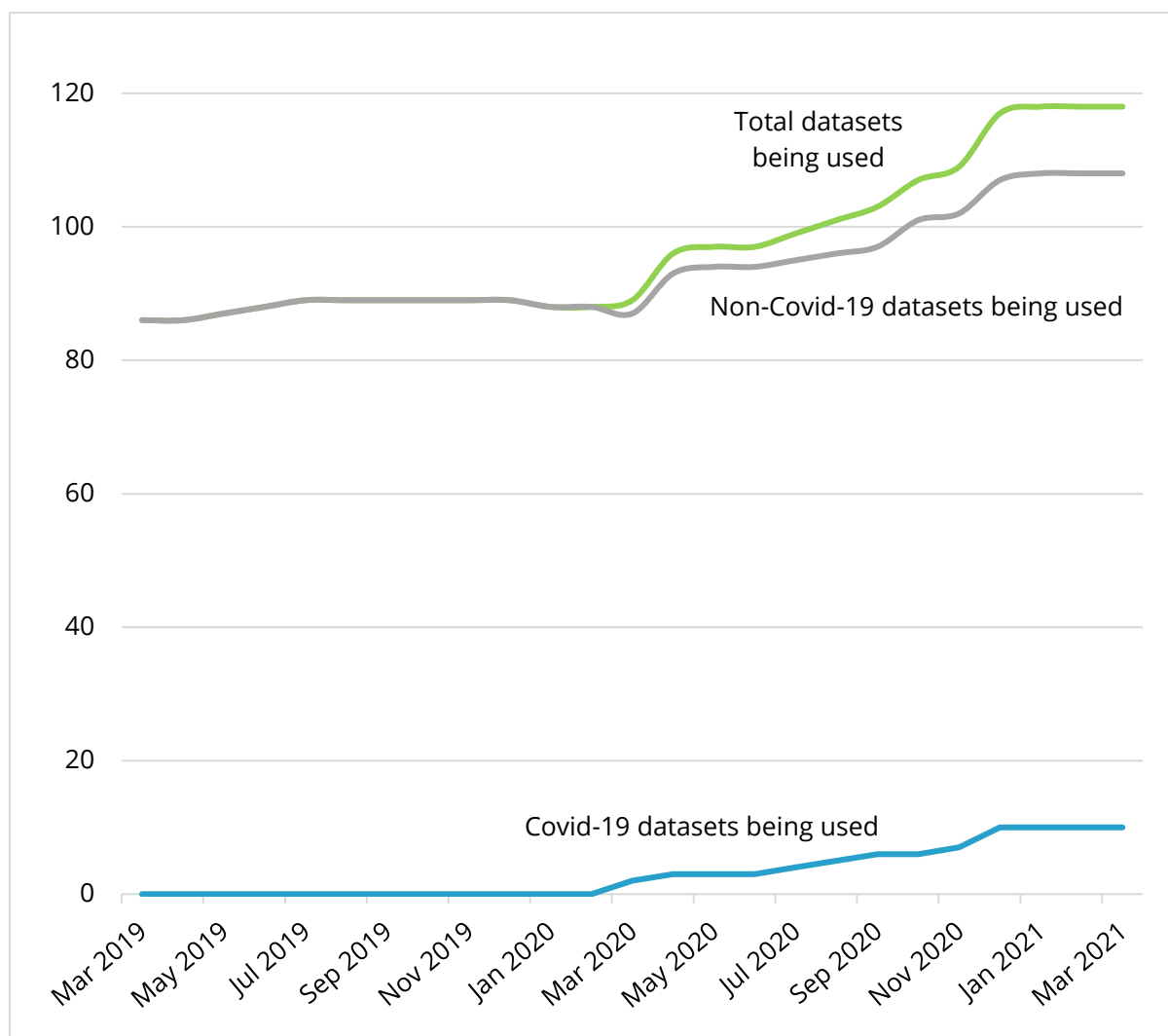
<b>March 2020</b>	<ul style="list-style-type: none"> <li>• Temporary homeworking policy is introduced to allow 24/7 access to the SRS for researchers</li> <li>• Training for newly accredited researchers provides online for the first time</li> <li>• Opinions and Lifestyle Survey (OPN) includes questions on Covid-19 to understand the impacts of the pandemic on society</li> <li>• First round of the Business Insights and Conditions Survey is conducted to provide real-time information on the effects of Covid-19 on UK businesses</li> </ul>
<b>April 2020</b>	<ul style="list-style-type: none"> <li>• The Coronavirus (Covid-19) Infection Survey (CIS) conducts its first sample of 20,000 individuals in England to understand the prevalence of Covid-19 in the community</li> <li>• The provisional monthly mortality datasets provides information on the number of deaths involving Covid-19 in England and Wales</li> </ul>
<b>May 2020</b>	<ul style="list-style-type: none"> <li>• ONS researchers use linked 2011 Census and mortality data to provide early insight into public health inequalities experienced by ethnic minorities</li> </ul>
<b>July 2020</b>	<ul style="list-style-type: none"> <li>• The Defra group and the Joint Biosecurity Centre (JBC) begins monitoring wastewater treatment identifying community-scale Covid-19 hotspots in England, storing the data in the SRS</li> </ul>
<b>October 2020</b>	<ul style="list-style-type: none"> <li>• CIS sample increases from 20,000 participants in England to 150,000 across all four UK nations</li> </ul>
<b>November 2020</b>	<ul style="list-style-type: none"> <li>• Covid-19 Schools Infection Survey (SIS) provides first estimates of staff and pupils testing positive for Covid-19 of sampled schools in England</li> </ul>
<b>March 2021</b>	<ul style="list-style-type: none"> <li>• CIS data is linked with Energy Performance Certificate data and Valuation Office data to provide information on housing conditions of CIS participants</li> <li>• National Immunisation Management System database is linked with ONS Public Health Asset to enable understanding into the different characteristics of the population who have been vaccinated</li> </ul>

## Using data during and after the pandemic

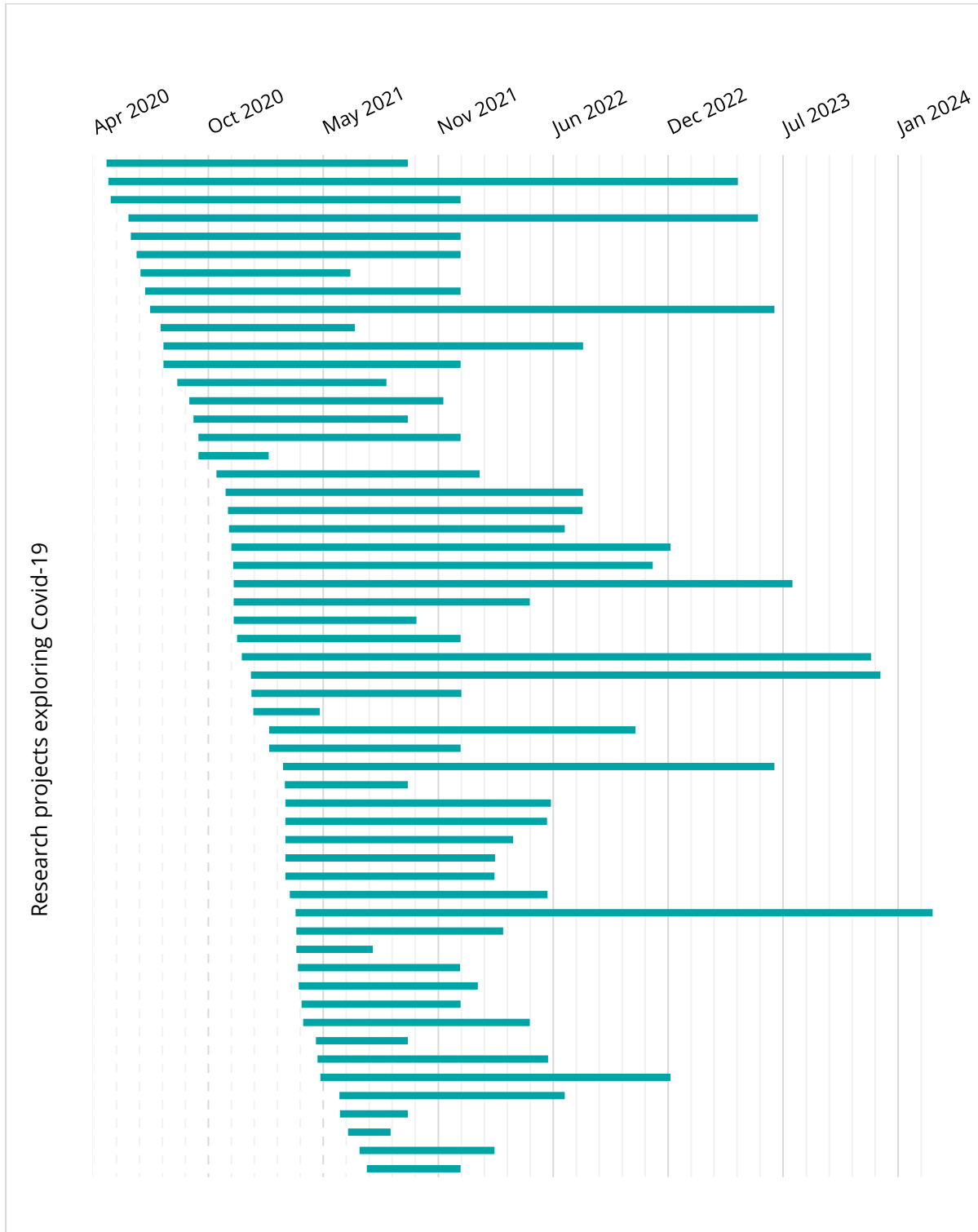
The Covid-19 pandemic has dramatically increased the need for rapid data analysis and not only in the short term and the ONS SRS has facilitated groundbreaking short-term and longitudinal research by continuing to meet the needs of researchers.

Despite the challenges of the last 18 months, the ONS continues to grow the number of accredited researchers able to access the SRS. Between March 2020 and March 2021, an additional 952 researchers became Digital Economy Act accredited researchers, accessing our Safe Researcher Training hosted online by the ONS Statistical Support team. This is almost double the number that were accredited during the same period the previous year (502 researchers).

As well as increasing the number of accredited researchers, the addition of new Covid-19 datasets has helped to expand the number and range of data being used for SRS projects. While in March 2020, there were 87 SRS datasets being used by live projects, in March 2021, this number rose to 118.

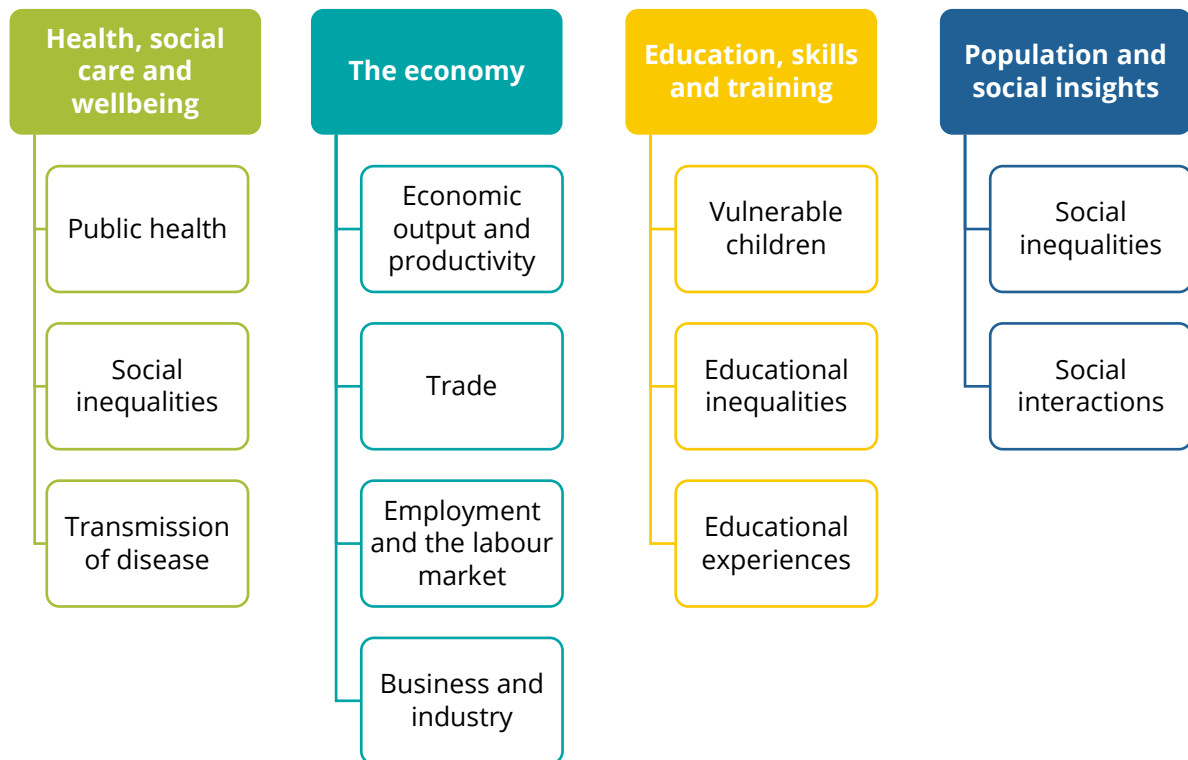


These new and linked data sources will continue to improve our understanding of the pandemic as the UK moves towards recovery, with researchers seeking to understand both the short-term and longer-term effects of Covid-19 on many areas of life and the economy, between March 2020 and March 2020, the expected running time of Covid-19 projects within the SRS varies between three months to three years.



The focus of the research being undertaken is diverse spanning a broad range of topics including investigations into:

- the transmission of the virus among communities, vaccine hesitancy and public health inequalities
- the disproportional economic and social impacts experienced by socio-demographic groups and specific communities
- the economic consequences on businesses and industries
- educational attainment and outcomes following the pandemic.



### **Covid-19 research projects within the SRS by Digital Economy Act 2017 themes**

These projects meet a number of critical policy questions and fill vital evidence gaps such as those identified as Areas of Research Interest (ARI) in the 2020 Government Office for Science’s [Rebuilding a Resilient Britain](#).

### **The impact so far**

#### **Supporting researchers**

Through the SRS, ONS and its partners have enabled researchers to create a vital evidence base during the Covid-19 pandemic. Despite the many challenges, the pandemic has accelerated data usage within and outside of government and highlights the need for more widespread use of administrative and health data and data linkage.



## SRS user testimonies



"Access to secure data through the SRS from home is enabling critical analysis to support a variety of Covid-19 policy decisions, including HM Treasury in the design of Covid-19 support schemes for businesses and the self-employed [...] allowing out of office SRS access, has been of fundamental importance in enabling research supporting these decisions." - Fergus Cumming, Bank of England



"The support [the SRS team] have provided has ensured the critical work of ONS to support decision-making and government's response to the global pandemic that continues 24 hours a day. The team have developed new and improved ways of working that allowed the modelling of the Covid-19 Infection Survey (CIS) to be undertaken." - Sarah Walker, University of Oxford



"The way in which ONS has responded speedily and flexibly to the current situation in ensuring continued data access has been hugely appreciated." - Paul Johnson, Institute of Fiscal Studies

## Policy impact

Research completed using data within the SRS has had a profound impact on government policy with studies such as the CIS, the BICS and the Coronavirus and the social impacts on Great Britain datasets being reported directly to the government departments and the Scientific Advisory Group for Emergencies (SAGE) for real-time policy analysis.

Highlights of analysis done within the SRS which have had an impact on government include:

Research	Data used	Impact
<b>The Coronavirus Infection Survey (CIS) study</b>	CIS	<ul style="list-style-type: none"> <li>Contributed to the Scientific Advisory Group for Emergencies' (SAGE) estimates of the rate of infection transmission (often referred to as the R number)</li> <li>Informed government policies on exiting lockdown and local-level lockdown decisions in high-risk areas.</li> <li>Cited in the coronavirus daily news briefings, as well as in the House of Commons and Select Committee meetings</li> </ul>
<b>Covid-19 risk factors for death and hospitalisation</b>	Linked 2011 Census and Mortality Dataset (now PHRD)	<ul style="list-style-type: none"> <li>UK Government ordered a review of the disproportionate impact of Covid-19 on Black, Asian and minority ethnic groups</li> <li>Regular updates of analysis are provided to SAGE ethnic subgroup</li> <li>Informed government thinking on the pandemic response including being included within written briefing to the Prime Minister</li> </ul>

**Covid-19 Schools Infection Survey (SIS)**

SIS

- Cited in parliamentary discussions and in a paper by the Children’s Task Force and Finish Group for the Scientific Advisory Group on Emergencies (SAGE)
- An important source of evidence for the Department for Education for national policy measures to keep schools open for young people while also ensuring the safety of pupils, staff, and the wider community

**Keeping the public informed**

Alongside providing data and analysis for researchers and decision makers, ONS has played a vital role in making data accessible for the public. ONS analysis has continuously been cited by media outlets and the ONS has created quick and accessible webpages with overviews of the economic and societal impacts of coronavirus.

For example, the [Covid-19 latest insights tool](#) helps users find the most up-to-date information related to the pandemic in a comprehensive and accessible way. Using predominantly ONS data, the page offers accessible and comprehensive information on infections, Covid-19 variants, deaths, vaccinations, and the effects on society.

**Coronavirus (COVID-19) latest insights**

A roundup of the latest data and trends about the coronavirus (COVID-19) pandemic from the ONS and other sources.  
9 August 2021

**Latest COVID-19 headlines**

- [Vaccine hesitancy falling across Great Britain](#)
- [Fewer returning UK passengers see testing as important for safety](#)
- [Infections decrease in England, Wales and Scotland](#)

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**Infections decreased**

Percentage testing positive for COVID-19, England

Office for National Statistics

**Hospital admissions remained similar**

Hospital admissions involving COVID-19 per 100,000 people, England

Public Health England

**Deaths increased**

Deaths registered by week involving COVID-19, UK

Office for National Statistics

**Around 3 in 4 adults are fully vaccinated**

Percentage who have received one and two doses of a COVID-19 vaccine, England

Office for National Statistics

**Over 9 in 10 adults had antibodies**

Percentage testing positive for antibodies to COVID-19, England

Office for National Statistics

**Happiness remained stable**

Overall, how happy did you feel yesterday?

Office for National Statistics

**ONS partnerships during the pandemic**



Since the onset of the pandemic, ONS’ partnerships have been essential in facilitating critical analysis in the SRS.

**ADR UK**

ADR UK is designed to work with UK government departments and devolved administrations to unlock the potential of administrative data. ONS works with ADR UK

to facilitate the acquisition, linkage and sharing of administrative data held across government departments and other public bodies and to provide researchers with access to administrative data for public benefit.

ADR UK are funding ONS' contribution to the National Core Studies and Data Connectivity initiative, led by HDR, to facilitate more Covid-19 datasets being made available to researchers. This partnership has been a key component of ONS's rapid response to the pandemic.

### **National Core Studies**

The [National Core Studies](#) are a small number of key studies and research infrastructure programmes answering essential and outstanding Covid-19 policy questions. The core studies consist of Epidemiology and Surveillance, Longitudinal Health and Wellbeing, Clinical Trial Infrastructure, Transmission and Environment and Immunity. The programme is defined by data sharing and collaboration between government departments.

### **Health Data Research UK (HDR UK)**

HDR UK is helping to map and make available the priority Covid-19 datasets required by the National Core Studies and, with the ONS, has been providing regular reports to the Scientific Advisory Group for Emergencies (SAGE). These reports demonstrate the progress making datasets available for the vital research, allowing priority research questions to be answered efficiently in a transparent and trustworthy way, informing policy and operational decision-making on Covid-19 across the UK.

### **Joint Biosecurity Centre**

Another key partner of the ONS' Covid-19 projects has been the Joint Biosecurity Centre (JBC). The JBC was part of NHS Test and Trace and is now the Data, Analytics, and Surveillance group inside the UK Health Security Agency. By using data science, assessment, and public health expertise, it provides analysis and insight on the status of the Covid-19 pandemic to break chains of transmission. Data acquisition teams from the ONS and JBC have worked closely to ingest data from Track and Trace and link these datasets to existing and other new sources of data.

### **Ministry of Housing, Communities and Local Government**

As part of this work, the ONS, the JBC, ADR UK and the Ministry of Housing, Communities and Local Government are enabling localities within England and Wales greater access of Covid-19 data about specific local authority areas. Using SRS data, the [Local Data Spaces](#) programme provides secure, bespoke virtual research for local authorities to access the data they need to inform their response to the pandemic.

## About the ONS Secure Research Service

The [ONS Secure Research Service \(SRS\)](#) is an accredited trusted research environment, using the Five Safes Framework to provide secure access to de-identified, unpublished data. If you would like to discuss writing a future case study with us, please get in touch: [srs.dev-impact@ons.gov.uk](mailto:srs.dev-impact@ons.gov.uk)

## Further reading

- ONS blog, May 2021: [The pandemic has revolutionised public data and there's no turning back](#)
- ONS blog, February 2021: [UK Infections and Antibody Survey passes key milestone as 3 millionth swab test collected](#)
- ONS blog, February 2021: [Protecting your Data at ONS during Covid-19](#)
- ONS blog, January 2021: [Understanding the 'UK' variant: How ONS is monitoring the new strain of Covid-19](#)
- ONS blog, January 2021: [Counting deaths involving coronavirus: a year in review](#)
- ONS blog, December 2021: [What do the latest analyses from ONS and PHE tell us about ethnic inequalities in Covid-19?](#)
- Looking back at 2020: [A statistical year like no other](#)