Office for National Statistics

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Census 2021: General report for England and Wales

Census 2021: General report for England and Wales

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A National Statistics publication

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Foreword by the National Statistician

The indisputable value of statistics, data and analysis to inform the most important decisions we face as a country has been clearly demonstrated in the policy challenges during my five and a half years as National Statistician. Those challenges have also shown the importance of timely data. I am proud of how the Office for National Statistics (ONS) has responded in providing high-quality statistics to meet urgent policy needs.

Since 1801, the census has been a crucial part of the evidence base for national and local decision-making. Taking place almost every decade, the census of population and housing has reached every part of England and Wales, providing vital information about the way we lived at each point in time. Census 2021 was a great success, with very high response rates nationally and locally. It delivered a wealth of high-quality data more quickly with greater flexibility for users than ever before.

The census has evolved over time, both in the questions we ask and the statistical methods we use to produce census estimates. Census 2021 was the first digital-first census, with nearly 9 out of 10 households completing their census online. We also made more use than ever before of the information that public sector organisations hold about people, alongside our wider research into how this administrative data can be used to provide more frequent and timely data in future. The UK Statistics Authority's recommendation, published alongside this report, proposes holding a 2031 census while maximising the growing power of administrative data to support and develop the admin-based population and migration statistics system. This would provide users with the granularity they require with an increased understanding of changes to society in the intercensal years.

While preparing for Census 2021, we responded swiftly to the data needs of the nation in the face of the coronavirus (COVID-19) pandemic. We did this both with new and adapted surveys monitoring the pandemic and its impact and with analyses based on 2011 Census data. We made exceptional early use of data from Census 2021 to update these pandemic analyses and to inform government policy on rising energy costs and the response to Russia's invasion of Ukraine.

The most important thing about a census is, of course, the data that come out of it, which inform decision-making across the public, private and charitable sectors. The estimates from Census 2021 were not only more timely than ever before, but also more flexible and accessible for users, catering for users with a wide range of needs and expertise. Through our 'Create a custom dataset' tool and a range of other datasets, we enabled users to explore for themselves census data across most topics and levels of geography to meet their needs, while keeping individuals' data safe. Meanwhile, a range of products from games to innovative data-visualisation brought the data to life and our analysis articles explored them in more detail.

This general report describes how we designed and delivered the census, from the 2014 decision to hold an online-first census, through to the publication of census data in 2022 and 2023.

A successful census relies on the contributions of many people and groups, for which I would like to record my personal gratitude. These include our colleagues in the Welsh Government, National Records of Scotland, and the Northern Ireland Statistics and Research Agency, for their support and collaboration through the whole process; our force of 20,000 field staff who visited households and communal establishments across England and Wales and over 300 engagement staff who engaged with diverse communities and population groups; the local authorities, charities and other stakeholders who worked closely with us to ensure that the census delivered for data users across sectors and across the country; and the staff in the ONS and the UK Statistics Authority, through whose hard work and professionalism we planned and delivered the enormous census operation from investigating user needs, through data-collection and processing, to publishing and disseminating the outputs.

Finally, the success of the census relies on members of the public across England and Wales. I would like to thank every one of them for taking the time to participate in Census 2021 and enabling us to produce the high-quality statistics that data users across the country need.

Professor Sir Ian Diamond
National Statistician | October 2019 to May 2025
May 2025

Executive summary and overview

Census 2021 in numbers

24 million

letters sent to households across England and Wales

97%

of all households completed the census

89%

of households completed the census online

200

buildings lit up census purple across the country

20,000

census field staff

2,900

census stories and interviews in print or online media

Census information was available in

49 languages

Population of England and Wales on 21 March 2021 was

59,597,542

Introduction

The census of population and housing has been at the heart of population statistics for England and Wales for over two centuries. It has been the biggest statistical exercise the Office for National Statistics (ONS) undertakes, involving contacting every household and communal establishment every 10 years. The resulting statistics from each census have been the most detailed available on the population, its characteristics, and where and how we all live. These statistics are widely used by government, local authorities, charities, private organisations and the public.

Census 2021 was the first to be primarily completed online. It achieved a high response rate, with 97% of all households completing the census, and all local authority areas reached response rates of at least 88%. It also saw a timelier release of data than ever before, with the first results released a year after the data-collection operation and all major England and Wales releases published by the end of 2023. This general report describes the preparation and delivery of Census 2021, from the decision to hold an online-first census through to the release of those outputs in 2022 and 2023.

Any census is an ambitious and complex undertaking. In addition, the preparation and delivery of Census 2021 was affected by the coronavirus (COVID-19) pandemic. The pandemic and lockdown restrictions meant that some people temporarily lived elsewhere, while other people's work and behaviours changed, including increased use of the internet. This presented both challenges and opportunities for the collection of census data.

Alongside Census 2021, the ONS has led a programme of research to improve its population and migration statistics by making the most of the potential of administrative data (information collected by other public bodies) to produce up-to-date statistics about the population more often and more quickly than the census.

Important features and innovations of Census 2021

Digital-first approach

Most people completed the census online (including 89% of households), which provided opportunities for features such as automatic quality checks and ensuring that people were shown only the questions that were relevant to them.

Innovative use of technology

New and improved use of technology featured throughout the census, including the electronic questionnaire: timely data on responses to inform decisions on follow-up activity: and increased computing capacity for data processing.

Inclusivity, accessibility and engagement

As well as providing a wide range of support online, by phone and in person, a major part of our communications and engagement focussed on overcoming barriers to taking part. The addition of new questions provided new data to address gaps in our understanding of society.

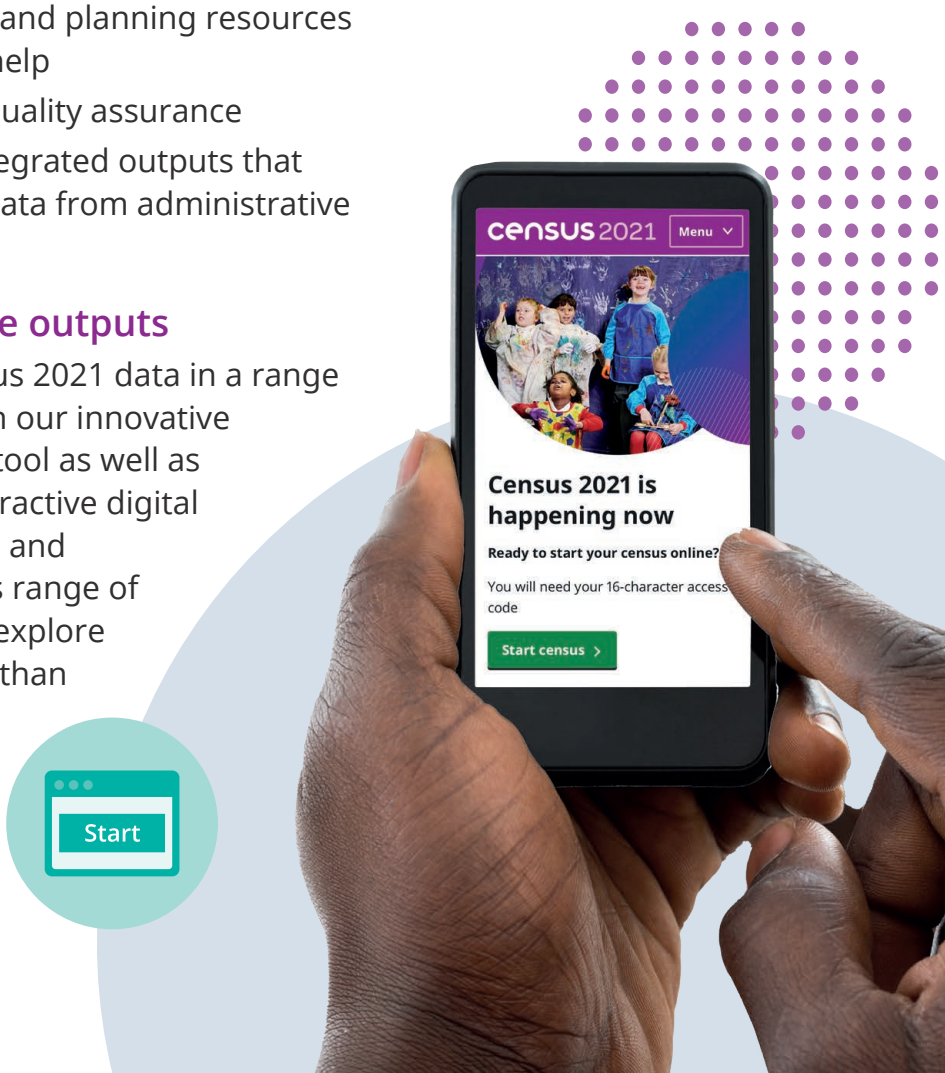
Use of administrative and alternative data sources

Throughout Census 2021, we made greater use than ever before of administrative data and other data sources. This included:

- in the data-collection operation, such as for the address frame (listing the residential address for initial contact and response tracking) and planning resources for those who needed help
- in our processing and quality assurance
- in the production of integrated outputs that used census data and data from administrative sources

Flexible and accessible outputs

People could access Census 2021 data in a range of ways, including through our innovative 'Create a custom dataset' tool as well as ready-made datasets, interactive digital products, analysis articles, and commissioned tables. This range of outputs enabled users to explore census data more flexibly than ever before.



Preparing for Census 2021

A three-year period of question development established what data users needed from the census and how we would collect them. This began with our Topic Consultation in 2015 and led to the recommended census questions being set out in the 2018 census white paper. This work and our wider preparations for Census 2021 are outlined in Chapter 2. We also consulted on census outputs in 2018 and 2021 and these consultations helped to shape the suite of products described in chapter 9.

Two new voluntary questions required a new Act of Parliament, which gained Royal Assent in 2019. This was followed by the census secondary legislation: an England and Wales Census Order and separate regulations for England and for Wales, which confirmed the questions and other details of the census.

While it was digital-first by design, Census 2021 was also multi-mode, with both paper and online responses. Most households received initial contact letters with online access codes, but our paper-first strategy identified 10% of areas to receive paper questionnaires, which also included a code to complete online, to aid responses. Our question and questionnaire development optimised the design for both online and paper completion.

Our commitment to delivering a bilingual census in Wales meant that the census website, our materials and services were available in English and Welsh. Users could toggle between English and Welsh versions of each webpage, including within the questionnaire for respondents in Wales. In Wales, initial contact letters sent to addresses were bilingual and paper-first addresses received questionnaires in English and Welsh. A Welsh-language option was also offered by our freephone contact centre, and the field force included Welsh speakers.

Census data collection

In early March 2021, we sent out **24 million letters and 3 million paper questionnaires** to households, ahead of Census Day on 21 March.

We exceeded our target of responses received without follow-up activity, with over 70% of households responding by the end of Census Day and nearly 79% by 26 March. As well as the quality and reach of our communications and the ease of completion both online and on paper, the coronavirus (COVID-19) pandemic lockdown conditions may also have helped this early success. Much work was needed to ensure that we reached our target of 94% of households taking part. The pandemic made this follow-up activity more difficult, but we exceeded both our response rate and variability targets. Chapter 4 describes the data-collection operation, including the work of the field force, the electronic questionnaire, and the support provided to respondents. Chapter 5 describes the communications, media and engagement work that was essential to delivering a successful operation with high response rates.

Major components of the data-collection campaign

Support and overcoming barriers to taking part

We provided guidance and offered practical support to help people to complete the census. The public could access a range of online and in-person support ,including a freephone public contact centre that provided guidance and help via telephone, and digital services such as web chat and social media. Our contact centre received almost 4.5 million calls, and over 180,000 census responses were completed through the telephone capture service. Information about the census

was available in 49 languages through the census website, the contact centre, and local engagement staff, and in a range of formats such as braille and large print. We also provided in-person support for online completions though census support centres, though this service was affected by the coronavirus pandemic and lockdown restrictions.

We recognised that some people may be less likely to take part without additional interactions taken to publicise the census, underline its use and value and offer support. Communications and advertising were produced in different formats and ran across numerous channels. Our network of engagement staff worked with communities at regional and local levels. They helped people to overcome barriers to completion and offered more tailored communications and support. We worked closely with local authorities and community partners well before March 2021, including deploying local engagement staff from autumn 2020. Building trust and advocacy from community leaders and representatives meant they could help to build awareness, trust, and willingness to complete the census within those communities. Our local engagement staff worked with population groups less likely to respond to the census without additional interactions, for example through community events and local media. These staff included 200 Census Engagement Managers working with local authorities and communities across England and Wales, and 115 Community Advisers working with specific population groups.

At our request, almost every local authority nominated a member of staff to take on the role of Census Liaison Manager or Assistant Manager. The support of local authorities, with their knowledge and understanding of their local areas and communities, was very important. These partners' contribution to co-ordinating activity across their councils and their commitment to achieve a successful local census was essential.

Completion of the census by students was a particular challenge; this was made harder by the pandemic as many students lived away from their normal term-time addresses. Our student communication campaign focused on the message that they had to be included at their term-time address, if they had one, as well as at their out of term-time address, such as a family home.

Each of the individual measures we took helped to ensure that as many people as possible could engage with the census and access the information that they needed to take part.

Communications and public relations

Our communications campaign was integrated with the phases of contact with households. Our campaign began with preparing audiences for the upcoming contact, and moved on to encouraging completion before and after Census Day, which included targeted advertising for areas and populations with lower response rates. The campaign used of a range of communications channels to reach a large proportion of the population. This ranged from TV and radio to social media and digital, including social media influencers and paid media partnerships. The communications campaign also focussed on messaging for groups facing barriers to taking part. For these targeted communications, we used different languages and bespoke photography representing different population groups, while keeping our "it's about us" message and a common style to the whole campaign.

The public relations campaign included promotional activities such as 'community heroes'; who received one of 22 purple plaques; a purple-light switch-on that lit up over 200 buildings across the country; and extensive media activity resulting in national coverage and over 430 pieces of coverage across community-specific media outlets. National coverage included appearances by ONS staff and spokespeople on every major news channel, an EastEnders storyline, and a partnership with Gogglebox. We also used social media influencers to reach both mass and niche audiences. Census communications and engagement were also supported by successful programmes for primary and secondary schools.

Field force operations

Our household field force of 20,000 people made over 16 million visits to over 5million households during the five weeks after Census Day, alongside us sending more than 11 million reminder letters. During these visits - 4.5 million of which resulted in contact with the household - census officers were able to offer advice on the doorstep and direct householders to support channels, to enable householders to complete their census. Flexibility in the design of the field operation was a vital part of its success. This included the use of mobile teams in the field force and the ability to redeploy staff in a flexible way. Technology played an important role, with up-to-date data on responses and information from field staff used to make timely decisions about whereto target resources to optimise response.

A further 1,300 field staff supported communal establishments and other "special population groups". Communal establishments are generally sites that provide managed residential accommodation, such as care homes and student halls of residence. Other "special population groups" were largely people who lived in accommodation types that were more difficult to access and enumerate, such as people living in armed forces family accommodation, marinas, or traveller communities. As expected, the final response rate was lower for communal establishments, at 79%, as was the return rate for "special population groups", at 76.4%.

After the main campaign, a further field operation of nearly 4,000 staff conducted the Census Coverage Survey, a vital part of producing accurate estimates for Census 2021.

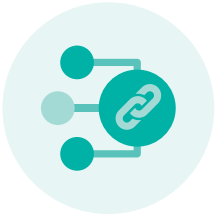
The coronavirus pandemic affected these operations in different ways, and the safety of the public and census staff was a major consideration in the operations.

Processing, estimation and quality assurance

Following the successful data-collection campaign, we completed a rigorous series of steps to produce accurate estimates of the whole population of England and Wales. There were four main stages of this work.

Pre-processing

The first stage involved cleaning and coding responses, resolving duplicates and removing false responses. This resulted in a dataset of 58.6 million residents and 26.3 million households.



Edit and imputation

The edit and imputation stages produced a fully populated, clean, and consistent census database by resolving missing values and inconsistencies within or between persons and within households.

Estimation and adjustment

In the estimation and adjustment stage, we produced accurate estimates of the whole population. We did this by taking account of both undercoverage and overcoverage (using the Census Coverage Survey) and adjusting the census dataset to represent the estimated population of 59.6 million usual residents.

Quality assurance

We carried out extensive quality assurance to assess the quality of the previous stages and compared the census results with other available information. Population estimates were quality-assured at national, local authority and sub-local authority levels, including inviting all local authorities to contribute to our quality assurance process. We also carried out detailed assurance of the census results for each topic. This included comparisons with 2011 subnational patterns and with other available data, and consideration of other issues raised by users or in the quality-assurance process.

Chapter 6 describes each stage in more detail. Processing the data from Census 2021 benefitted from the digital-first approach. This was because collected data were quickly available to test, update and quality assure the processing stages. Processing also benefitted from a substantial increase in computation processing power since 2011. Estimation of large communal establishments also made use of administrative data and bespoke surveys carried out after the census.

Quality of census data

We estimated the usual resident **population in England and Wales on Census Day to be 59,597,542**, of whom 56,490,048 lived in England and 3,107,494 in Wales.

As for previous censuses, we had a range of measures and targets to assess the quality of those estimates. The main strategic aim was to achieve at least a 94% overall response rate and to minimise local variation, with all local authorities having a response rate above 80%. We exceeded both, achieving a 97% overall response rate and over 88% in all local authority areas, with more than half above 97%.

Chapter 7 details other measures of the quality of the census population estimates. These include:

- response rates by ethnic group, all of which were higher or the same as in 2011, with less variation between groups because each had a response rate of at least 92%
- question completeness, which was generally higher than in 2011
- confidence intervals, which are a statistical measure of uncertainty

Our 95% confidence interval had a lower limit of 0.16% below the England and Wales population estimate and an upper limit of 0.07% above. This was well within our target of plus or minus 0.2%, and a narrower overall width of the interval than in 2011.

Chapter 7 also outlines some issues that were specific to Census 2021. The coronavirus (COVID-19) pandemic and lockdown restrictions had some specific impacts. These were most notably on the place of usual residence for some people, and on labour market and travel to work data. The chapter also describes issues relating to the new questions and our joint workplan with the Welsh Government on the coherence of Welsh language statistics.

Outputs

Our strategic aims for Census 2021 outputs were flexibility, timeliness, accessibility, and relevance. The first release of Census 2021 data on 28 June 2022 provided rounded population estimates of usual residents, along with estimates by sex and five-year age bands, down to local authority area level. We published more detailed releases over the remainder of 2022 and 2023, supported by data visualisations, interactive content, and information on quality and methods. We released our innovative 'Create a custom dataset' tool in March 2023, enabling users to find and download multiple combinations of data they were most interested in. This was followed by specialist data and additional geographies, including origin-destination flows, alternative population bases and bespoke datasets containing data about specific small population groups (defined by ethnic group, religion, national identity, main language, or country of birth). With the first results released a year after the data-collection operation, and the main England and Wales census data published by the end of 2023, this was a timelier release of census data than ever before. Chapter 9 describes the full range of Census 2021 outputs.

Our suite of outputs supported users with a range of experience and needs. These included expert users who wanted machine-readable datasets and APIs (application programming interfaces) and general users who used our interactive content, data visualisation, storytelling, and games to bring the data to life. We also produced a suite of analysis articles using multivariate data to explore different topics and populations.

Confidentiality, security and privacy

The safety of census respondents' personal data is a top priority for the Office for National Statistics. All our systems, staff, and suppliers must protect the confidentiality of census data by law, including the:

- Data Protection Act 2018
- UK General Data Protection Regulation (GDPR)
- Census Act 1920
- Statistics and Registration Service Act 2007

Chapter 8 sets out how security and confidentiality were built into Census 2021 storage, processing and publication. This included our approach to statistical disclosure control to protect personal data in our published datasets. An Independent Information Assurance Review provided independent assurance.

Cost and benefits of the census

Our Census and Data Collection Transformation Programme delivered both Census 2021 and evidence to enable the UK Statistics Authority's recommendation on the future of population and migration statistics. The census cost £539 million as part of this £820 million programme. More detail on the costs can be found in Chapter 3.

As in previous censuses, external suppliers provided several of our services, including:

- printing and posting census materials
- the communications campaign
- questionnaire management
- the public contact centre
- field force people services

More information on these and other contracts is available in chapter 3 and on our Census 2021 suppliers webpage.

Ahead of the census, the total benefits to central government, local government and private sector users were expected to be £5.5 billion over a 10-year period. Our assessment of Census 2021 benefits is due to be published in summer 2025.

Evaluation and lessons learned

Chapter 10 reflects on the experience of planning and delivering Census 2021 and reflects on both positive lessons and things that could have been improved. It identifies the main factors that made Census 2021 successful, including some of the features and innovations described earlier in this executive summary. These factors include:

- a good statistical design for the census and a strong, but flexible, operational design to deliver it
- very high response rates by the end of the census weekend, reflecting the quality of our communications campaign, engagement, and media relations, and well-designed routes to completion
- exceeding our household response and local variability targets, thanks to effective follow-up activities and communications, and local, national, and community engagement
- improvements in our processing stages, assisted by early access to live census data and greater processing power
- improvements in our estimation and quality assurance, including the Local Authority Insight Initiative
- high-quality outputs that were more timely and more flexible than ever before, providing data and resources to meet a wide range of user needs
- a legacy beyond the census itself, with many of the technologies, methods and lessons used across the wider work of the ONS

Chapter 10 then addresses each stage of Census 2021 from planning through data-collection and processing to outputs dissemination, highlighting lessons. While some are specific to the delivery of a census, others may be applicable to our wider work, including producing population estimates based primarily on administrative data and other surveys.

Census 2021 and the future of population and migration statistics

We ran Census 2021 as part of a wider programme focused on producing essential, up-to-date statistics about the population and migration. This work follows our 2014 commitment to deliver an online-first census in 2021 and use administrative data and surveys to improve annual statistics, reducing reliance on a census every 10 years. We are using a wider range of data sources, including administrative sources - including administrative data, such as data from tax, benefits, health, border flows, and education systems - to produce up-to-date statistics about the population and migration more often.

For our headline international migration estimates this has seen a change from survey-based data, where we would ask people if they were intending to move to or from the UK, to primarily using administrative data. These new data and methods mean we are using a wider range of data to provide improved estimates that capture long-term international migration based on actual behaviours rather than stated intentions.

Chapter 11 summarises the programme's work beyond the census. This includes the UK Statistics Authority's June 2025 recommendation to government that the ONS should be commissioned to deliver a questionnaire-based census in 2031, alongside the ongoing development of an admin-based population and migration statistics system, supported by improvements in the supply and quality of admin data. This will enable us to combine the strengths of both sources of data. Delivering a census in 2031 is an exciting opportunity to build a system of population and migration statistics that combines the strengths of whole-population data collection with the additional value that administrative data can provide. This combination would create a resilient and future-focussed population statistics system, which will help to provide users with the detail they require, while also providing an improved understanding of how society is changing in the years between censuses.

Introduction and background

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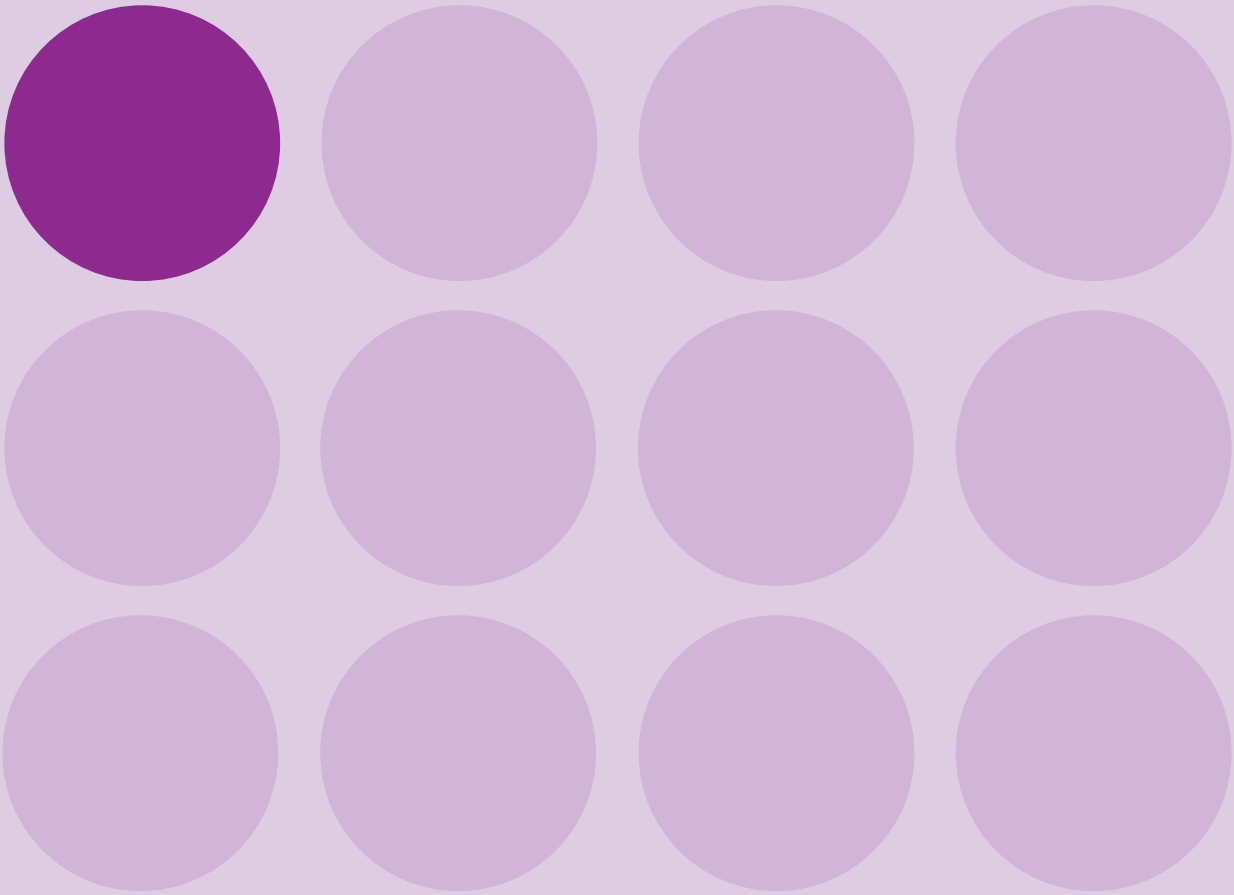


> "The UK's decennial population census is central to decisions in all areas of society - whether by businesses, councils, the health service or charities. It is the basis of population estimates; it underpins funding formulae; it provides insight into the wellbeing and needs of communities throughout UK society. It is also the most expensive single statistical undertaking - getting it right matters, both in terms of providing value for this spending of public money, as well as in ensuring that users base these important decisions on trusted and high-quality data."
>
> **UK Statistics Authority, Special Assessment of the 2011 Censuses in the UK[1]**

1.1 Historical background

There has been a census in England and Wales every ten years since 1801, with the exception of 1941 during the Second World War. The Census of Population and Housing has been the most important single source of information about the size and condition of the country's most valuable resource – its population.

Following the 2011 Census, the Office for National Statistics (ONS) explored whether statistics on population and housing for England and Wales could be produced through alternative means, primarily using administrative data. The National Statistician recommended in 2014 that an online-first census should be held in 2021, alongside ongoing work on meeting user needs through administrative data and other sources that would offer the possibility of moving further away from the traditional decennial census.

With censuses run separately in Scotland and Northern Ireland, broadly the same questions have been asked, and the information recorded in the same way, throughout the UK. This means that the census allows the comparison of different groups of people and small areas across the UK, and the opportunity to explore various characteristics of the population. The high degree of consistency between one census and another also allows for changes over time to be measured. A high-level comparison of census questions across the UK has been published alongside this report[2].

From 1801 to 2011, a census was taken in Scotland on the same date as that in England and Wales. Since the Second World War, the census in Northern Ireland has also been held on the same date as those in England, Wales and Scotland. In 2021, censuses were run in England, Wales and Northern Ireland, with Scotland's census held a year later. Chapter 9: Outputs and Dissemination includes more information about the impact of this change on the production of UK-wide census statistics.

1.2 Reasons for conducting a census in 2021

Everyone benefits from the data provided by a census. It informs decisions nationally and locally on vital services and issues like diversity. The information the census provides on the population (including their characteristics, education, religion, ethnicity, working life, living arrangements, housing, and health) gives decision-makers in national and local government, community groups, charities and businesses the opportunity to better serve communities and individuals. Information derived from the census helps to inform policy, plan services, and distribute resources effectively to local and health authorities.

Examples of how census information is used to make decisions by a wide range of users include:

Resource allocation

The Ministry of Housing, Communities and Local Government and the Welsh Government use population statistics to allocate billions of pounds to local areas using funding formulae. Similarly, census data are used by the Home Office to allocate police funding.

Targeting investment

For many local and central government funding uses (such as grant allocations), statistics about population characteristics are used to ensure that targeted investment is made in the areas where it is most needed or beneficial (for example in decision-making on transport investment). Businesses also use information provided by the census. For example, the retail sector uses it to target the location of new stores.

Service planning

Basic population counts and counts by key characteristics (such as age, sex, ethnic group, and household type) are used for national and local service planning. In particular, data for small areas are crucial to inform decisions on public health, social care, and local planning.

Policy making and monitoring

Information on the population size, age, sex, and location is fundamental to a range of government policies. For example: ageing and social care, internal and international migration, and labour supply relative to labour demand. In Wales, information on local Welsh language skills is monitored to inform Welsh language policy. Government departments also use census data to support fulfilling their public sector equality duty, and census data are important in building the samples used for surveys that inform government policy (such as the National Travel Survey, English Housing Survey, and the Participation Survey).

Statistical benchmarking

Many ONS, wider government and private sector statistics are benchmarked, checked for bias and/or grossed up using census statistics or the population estimates and projections based on the census.

Market research

Census statistics are used in the creation of demographic packages (such as Acorn and Mosaic) and are vital for understanding small area characteristics to target marketing strategies.

Academic research

Population and socio-demographic statistics are used for research purposes including longitudinal analysis to understand social conditions and examine the impact of policies. The census can provide information for areas of research where data are not available from administrative sources (such as unpaid care or sexual orientation).

Family history

When released after 100 years, census records are a key source for genealogists and historians to support family or social history research.

The ONS estimated the quantifiable benefits of the 2011 Census to local authorities (LAs), central government departments and the private sector to be £500 million per year in 2011/12 prices. Detail of that assessment is set out in the 2011 Census benefits evaluation report,[3] which includes specific examples of use of 2011 data across a range of users. In 2018, we estimated the total benefits to central government, local government and private sector users from Census 2021 were expected to be £5.5 billion over the 10-year appraisal period. Section 11.2: The benefits of Census 2021" sets out how we have been assessing of the benefits of Census 2021

1.3 Legal basis for the census

The statutory authority for taking a census of population in England and Wales is the Census Act 1920.[4] This Act also provides for a separate census in Scotland, and similar legislation covers census-taking in Northern Ireland. The Act gives powers for taking a census in any year that is at least five years from the year of the previous census. The 1920 Act was amended by the Statistics and Registration Service Act 2007 so that the responsibility for conducting an England and Wales census now lies with the Statistics Board, whose functions are carried out under the title of the UK Statistics Authority. The ONS is the executive arm of the UK Statistics Authority.

Each census also requires secondary legislation in the respective legislatures. The addition of new voluntary questions for 2021 on sexual orientation and gender identity meant that primary legislation needed to be passed in the UK Parliament for England and Wales and the Scottish Parliament for Scotland. As the Northern Ireland Assembly was not sitting, the UK Parliament also legislated for Northern Ireland. The primary and secondary legislation for England and Wales is covered in more detail in Section 2.8: Legislation and parliamentary Engagement.

1.4 The decision to conduct a census in 2021

In 2010, the UK Statistics Authority asked the National Statistician and the ONS to review the future provision of population statistics in England and Wales in order to inform the government and Parliament about the options for the next census. The ONS researched new ways of counting the population, reviewed practices in other countries, engaged with a wide range of users, commissioned an independent review of methodology and completed a three-month public consultation.[5]

In 2014, after reviewing the ONS's extensive programme of research and having considered all the available options and evidence, the National Statistician recommended that an online-first census be held in 2021 "as a modern successor to the traditional, paper-based decennial census", along with "increased use of administrative data and surveys in order to enhance the statistics from the 2021 Census and improve annual statistics between censuses."

The recommendation noted that this could offer "the possibility of moving further away from the traditional decennial census to annual population statistics provided by the use of administrative data and annual surveys."[6]

This approach was endorsed by the UK Government and the Welsh Government and formed the basis for planning for the England and Wales Census in 2021. The UK Government published a white paper in December 2018 setting out the ONS's recommendations for Census 2021.[7]

In line with the recommendation for the greater use of administrative data and work on moving away from the decennial census approach, Census 2021 was delivered as part of a wider ONS programme to transform population and migration statistics. This work is summarised in chapter 11. The rest of this general report focusses on the census side of the programme's work.

Section 1.11: Impact of the coronavirus (COVID-19) pandemic describes how the pandemic affected the planning and delivery of Census 2021, how we assessed the feasibility of delivering a census in 2021 and the involvement of the UK Statistics Authority Board and UK Census Committee in overseeing and assuring that work.

1.5 Strategic aims and objectives for 2021 Census

As set out in the 2018 white paper, Census 2021 was designed with respondents at its heart to meet the needs for high-quality data for decision-makers. Paragraph 1.8 of the white paper states these aims for the design of the census:

- the census is easy to complete, and rewarding for respondents, so 70% provide data without follow-up
- the ONS protects respondents' data, ensuring the data are used for statistical purposes only, and is seen to protect respondents' data in everything it does
- census data reflect the needs of today's society
- the census will be predominantly online with 75% of responses provided online, and assistance provided to those who need it, to make this the most inclusive census ever

Paragraph 1.7 of the white paper set out our aim to produce outputs that were timely (first results within a year) and easy to use, and met our quality targets. As in 2011, these were:

- nationally accurate as measured by a confidence interval of +/-0.2%, with bias less than 0.5% for England and Wales
- high-quality locally with 95% confidence intervals for all LAs of +/-3%
- minimal variation within LA area
- response rate targets of at least 94% nationally and 80% locally in all LAs, to support these quality levels

As set out in Chapter 7: Quality of Census 2021 data, we were successful in meeting most of our strategic aims. Most importantly, we exceeded both the overall response rate targets and the target for all LA areas, with a 97% response rate across England and Wales and at least 88% in all LA areas. Achieving this was aided by exceeding both our online response target, with almost nine in ten responses made online, and the target for responses submitted without requiring follow-up.

The first results from Census 2021 were published in June 2022, within a year of the end of the data collection operation. All major datasets were published by the end of October 2023, including topic releases over the winter of 2022-23 and the 'Create a custom dataset' tool and main prebuilt multivariate tables in Spring 2023.

1.6 UK and international harmonisation

1.6.1 Choosing a date for the census

The choice of the date for the census is central to its planning and directly affects the quality of the data collected. Although the census does not have to take place on a specific day of the week, all censuses in England and Wales have had a reference date of a Sunday. In selecting the date, a number of factors were taken into consideration including:

- maximising the number of people present at their usual residence
- maximising the number of students present at their term-time address
- avoiding local and devolved elections (when publicity messages may get confused)
- allowing sufficient hours of daylight for field work
- avoiding holiday periods in order to maximise recruitment and retention of field staff
- managing anticipated volumes of online traffic

The proposed date for the census was considered collectively across the three census offices in the UK (in England and Wales, Scotland, and Northern Ireland) and the date of 21 March 2021 was recommended and confirmed through secondary legislation. Due to the coronavirus pandemic, National Records of Scotland took the decision in 2020 to move the census in Scotland to 20 March 2022.

1.6.2 Co-operation and harmonisation

Following the 2011 census, UK harmonisation has been achieved through close liaison and cooperation between the three census offices. A statement of agreement between the National Statistician and the registrars general for Scotland and Northern Ireland on the conduct of the 2021 censuses was published in October 2015.[8] This outlined the principles that the three census offices would work on together to ensure the censuses were successful in providing high-quality population and housing statistics for the UK, meeting the needs of data users, and reflecting UN Economic Commission for Europe (UN-ECE) and other international requirements. Progress updates on the conduct of the 2021 censuses in the UK were published in 2016, 2019 and 2020, and an updated statement of agreement was published in January 2021, reflecting the change in the date of Scotland's census.[9] Chapter 9: Outputs and dissemination includes information about how the three offices have worked together on producing UK-wide statistics.

Adhering to international standards and practices ensures coherence and comparability globally and over time. The concepts and definitions used within the UK censuses adhere to the United Nations Statistics Division (UNSD) principles and recommendations on population and housing censuses and the Conference

of European Statisticians' Recommendations for the 2020 Censuses of Population and Housing. The ONS, along with National Records of Scotland (NRS) and the Northern Ireland Statistics and Research Agency (NISRA), made a significant contribution to the development of these recommendations.

We have been an active participant in international forums with other census-taking bodies. This includes the International Census Forum, which is made up of ONS, NRS, NISRA, the Welsh Government, Central Statistics Office Ireland, US Census Bureau, Statistics Canada, Australian Bureau of Statistics, and Stats NZ. In addition to annual meetings, this group has virtual 'communities of practice' to share lessons on a range of census design areas. The ONS is also on the Steering Group of the UN-ECE's census expert group and has been involved in task forces to develop census design recommendations, both before 2021 and since. Both have provided valuable opportunities to share experiences and learn lessons.

UK co-ordination and harmonisation forums

The census offices of the nations of the UK (ONS, NISRA, and NRS) came together in a range of forums that covered the preparation and delivery of the 2021 and 2022 censuses. These included a senior-level UK Census Committee (UKCC), which met alongside the existing Inter Administration Committee,[10] and working-level engagement between the three organisations, Welsh Government and other users and experts.

The UKCC, chaired by the National Statistician, included the registrars general for Scotland and Northern Ireland, the chief statisticians for Scotland and Wales and senior census officials from ONS, NISRA and NRS. The Committee's remit included: co-ordination of UK-wide work on censuses; ensuring consistency across the UK censuses; agreeing census delivery plans in a way that takes full advantage of harmonisation of working practices and sharing of research and resources; and sharing plans and approaches to the use of administrative data for the censuses. In response to the coronavirus pandemic, and recognising that it would affect each nation differently, the UKCC held an extraordinary meeting in May 2020 to consider how different potential scenarios for the pandemic would affect the delivery of each of the UK censuses. The UKCC also agreed and assured the updated statement of agreement in January 2021.

Reporting to the UKCC, a UK Harmonisation Working Group met monthly representing the three census offices and Welsh Government. Their role was to manage relationships between census programmes of work across the UK, identify potential areas of joint working and manage risks to harmonisation of UK outputs. This included considering the scope, quality and coherence of statistical outputs; statistical methods; user engagement; quality assurance and opportunities to collaborate across the UK.

The November 2020 update on the statement of agreement set out the names, purposes and membership of the working groups being used to promote UK census harmonisation.[11] These all included ONS, NRS and NISRA, many included

Welsh Government officials, and some also included other organisations. This included a UK Data User Group, which provided a forum for sharing information and feedback between the UK Census offices and UK census data users, and a UK Data working group, which took forward recommendations from the National Statistics Accreditation process that had a UK focus (see section 2.8: Accreditation and designation as National Statistics).

Other working-level harmonisation groups included:

- Outputs and Dissemination Harmonisation Working Group (including Welsh Government (WG) officials), which covered outputs products and statistical disclosure control
- UK Statistical Quality Working Group, which aimed to maximise our harmonisation in approach to the statistical quality assurance of the 2021 and 2022 censuses
- Census Research Assurance Group, a group of methodological and demographic specialists (including WG) providing advice, assurance and guidance on methodology
- Data Processing Harmonisation Working Group (including WG), which aimed to identify and document potential areas of joint working and differences in the way the data are processed
- Edit and Imputation Working Group (including WG and the University of Southampton)
- UK Product Working Group, which discussed the question development work and testing, results and rehearsal findings, to help develop harmonised questions and questionnaires
- working groups including WG and academic, local government and commercial users, which focussed on Microdata and Origin-Destination products (see section 9.5.3: Phase Three: specialist products and alternative geographies)
- UK Addressing Working Group (including WG), which discussed and shared best practice on the development of the address registers to support the census operations
- UK and Ireland Geography Harmonisation Working Group (including WG and Central Statistics Office Ireland), which discussed geography information relating to initiatives, policies, standards and census planning and dissemination
- UK Census and Population Statistics Strategic Group (including WG), which discussed the development and production of population statistics (including demographic outputs, projections, census and other estimates), and the transformation of population and migration statistics, with a particular focus on UK coherence

The November 2020 update on the statement of agreement also covered the variety of topic groups, assurance panels for the ethnic group and religion questions.

Operational co-operation with Northern Ireland

Operationally the England and Wales census and the Northern Ireland census were run together in many ways, with close co-operation and shared contracts in many areas. This includes shared contracts for the data collection operation, such as the printing and post-out of paper questionnaires, field devices and logistics, translation services and the freephone contact centre. The field operation was managed separately in Northern Ireland, including separate procurements for field staff recruitment and payroll. Advertising and the Census at Schools programme were also procured separately in Northern Ireland. The NI Census 2021 website and electronic questionnaire were hosted by the ONS, using the same branding, as well as having the same look and feel. As well as working closely with ONS on harmonising output and dissemination, NISRA also developed a flexible table builder with Sensible Code Company, who also developed our 'Create a custom dataset' tool. Details of ONS suppliers can be found in section 3.8: External suppliers and relevant chapters. Other than where indicated, this report deals solely with the England and Wales census; a general report for the Northern Ireland 2021 Census was published by NISRA in December 2024.[12]

1.7 Delivering the census in Wales

The census in Wales is carried out by the ONS on behalf of the Welsh Government. As set out in section 2.8: Legislation and parliamentary Engagement, the Welsh Government was consulted on the Census (England and Wales) Order 2020 and laid the census regulations for Wales before the Senedd.

Officials from the Welsh Government worked jointly with the ONS throughout the planning of Census 2021, to ensure that the needs of Wales were represented and accommodated during the planning process. The Welsh Government also led on publication of census data on Welsh Language skills.

An important feature of the delivery of the census in Wales was to ensure it was bilingual, from recruitment for the field force and provision of Welsh-language support through our contact centre through to the paper and online census questionnaires. The census in Wales has been conducted bilingually since 1841; for Census 2021, as in 2011, Welsh language versions of census questions were developed alongside those in England (rather than being translated at the end as was previously done). In addition to the question on Welsh language skills (asked since 1891) being asked only in Wales, some other census questions included response options that were adjusted to reflect the geography in which they were asked. A high-level comparison of questions across the UK has been published alongside this general report.[13]

More detail on how the census was delivered in Wales are set out in the article Census 2021 in Wales published alongside this general report.[14]

1.8 Accreditation and designation as National Statistics

The UK Statistics Authority designated Census 2021 statistics as National Statistics in June 2022, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics.[15] The Code ensures that statistics published by the government serve the public. It does this by setting out practices that we must commit to when producing official statistics. When government statistics comply to the Code, the statistics are of public value, high quality and trustworthy.

There was a three-phase process of accreditation, through which the Office for Statistics Regulation (OSR) assessed the entire operation against the Code. More information and copies of the publications referred to here can be found on the National Statistics accreditation page[16] on the ONS website.

Phase one covered planning and consultation. We published our initial report How the ONS is ensuring the 2021 Census will serve the public, in June 2019. Following the OSR's 2021 Censuses in the UK – Preliminary findings report (published in October 2019), we worked closely with NRS and NISRA to address the OSR's findings. On 15 June 2020, each census office published a response, providing further evidence of how we were each working to comply with the Code.

Phase two focussed on strategies for developing and providing outputs. In January 2021, we submitted our phase two report to the OSR. This included: our response to the OSR's actionable findings; our practices, processes and procedures for creating valuable, high quality and trustworthy statistics; and the effect of the coronavirus pandemic on Census 2021. In November 2021, the OSR published their Assessment of compliance with the Code of Practice for Census 2021 statistics in England and Wales. The assessment highlighted our successful collection operation. It also told us what we still needed to do to gain National Statistics accreditation. In response, we addressed the feedback and provided further evidence to the OSR.

On 27 June 2022, the OSR published their confirmation of National Statistics designation for Census 2021 in England and Wales in a letter from the Director General for Regulation to the National Statistician. This accreditation validates the quality and trustworthiness of the data and statistics produced from Census 2021. As described in section 7.4.2, following further investigations and evidence from Scotland's census, we wrote to the OSR to request that the gender identity estimates from Census 2021 should be redesignated as 'official statistics in development' and the change was confirmed on 12 September 2024, reflecting their innovative nature and the evolving understanding of measuring gender identity. All other Census 2021 estimates are still designated as accredited official statistics.

Phase three is an assessment of how well our outputs meet user needs, taking place after the publication of the statistics. The OSR have recently conducted the third phase of investigation. As in previous phases, we will address any opportunities for improvement.

1.9 Major elements and innovations of the 2021 Census design

Central to delivering those strategic aims and having a successful census were a number of important themes that ran through the ONS's work:

Digital-first approach and use of live response data

This was the first digital-first census in England and Wales, with around nine out of ten households receiving a letter with an online access code rather than a paper questionnaire and a similar proportion completing the census online. Being digital-first meant not only that it was easier for many to complete their census return but also that we reduced the need for printing, postage and scanning of paper questionnaires. Using letters with online access codes as our primary method of contact shaped our 'wave of contact' by making sending reminder letters a central part of our follow-up activity. Being digital-first also meant that we started receiving live census responses immediately. These data were invaluable both for the data-collection operation, which was able to use daily updates on completion rates broken down by small areas, and for processing, which was able to use and react to early census data to improve processes and write-in response indexing in real time.

Innovative use of technology

Census 2021 made use of new and improving technology throughout. The electronic questionnaire was developed to be secure and accessible by design, to operate at scale, and to meet Government Digital Service standards, making responding to the census easy and secure. Our work to follow up non-responding households also utilised technology to optimise response across the country. Data on responses (and other interactions such as requests for new access codes and paper questionnaires) fed into both management information for daily operational meetings, helping us to direct the field force and other follow-up activities, and the daily workloads that field staff accessed through the Fieldwork Management Tool on their census-issued electronic devices. Online engagement and meetings grew significantly during the pandemic and enabled engagement despite lock down restrictions. The processing of census data benefitted not only from early live responses data but also from an increased computing capacity, for example allowing estimation to be run for the whole of England and Wales together, rather than broken down regionally. Using new technology also facilitated our flexible approach to outputs, allowing us to create and disseminate a broader range of products to suit users

with different needs and experience. We were also able to produce and publish the outputs from 2021 significantly more quickly than after previous censuses, with all main England and Wales outputs published by the end of 2023.

Inclusivity, accessibility and engagement

Our aim to make the census as inclusive as possible is reflected across the design and delivery of Census 2021. To support equalities monitoring and the Armed Forces Covenant, we included a new question on previous service in the UK armed forces, and voluntary questions on sexual orientation and gender identity. While most people completed the census online, we sent paper questionnaires to households in some areas and made them available to anyone who wanted them. A large-print paper questionnaire was available on request and our public contact centre also provided a service for people to complete the census by telephone. In addition to being available in English and Welsh, the Census 2021 website and contact centre provided information in 49 languages, including translated copies of the paper questionnaire to support people completing the census and information in easy-read, large-print and Braille formats and through British Sign Language (BSL) videos. A major strand of our communications and engagement work focussed on supporting people to take part, with bespoke communications products incorporating messages and languages relevant to different communities and population groups, and addressing specific matters relevant to different groups. Engagement with national organisations and networks before, during, and after the data-collection operation, was combined with deploying over 300 local engagement staff, more than any previous census. Our local engagement staff were employed across the whole of England and Wales and worked with local authorities (LAs) and communities in their areas to raise awareness of the census and promote and support people completing the census- as well as sign-posting support services such as contact centre and local census support centres (see Chapter 5: Communications and engagement).

Use of administrative and alternative data sources

In keeping with being part of the wider programme to transform our population and migration statistics, Census 2021 made greater use than ever before of the administrative data collected by public and some private sector organisations. We made use of these throughout the census. As with all census data, administrative data were only used for statistical purposes in the public interest and used in line with the data protection legislation described in section 8.2.3. The data were subject to robust controls to ensure the security of the data.

The availability of Valuation Office Agency (VOA) data meant that the 'number of rooms' question could be removed and integrated outputs produced using VOA data and census data. The Census 2021 address frame was created from AddressBase Premium and additional administrative and commercial data sources (see section 2.6: Address frame). These additional sources were particularly useful to address the challenges in enumerating communal establishments, such as care

homes, military accommodation and university halls of residence. Sources used in developing the paper strategy for census data-collection (see section 2.5: A digital-first census) included data from the Office for Communication (OfCom) and Driver and Vehicle Licensing Agency (DVLA) data on driver interactions such as driving licence applications, which helped us to understand broadband coverage and likelihood of respondents engaging online with government services. Similarly, data including the Claimant Count for unemployment benefit, the Land Registry, and the England and Wales Schools Censuses were used alongside 2011 Census data on area demographics to predict willingness to take part, and therefore the level of field force follow-up likely to be needed in each local area.

Administrative sources were also used in the processing and estimation stages and for the quality assurance of our estimates (see Chapter 6: Processing and estimation). For example, national and local population estimates derived from NHS Personal Demographic Service data were used as a comparator to validate census population estimates, and other administrative sources were used in the estimation process for large communal establishments. Our Admin-based Population Estimates (ABPEs) of the population of England and Wales were also used in quality assurance to compare against the census estimates, the first time a combined administrative dataset has been available to provide this comparator. Our publication Administrative data used in Census 2021[17] describes more fully the range of sources and how they were used. This work drew on our experiences of using many of these sources in existing National Statistics and as part of the ONS's wider transformation programme.

Flexible and accessible outputs

The centrepiece of our multivariate data releases was the Create a custom dataset tool, a flexible table builder that allowed users to choose the geography, population and variables they are interested in and produce their own tables. Accompanied by ready-made tables for many datasets not available in the tool, this meant that users could access data in the way that they wanted. We also produced a range of flexible and accessible outputs for univariate data, including a Build a custom area profile tool that allowed users to explore data for bespoke areas, and interactive maps and data-visualisation in our articles on census data releases. As set out in Chapter 9: Outputs and dissemination, in addition to these data releases we expanded our range of analysis articles, published semi-automated articles on how the local population in each LA area had changed since 2011, and produced interactive games – the census quiz and a census map game.

1.10 Census legacy

An important part of the work of our Census and Data Collection Transformation Programme was to deliver a legacy from Census 2021, to make sure that the work and innovations that helped to deliver the census also benefitted the ONS more widely. Some of these benefits came alongside or even before the census

was delivered, some have been implemented since 2021, while others provide examples and experience that can be drawn upon as part of the transformation of population and migration statistics described in chapter 11.

1.10.1 Examples of the legacy of Census 2021

Technology used to deliver the digital-first census.

The electronic questionnaire (eQ) developed for Census 2021 has become our strategic data collection tool. Developed for use in Census 2021 and our business surveys, the eQ has been developed further for use on other surveys including the Business Impact of COVID-19 Survey (BICS) and the Coronavirus (COVID-19) and Respiratory Infections Survey (CRIS). The system that enabled management information on responses to be used to inform decisions in the census data-collection operation has informed the transformation of the Labour Force Survey. The Lone Worker Solution, an important tool in ensuring field staff safety, was also used in Scotland's census in 2022. The mobile devices used by Census 2021 field staff were provided for use at the Birmingham Commonwealth Games in 2022.

Community and stakeholder relationships

Building community and stakeholder relationships was a vital part of encouraging participation among all population groups across England and Wales and the impact of this work continued beyond Census 2021. The National Statistician's Inclusive Data Taskforce cited the community engagement for censuses as a good example of working with communities, and we have carried through much of this engagement beyond Census 2021. Connections made in our preparations for the census were maintained through the outputs phases and into our work on the future of population and migration statistics, including communicating and promoting response to the consultation on this work in 2023. We have also built on these connections through the ONS Assembly, which brings together community leaders, charities and organisations that represent the interests of populations that are traditionally under-represented in both survey and administrative data.

Methods, approaches and products.

Innovative approaches from Census 2021 across processing, estimation, quality assurance and outputs provide both examples and experience that will benefit our ongoing production of population and migration statistics. Coding tools developed for the census are already in use for our social surveys, while coverage estimation and adjustment methodologies have potential for use in a transformed statistical system, as do the methods used for statistical disclosure control and our transparency in how they have been applied. The Local Authority Insight Initiative was a good example of bringing stakeholders on board as part of our quality assurance process to give both them and

other users greater confidence in our estimates. Likewise, the Methodological Assurance Review Panel (MARP) has provided an important external assurance of our methods through the census and our transformation work. Since 2023, its remit has widened to include change programmes across the ONS. The award-winning range of Census 2021 outputs (see chapter 9) provides a suite of examples of product types to meet different user needs, as well as experience within the ONS of delivering them that can be applied to our future outputs.

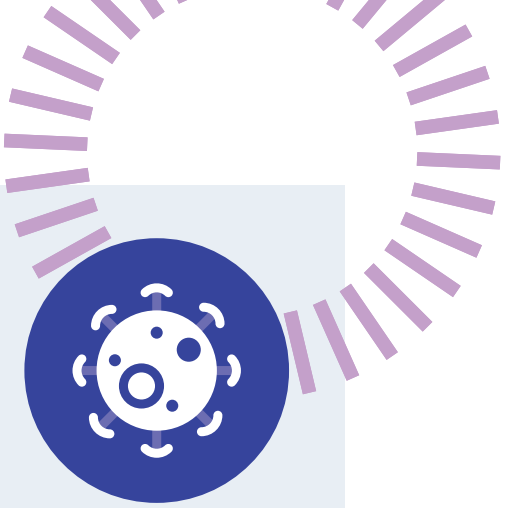
Improved Welsh language provision

After delivering a largely bilingual census, particularly in its data-collection phase and also in the topic summary statistical bulletins, we have been improving our Welsh language provision more generally, including updating the UK Statistics Authority's Welsh Language Scheme.[18] Lessons and examples from Census 2021 have helped to drive this improvement. Improving our wider Welsh language provision will be of increased importance as we move towards a population and migration statistics system that makes use of a greater range of data sources.

1.11 Impact of the coronavirus (COVID-19) pandemic

Every census presents different challenges. For Census 2021, a major challenge came in the form of the coronavirus pandemic and the national lockdown restrictions during 2020 and 2021. The first national lockdown began on 23 March 2020, a year before the census data-collection operation. On Census Day itself, 21 March 2021:

- a nationwide lockdown was in place in both England and Wales, with government guidance requiring people to work from home wherever possible
- those key workers who were working outside of their homes were encouraged to avoid public transport where possible to reduce transmission
- non-essential retail and businesses were closed
- up to 5.6 million people in England and Wales were supported by a national job support scheme known as furlough
- households were not able to meet with others outside of their bubble
- the roadmap for moving out of lockdown (in England) had just been released, with children and students beginning to return to educational establishments
- our Coronavirus Infection Survey (CIS) estimated that around 170,000 people were infected with COVID-19 in England and Wales
- approximately 7% of the population of Great Britain (3 million people) were self-isolating with symptoms consistent with COVID-19



The ONS was at the forefront of the provision of data to government and the public during the pandemic, setting up initiatives including the Business Impact of COVID-19 Survey (BICS) from March 2020 and the CIS from April 2020 (with its first results from May 2020). ONS data was used on a regular basis for providing evidence for decision making within government and in televised briefings by UK Government ministers and their medical and scientific advisers.

1.11.1 Responding to the pandemic

Based on the latest academic thinking available at the time, we reviewed how critical functions for a successful census could be delivered in a series of scenarios. These scenarios broadly reflected there being: only a few months' disruption due to the pandemic or the same disruption followed by either the reimposition of restrictions over winter 2020/21 or a rolling set of restrictions. A series of 'readiness assessment points' were arranged for April, June, September and December 2020, which helped to determine the focus for continuing detailed planning and prioritisation. We reported the outcome of this scenario-planning, readiness assessments and adaptations to the UK Statistics Authority Board at its monthly meetings; further information can be found in the Board's minutes.[19] As noted in section 1.6.2: Co-operation and harmonisation, the UK Census Committee held an extraordinary meeting in May 2020 to consider how different potential scenarios for the pandemic would affect the delivery of each of the UK censuses.

With an operation the size of the England and Wales census, much of the planning has to be done well in advance to allow time for contracts to be finalised and practical steps to be taken. These steps included building systems for scanning and processing responses, printing letters and paper questionnaires, and recruiting and training field force and engagement staff. This meant that by Summer 2020 we had to be ready for whatever might transpire over the following Winter and Spring. This made our existing aim to be flexible and adaptable even more important. Section 1.11.2 describes the operational changes we made and how we made ourselves ready to respond to anything that might happen.

Following our final 'readiness assessment' in December 2020, we were able to announce in January 2021[20] that the census would go ahead, based on our ongoing assessment of our capacity to deliver a census that would provide high-quality data while also being safe for our staff and the public alike.

The census in Northern Ireland also went ahead in 2021 as planned. The Scottish Government, on the recommendation of NRS, announced in July 2020 that the census there would be moved to March 2022.

1.11. 2 Operational impact of the pandemic

The later chapters in this report reflect how Census 2021 was delivered, incorporating changes made in response to the pandemic, particularly in the data-collection operation and the communications and engagement that supported it. Many of these adaptations were outlined in our October 2020 publication Coronavirus and the operational impact on Census 2021[21], which describes the potential impacts of the pandemic and our design changes and contingency planning. Differences between restrictions and guidance in England and in Wales added further complexity to our planning.

As set out in section 4.2.2: Preparing for uncertainty, through detailed understanding of our risks and vulnerabilities (including those relating to the pandemic), war-gaming, training, and thorough scenario-planning, we made ourselves ready to respond to anything that might happen in the development of the pandemic or more generally. This section summarises some of the changes and operational effects of the pandemic.

From the start of the first national lockdown in March 2020, ways of working changed at the ONS as they did across the country, with almost everyone required to work from home, followed by a transition to hybrid working. A combination of use of technology, care for colleagues, strong leadership and strong existing relationships and team structures across the programme enabled us to adapt quickly and deliver successfully in these changed circumstances. During the data-collection operation this meant that colleagues could attend daily meetings from home and additional attendees could be added at short notice in response to operational developments. These arrangements were beneficial to the operation, but their success relied to some extent on the strength of existing relationships between colleagues and teams built up before the pandemic.

In 2020, we assessed the Census 2021 questionnaires to understand the potential impact of the pandemic on how respondents answered questions. Additional advice was provided in the electronic questionnaire and online help (see section 2.5.2: The electronic questionnaire). As noted in section 2.4: Population bases, we also amended the population definition for students' term-time addresses as many students were not at their term-time addresses on Census Day, which was reflected in the guidance and student-specific pages on the census website.

Initial contact with households being done by post meant that this was not directly affected by the lockdown restrictions, there were additional impacts for people with second homes. While some were unable to visit their second homes to collect the census questionnaire or letter delivered there, other people had moved temporarily to what would normally be their second homes, causing some confusion about which property to record as their usual residence.

The work of our field staff was naturally affected by the pandemic and we amended the doorstep routine to ensure that field staff and respondents could interact safely and effectively, in line with guidance on social distancing and facemasks. Census officers were provided with personal protective equipment, including facemasks and hand gel, as well as lateral-flow test kits. The pandemic affected follow-up for communal establishments in particular, with some sites restricting access and some population groups not being present in their usual accommodation, meaning that in-person visits were often replaced by telephone follow-up. The pandemic particularly affected the enumeration of students; the challenges of this element of the data-collection operation are outlined in the communal establishments section (section 4.9) and relevant chapters describe a change to the population definition, the communications campaign aimed at students, and a student address adjustment in the pre-processing stage.

Recruitment and training of the field force were also affected by the pandemic. Advertising for roles was moved online and most of the recruitment process was also carried out online, as was field force training. The different lockdown restrictions in Wales may have contributed to the lower recruitment levels compared with England.

While online and telephone support for respondents were delivered as planned, in-person support was affected by the pandemic. Although we were able to open many census support centres offering assisted digital support to tens of thousands of people, other centres remained closed (for example because the buildings hosting them were closed).

Engagement with LAs, communities and population groups was affected by restrictions on travel and in-person meetings, with most engagement instead taking place online. This enabled us to engage while lockdown restrictions prevented in-person meetings.

The communications campaign was affected both in its contents and in the media through which it was delivered. The campaign approach was reliant on showing a representative portrayal of the population of England and Wales and capturing community spirit. This was difficult during lockdown restrictions where both photography shoots and TV filming had to be undertaken in line with the highest pandemic safety standards at the time. There was also a shift in the type of media used for the campaign, with greater use of in-home digital and less out-of-home advertising through posters and bus adverts. The primary and secondary schools campaigns were affected by the pandemic, both from schools being

closed and with teachers' priorities being focussed on adapting to the impact of the pandemic. We adapted our materials and revised our target levels for both campaigns. Other elements of our communications and media campaigns were well-suited to be delivered during a period of lockdown, including the 'purple light up' of buildings and the community heroes plaques.

The overall impact of the pandemic on the data-collection operation was mixed, as described in chapter 4. While it was potentially a factor helping us to exceed our target for household completions made without any follow-up activity, it also made the follow-up work more complex and difficult.

1.11.3 The pandemic and census data

The pandemic had some specific impacts on the data collected in the census. These are described in more detail in section 7.4.1: Impact of the coronavirus (COVID-19) pandemic on census data and in the quality and methodology information publications for the relevant topics.

While, for most people, the pandemic would not have affected their place of usual residence, for some students, and in some urban areas, there is evidence that the pandemic did result in changes to where people lived either temporarily or permanently. The steps we took to inform students about the census, to enumerate them, and to ensure they were accurately represented in our estimates are described in the relevant chapters of this report.

Labour market and travel to work statistics will have been affected by the pandemic, with many people working from home or on furlough on census day. We published extra guidance to help people on furlough to answer the census questions about work, but cannot determine whether furloughed people followed this guidance. Similarly, it is unclear how representative the census statistics are of travel to work patterns as at Census Day.

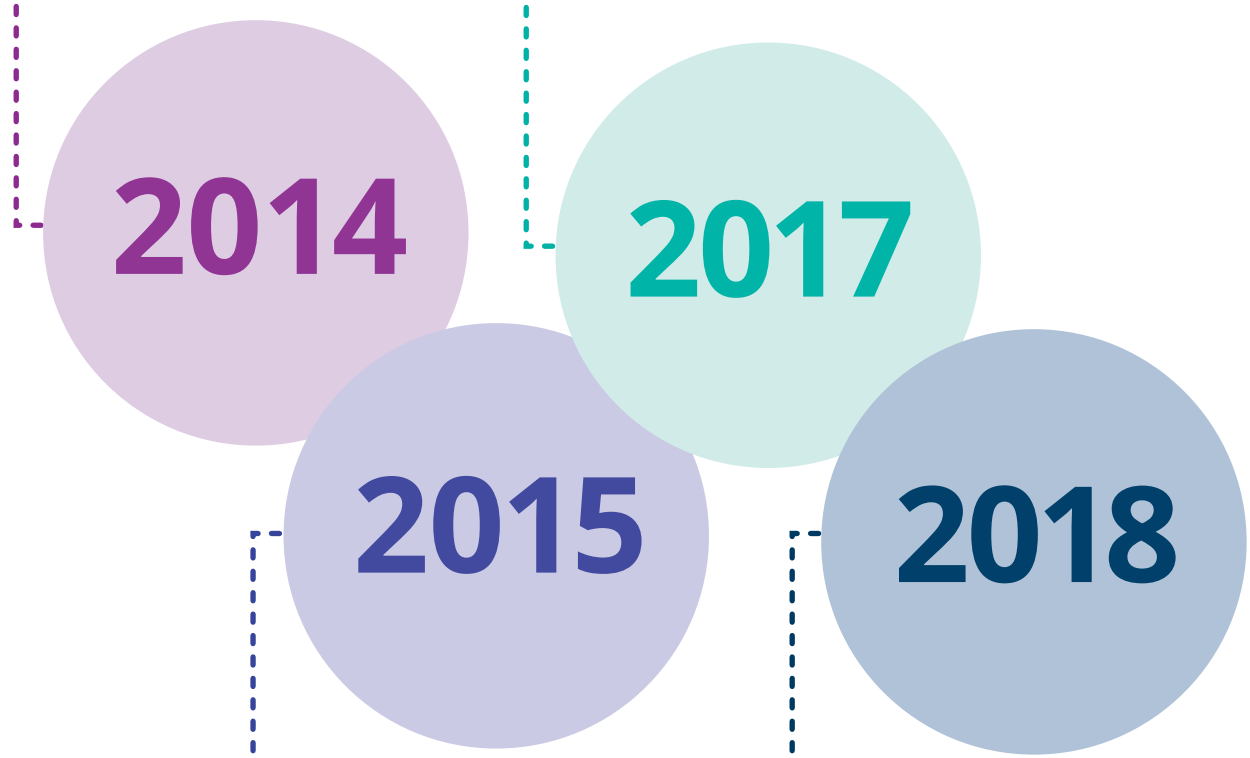
The change of date of Scotland's census to 2022 due to the pandemic has also affected census outputs relating to the UK as a whole. Chapter 9: Outputs outlines how our origin-destination and detailed migration publications were affected by the differences in census dates, and how data from the different censuses have been incorporated into UK-level population estimates at different times. We have worked closely with NRS and NISRA to ensure that user needs for UK data are met as well as possible.

Despite the challenges caused by the pandemic that are described in this section, Census 2021 was successful in providing timely and high-quality statistics. It was important to understand the population and its characteristics during the coronavirus pandemic. As well as providing data for important local and national decision-making, we were able to provide early census data exceptionally for vital policy purposes including understanding patterns in deaths and vaccination rates during the pandemic, informing the response to rising energy costs and the Russian invasion of Ukraine (see section 9.10).

1.12 Census 2021 timeline

March: National Statistician recommends an online-first census in 2021 and increased use of admin data, with the possibility of moving further away from the traditional decennial census

April: Census Test



June to August: Census 2021 topic consultation – start of the process of question and questionnaire development

December: Publication of UK Government's white paper 'Help Shape the Future' setting out plans for Census 2021

2019

- **May to October:** Census (Return Particulars and Removal of Penalties) Act 2019 passed by UK Parliament
- **October:** Census data-collection Rehearsal

2020

- **March:** Coronavirus (COVID-19) pandemic restrictions begin
- **March to May:** Census (England and Wales) Order 2022 before UK Parliament
- **May to June:** Census regulations laid before UK and Welsh Parliaments and come into force
- **September:** start of live operations

2021

- **February 22:** Electronic Questionnaire goes live on Census 2021 website
- **March 1:** Support services launched and "Act Now" phase of publicity campaign begins
- **March 3:** First initial contact letters and paper questionnaires arrive with households
- **March 20/21:** Census weekend
- **March 21:** Census Day
- **May 25:** Electronic Questionnaire closes
- **May to June:** Census Coverage Survey
- **July to October:** Outputs consultation

2022

- **June 28:** First results published
- **2022 onwards:** Main census outputs published in three phases

Endnotes

1 **UK Statistics Authority, Special Assessment of the 2011 Censuses in the UK: Phase 3**
https://www.statisticsauthority.gov.uk/publication/special-assessment-of-the-2011-censuses-in-the-uk-phase-3-office-for-national-statistics-national-records-of-scotland-and-the-northern-ireland-statistics-and-research-agency/

2 **A comparison of questions asked in the 2021 and 2022 UK censuses**
https://www.ons.gov.uk/census/censustransformationprogramme/acomparisonofquestionsaskedinthe2021and2022ukcensuses

3 **2011 Census benefits evaluation report**
https://www.ons.gov.uk/census/2011census/2011censusbenefits/2011censusbenefitsevaluationreport

4 **Census Act 1920**
https://www.legislation.gov.uk/ukpga/Geo5/10-11/41/contents

5 **Beyond 2011 programme**
https://www.ons.gov.uk/census/censustransformationprogramme/beyond2011censustransformationprogramme

6 **National Statistician's 2015 recommendation and government response**
https://www.ons.gov.uk/census/censustransformationprogramme/beyond2011censustransformationprogramme/thecensusandfutureprovisionofpopulationstatisticsinenglandandwalesrecommendationfromthenationalstatisticianandchiefexecutiveoftheukstatisticsauthorityandthegovernmentsresponse

7 **Census 2021 white paper**
https://www.gov.uk/government/publications/the-2021-census-of-population-and-housing-in-england-and-wales

8 **Conduct of the 2021 censuses in the UK (pdf)**
https://www.ons.gov.uk/file?uri=/census/censustransformationprogramme/legislationandpolicy/theconductofthe2021censusesintheuk.pdf

9 **Conduct of the 2021 and 2022 censuses in the UK**
https://www.ons.gov.uk/census/censustransformationprogramme/legislationandpolicy/conductofthe2021and2022censusesintheuk

10 **GSS Inter Administration Committee**
https://analysisfunction.civilservice.gov.uk/government-statistical-service-and-statistician-group/governance/committees-and-groups/inter-administration-committee/

11 **Census working groups being used to promote UK harmonisation**
https://www.ons.gov.uk/census/censustransformationprogramme/legislationandpolicy/conductofthecensusesacrosstheuknovember2020progressupdate#census-working-groups-being-used-to-promote-uk-harmonisation

12 **Northern Ireland Census 2021 general report**
https://www.nisra.gov.uk/publications/census-2021-general-report

13 **A comparison of questions asked in the 2021 and 2022 UK censuses**
https://www.ons.gov.uk/census/censustransformationprogramme/acomparisonofquestionsaskedinthe2021and2022ukcensuses

14 **Census 2021 in Wales**
https://www.ons.gov.uk/census/aboutcensus/census2021generalreport/census2021inwales

15 **Code of Practice for Statistics**
https://code.statisticsauthority.gov.uk/the-code/

16 **National Statistics Accreditation for Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/nationalstatisticsaccreditation

17 **Administrative Data used in Census 2021**
https://www.ons.gov.uk/releasesadministrativedatausedincensus2021englandandwales

18 **Welsh Language Scheme – October 2023**
https://uksa.statisticsauthority.gov.uk/publication/welsh-language-scheme-october-2023/

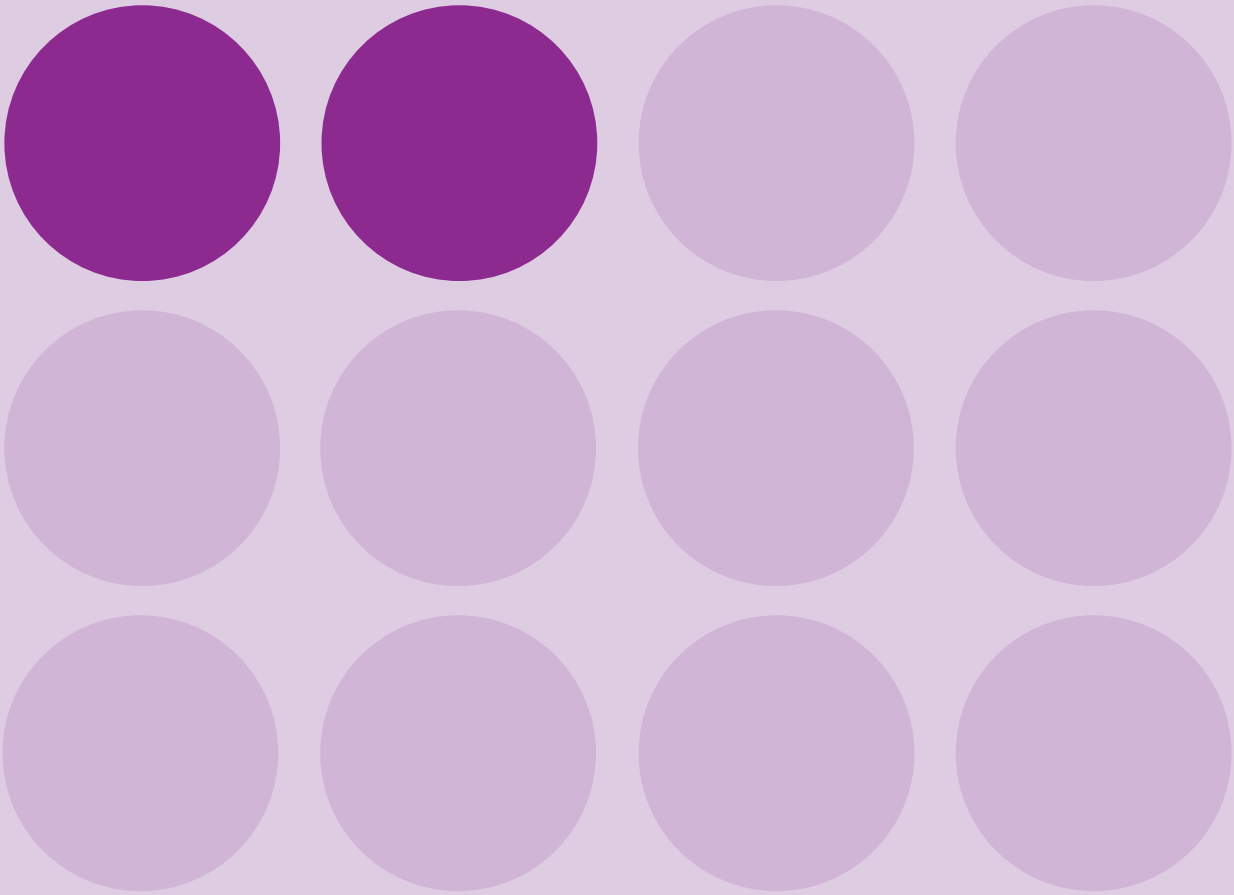
19 **UK Statistics Authority Board: minutes and papers**
https://uksa.statisticsauthority.gov.uk/publications-list/?keyword&type=minutes-and-papers

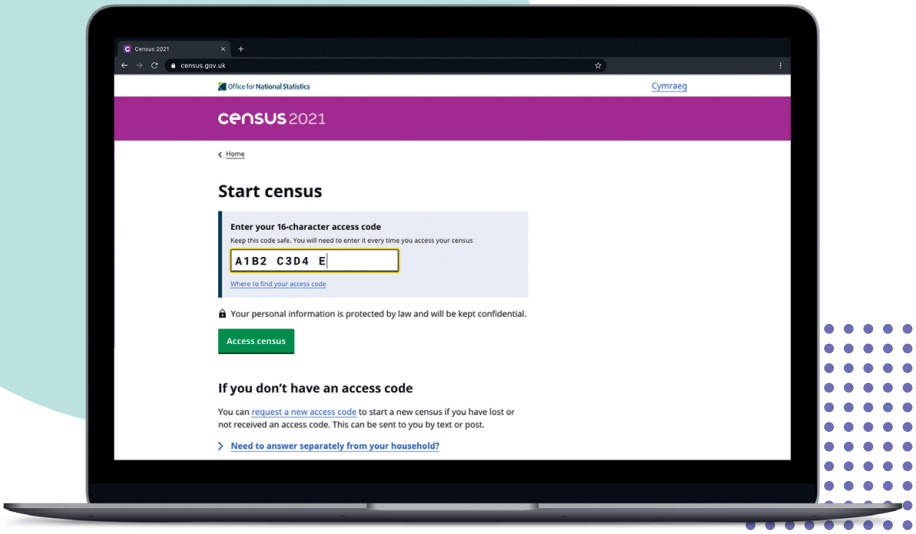
20 **Statement: Census 2021 and coronavirus**
https://www.ons.gov.uk/news/statementsandletterscensus2021andcoronavirus

21 **Coronavirus and the operational impact on Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/censusdesign/coronavirusandtheoperationalimpactoncensus2021

Preparing for Census 2021

02





2.1 Introduction

Since 1801, the census has been the largest statistical exercise undertaken by the ONS and its predecessors, producing statistics informing all areas of public life and underpinning social and economic policy. Meeting the strategic aims and objectives set out in the 2018 white paper (and quoted in section 1.5 Strategic aims and objectives for 2021 Census) required a great deal of preparation for the data-collection, processing and output stages described later in this report, to deliver high-quality statistics that met users' needs.

From 2015, we began preparing to deliver an inclusive, secure, online-first census, developing our statistical design and operational plans.

This chapter sets out some of the main parts of the preparation, from research and decisions on the census topics and questions to elements that made it digital-first, including the website, electronic questionnaire and response management system. It also describes the legislation required for Census 2021 and parliamentary engagement to support the legislation and the census itself.

Part of our approach was to think of the census as a service, with a user-centred perspective, which meant aiming to support all segments of the population, predicting the need for support and information accurately, and making the census inclusive and accessible. This is reflected in the preparations and plans described in this chapter and in the delivery of the census, described in chapter 4: Data-collection operation and chapter 5: Communications and engagement.

2.2 Designing Census 2021

2.2.1 Quality characteristics

The census was designed to meet the requirements of end-data-users. In order to do that, different aspects of quality needed to be balanced and drive many of the design decisions. The quality characteristics are set out in detail in our Quality and Methodology Information for Census 2021 publication.[1] They reflect the European Statistical System's five dimensions of quality.[2] In brief those dimensions are:

Relevance

Relevance is the extent to which the questions asked reflect the population, and meet the data needed by census data users.

Accuracy

Accuracy is the degree of closeness between an estimate and the true value the statistics were intended to measure, including having comparable accuracy across all geographic areas, and all population groups.

Coherence and comparability

Coherence is the degree to which data derived from different sources or methods, but which refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain, for example, at geographic level. This includes coherence with previous censuses and other data sources, and comparability across the UK and internationally.

Accessibility and clarity

Accessibility is the ease with which users can access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.

Timeliness and punctuality

Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates. We aimed to ensure that census data were available to users as soon as possible after the census period, with Census 2021 outputs more timely than previous censuses.

A widely-accepted sixth dimension, included in the UN Economic Commission for Europe (UN-ECE) definition of statistical quality is interpretability: ensuring that information about our design and methods are available to users to understand and interpret the census results.

2.2.2 Quality and the design of Census 2021

These quality characteristics, and the targets described in section 1.5 Strategic aims and objectives for 2021 Census, drove the design of Census 2021 that is described in this chapter (and our October 2020 publication Design for Census 2021[3]) and in the chapters setting out how we collected, processed, produced and disseminated census data. Central to this design was the aim of good response levels from all population groups and geographic areas, in addition to the overall aim to achieve a high response rate nationwide. Much of the design and operation of the census data collection was geared towards population groups and communities that faced barriers to completing the census. The focus in our communications and engagement, and the design of the field force workloads, was on reaching and assisting these population groups.

During the operation, management information and the response-chasing algorithm fed into decision-making at daily meetings such as the Optimising Response Group, which focused on capturing data on all population groups and minimising the variability in response between geographic areas of similar types – an important factor in ensuring the accuracy of the final results. Meanwhile our initial contact (through letters and paper questionnaires), communications campaign, electronic questionnaire and public support (online, by phone and in person), aimed to help most respondents to complete the census without any follow-up activity.

The management of quality was a central focus throughout the design of Census 2021. This included iterative development and evaluation through the development, testing and rehearsing stages, as well as during the data-collection operations themselves and the production, quality assurance and dissemination of census statistics. In addition to consultation and engagement with users, we incorporated internal and independent external assurance of our methods into the preparations for Census 2021 in the form of the National Statistician's Methodological Assurance Review Panel.[4] The panel's work has been very valuable in delivering a successful census and its remit has widened to include change programmes across the ONS.

2.3 Topic and question development

2.3.1 Topics for Census 2021

Decisions about the inclusion or exclusion of topics on the census were made based on extensive consultation with a wide range of stakeholders as well as detailed research and rigorous testing. This began with a public consultation in 2015,[5] in which we set out that we aimed to maintain or improve the quality of the data for topics collected in 2011, provide comparability where it was important to users and deliver information that was relevant to the needs of users in 2021. Through that consultation, users indicated an ongoing need

for most topics covered in the 2011 Census as well as a range of requirements for new topics including information on the armed forces community, gender identity, health conditions, place of birth, reason for migration, sexual orientation, income, and volunteering. The criteria we used to assess the evidence provided by users were similar to those used for 2011, with some changes designed to make the criteria stronger and more transparent and to reflect proposals for a predominantly online census in 2021. Our Assessment of initial user requirements in 2016[6] detailed the scoring mechanism we used to evaluate users' data needs, provided the rationale for our decisions, and outlined our proposals and research plans.

Our evidence-based recommendations for Census 2021 topics were further developed through meetings and correspondence with stakeholder organisations, consultation with subject experts, feedback at census events and survey responses on specific topics. As described in section 2.3.3 Question and questionnaire development, we also sought advice from and worked closely with Census Advisory Groups and topic experts from Welsh Government, NRS and NISRA.

Updates on our topic research and testing were published in December 2017[7] and December 2018,[8] the latter coming alongside the 2018 white paper,[9] which set out the ONS recommended topics for Census 2021. While most topics for Census 2021 were the same as in 2011, we identified strong needs from decision-makers for new three new questions. These were:

- veterans of the UK armed forces, to support users to meet their commitments under the Armed Forces Covenant – a promise between the country and those who serve or have served it
- gender identity, in addition to the existing question on sex, to meet the needs for better quality information for monitoring and for supporting anti-discrimination duties under the Equality Act 2010
- sexual orientation, to meet the needs for better quality information on the LGB+ population (gay, lesbian, bisexual, or other sexual orientations) for monitoring and supporting anti-discrimination duties under the Equality Act 2010

All topics included in the 2011 Census were included in Census 2021 other than number of rooms, which we were able to replace with the use of administrative data from the Valuation Office Agency (VOA). The number of bedrooms was still asked. The "ever worked" question was changed so that it no longer asked the year in which the person had last worked, as respondent burden and limited user need did not justify it being asked. Instead people were asked if they had worked in the last 12 months, to distinguish short- and long-term unemployment.

2.3.2 The topics and questions included in Census 2021

The final census question topics recommended by the ONS and confirmed in the census secondary legislation were:

For households

- number and names of all residents whether present or temporarily absent on census night
- relationships between residents within the household
- tenure of accommodation
- type of accommodation and whether or not it is self-contained
- type of landlord (for households in rented accommodation)
- number of bedrooms
- type of central heating
- number of cars and vans owned or available

For individuals

- name, sex, and date of birth
- marital or civil partnership status (including whether spouse or partner is/was of same or opposite sex)
- student status, and whether or not student residents lived at enumerated address during term-time
- usual address one year before Census Day (or country if outside the UK)
- second address (or country if outside the UK)
- country of birth
- passports held (as a proxy for country of citizenship)
- date of most recent arrival into the UK and intended length of stay (for non-UK born residents)
- national identity
- ethnic group
- religion (voluntary)
- main language, and English language proficiency if respondent's main language was not English (or was not English or Welsh in Wales)

- Welsh language proficiency (in Wales only)
- general health
- long-standing illness or disability
- provision of unpaid personal care
- gender identity (new, voluntary)
- sexual orientation (new, voluntary)
- educational and vocational qualifications
- economic activity in the week before Census Day
- whether ever done paid work
- employment status
- supervisor status
- hours worked
- job title and description of occupation
- name of employer and nature of employer's business at place of work (industry)
- workplace address
- means of travel to work
- previous service in UK armed forces (new)

For visitors in households

- name, sex, and date of birth
- usual address (or country of usual residence if a non-UK resident)

For respondents completing an individual questionnaire (rather than a household questionnaire)

- type of accommodation: household or communal establishment
- position in communal establishment (where applicable)

For communal establishment managers:

- nature of the establishment
- number of usual residents and the nature of their residency
- number of visitors and their status as a visitor

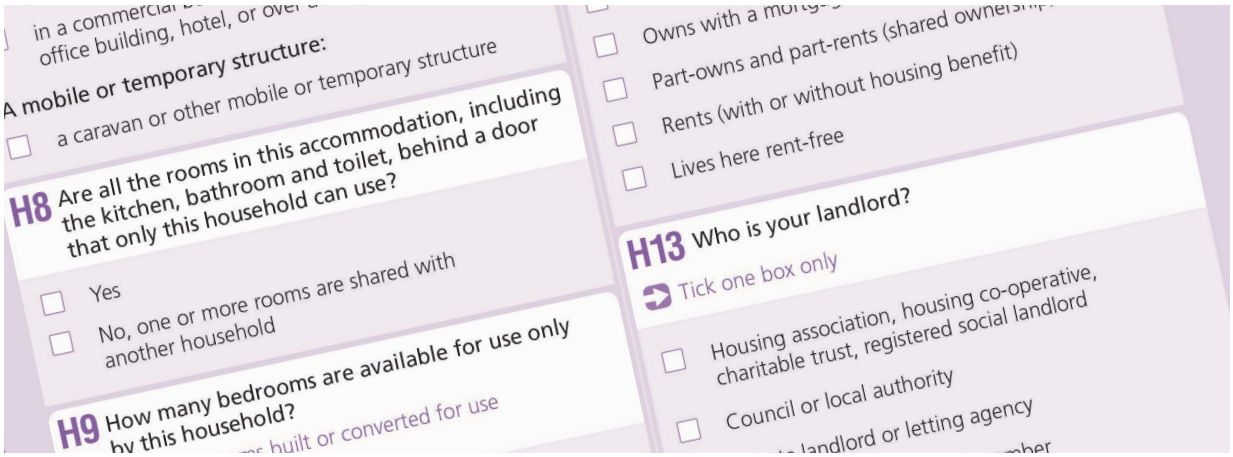
Not all individual questions were asked of all usual residents. Some were age-restricted, for example sexual orientation, gender identity, and the education and employment questions were asked only of those aged 16 and over; main language and (where applicable) English language proficiency were only asked of those aged 3 and over. As noted in the list above, the new sexual orientation and gender identity questions were also voluntary, as was the existing religion question.

Other questions were only asked if applicable, such as work-related questions only applying to those in work or who had previously worked. The electronic questionnaire automatically routed respondents to only answer the relevant questions based on their previous answers.

In addition, while students with separate term-time addresses were included in questionnaires for their out-of-term addresses, only basic demographic details were asked (name, date of birth, sex, marital status, alternative address and nature of that address, student status, and whether resident during term-time). This was intended to balance respondent burden, by reducing the need for their further details to be captured at the out of term-time address, with quality, by allowing us to filter students out of the usual resident population for the out of term-time address in line with our population definitions. It also enabled us to check and link to the student's response at their term-time address.

2.3.3 Question and questionnaire development

In addition to the topic consultation, extensive stakeholder engagement, research and testing informed the design of the questions and the questionnaires for Census 2021. These two strands are linked as the needs of questionnaire format, both online and on paper (and appearing in both English and Welsh in Wales), were a factor in the development of the questions. The same information was collected on both the electronic and paper questionnaires, but we optimised the question designs separately for each version of the questionnaire to ensure that we collect the best quality data. This section covers the general question design and the development of the paper questionnaire; the electronic questionnaire is described in section 2.5.2 The electronic questionnaire.



Question development, including response options

Each question's development was unique, based on our findings at each stage and evidence from previous testing development and use. However, all testing followed a basic structure, beginning with engagement with data users to understand their requirements, followed by a programme of qualitative, quantitative and user experience (UX) testing.

The ONS worked with stakeholders, topic experts and other interested parties to better understand the detailed needs for specific questions and inform our final questionnaire design. We did this through a range of forums, including:

- meetings and correspondence with stakeholder organisations
- consulting experts on specific topics for their independent, specialist knowledge
- presenting and seeking feedback at census events
- seeking advice from Census Advisory Groups (CAGs), which represented the interests of local authorities, central government departments, academics, third sector bodies, business and professional bodies
- collaborating with the Welsh Government and the Welsh Language Commissioner
- establishing topic-specific working groups with representation from topic experts from the ONS, Welsh Government, NRS and NISRA
- conducting stakeholder surveys on specific topics

We used a variety of qualitative and quantitative research methods to develop the questions for Census 2021, according to best practise. The qualitative methods were focus groups; informal interviews and group discussions at community events; in-depth interviews (for example, cognitive interviews); peer reviews; and UX. The quantitative research methods were small-scale individual online surveys; small-scale individual online omnibus surveys; and large-scale multimodal surveys (replicating census context). Most qualitative testing was conducted in either English or Welsh, while most quantitative testing was conducted in English and Welsh. As set out in our published summary of testing,[10] this was a mixture of in-house research and work by external suppliers in collaboration with ONS qualitative experts. More information on our testing can be found in our Question and Question Development Overview and reports on each topic area.[11]

Throughout the question development, an important consideration was ensuring that on all identity questions it was clear to respondents that they could identify how they wished and were not constrained by the response options provided. This was primarily achieved by making the option to provide an alternative answer clear and by developing search-as-you-type functionality for the online questionnaire (see section 2.5.2: The electronic questionnaire).

For the ethnic group question, we ran a further exercise following the 2015 consultation to gather evidence of the need for new response options. Requests were prioritised initially against strength of need, and further against additional criteria including the availability of alternative data sources, data quality, and comparability. In this exercise, 55 possible new response options were requested, with four of those taken forward for further investigation. The four with highest user need were Roma, Somali, Sikh and Jewish. Further research and evaluation[12] was carried out on these options, resulting in two changes with the addition of a Roma tick-box response option and a write-in box for African ethnic groups.

In addition to new topics and response options, some other changes were made to the format of existing questions and responses. This included:

- increasing the number of response options for time spent providing unpaid care, to better understand the number of carers eligible for Carer's Allowance
- reordering the sex question response options to list female first, as "female" is first alphabetically and the largest group in terms of population size
- requesting middle names to help respondents to distinguish between members of households with similar names when completing the electronic questionnaire (eQ)
- amending the marriage and civil partnership questions to reflect the changes since 2011 allowing same-sex marriage and opposite-sex civil partnerships

Some response options are different in Wales, such as in the religion and qualifications questions. Following a request by the Welsh Government and further research, the terms 'Black Welsh' and 'Asian Welsh' were included in the relevant high-level response options in the ethnic group question in Wales only.

The topic and question recommendations were approved through the necessary secondary legislation in the UK Parliament and the Senedd (Welsh Parliament) in 2020. Primary legislation was also passed to make the new sexual orientation and gender identity questions voluntary (see section 2.9: Legislation and parliamentary engagement).

Welsh language question design

The Welsh language versions of the census questions were not simply a translation of the English questions. New and amended questions were developed in both Welsh and English. To ensure questions adhere to Cymraeg Clir guidelines,[13] which encourage the use of simple, natural and clear Welsh by public bodies, some changes to the text or questions were translated by our contracted specialist Welsh language translation service provider (Prysg). These changes were quality assured by our Welsh Language Census Question Assurance Group. This group was convened to give advice on the accuracy, clarity and acceptability of the language as well as other policy issues pertaining to the Welsh language and bilingual design. It includes Welsh language and policy experts from the Welsh Language Commissioner's office and Welsh Government. We completed dedicated question development testing in the Welsh language to optimise the question wording.

Working with Scotland and Northern Ireland

The questions for England and Wales were developed through close collaboration with NRS and NISRA, in line with the statement of agreement and wider collaboration between census offices described in section 1.6: UK and international harmonisation. This included a statement that "Common topics and questions should be agreed wherever possible, with the intention of making available consistent census outputs across the UK". As noted in the November 2020 update on the statement of agreement,[14] the three census offices and the Welsh Government worked together on a number of topic panels. The three offices also came together with stakeholders including public sector bodies and academics in an assurance panel for the ethnic group and religion questions. The Census 2021 dictionary[15] provides information on the comparability of variables across the UK censuses. A high-level comparison of census questions across the UK has been published alongside this report.

Paper Questionnaire design

The starting point for the design of the paper questionnaires (PQs) was the design used in the 2011 Census. However, the addition of three new questions for Census 2021 required that we included an extra page per person on the household PQ. To offset the increased cost of printing longer forms, we reduced the maximum number of respondents on the paper household form from six to five. Any households with more than five members completing the census on paper could request a continuation form so that all household members could be recorded. Moving the sixth person to the continuation form meant that less household relationship information was collected on paper forms. The 2011 household questionnaire also included a page of information for respondents at the end; for Census 2021, this information was provided on a separate information leaflet, making the guidance more obvious to respondents.

We also changed the colours on the paper forms from those used in 2011 to increase contrast, improving the readability of the questionnaires. For example, question numbers, question stems, question instructions and routing instructions all appeared against a white background.

The question order was the same for online and paper completion. Where possible, we sought to keep the questions in the same order as the 2011 Census for consistency. However, some changes to question order were necessary due to the addition of new questions, the interaction between questions and the grouping of similar questions. For example, date of birth was moved before the sex question, so that those under 16 were not shown the guidance about the gender identity question later in the questionnaire. The questions on general health and the impact on daily activity owing to health problems or disability were moved together to help the flow of the questionnaire and to meet the Government Statistical Service (GSS) harmonisation recommendation on how to order these questions.

More information can be found in our Question and questionnaire development publication.[16] Section 2.5.2 describes the design of the eQ.

2.4 Population bases

One of the main aspects in designing a census is the definition of who exactly should be counted and where. In the 2015 consultation, we proposed to retain the 2011 enumeration base. Respondents to the consultation stated a need for the enumeration base to remain the same to maintain continuity and there was a clear requirement for consistency of definitions. While we have sought to maintain the same definitions over time, some minor changes have been made.

Census 2021 maintained the same definitions for households and communal establishments as used in 2011:

- A household was "One person living alone; or a group of people (not necessarily related) living at the same address who share cooking facilities and share a living room or sitting room or dining area."
- A communal establishment (CE) was "An establishment providing managed residential accommodation. 'Managed' in this context means providing full- or part-time supervision of the accommodation."

Similarly, the definitions of the categories of people to be counted were retained from 2011. A usual resident of the UK was "anyone who, on 21 March 2021, is in the UK and has stayed, or intends to stay, in the UK for 12 months or more or has a permanent UK address and is outside the UK and intends to be outside the UK for less than 12 months." This is the same definition used for our mid-year population estimates and aligns with the United Nations (UN) definition for usual residence and long-term international migration As in 2011, the census also collected information on visitors and short-term UK residents ("anyone born outside the UK who has stayed, or intends to stay, in the UK for a period of three months or more but less than 12 months").

The definition of a household resident was "a person whose place of usual residence is in an individual household and not within managed residential accommodation in a communal establishment." In addition, there were certain circumstances in which they retained household resident status if living elsewhere, for example being on holiday or travelling, or living in a CE for less than six months.

Correspondingly, for the most part a CE resident was someone who had already spent or planned to spend at least six months living in a CE. In addition, people without another residence were counted as usually resident in a CE if:

- they were a UK resident but had no other usual address in the UK regardless of their length of residence in the CE

- they were from outside the UK and were staying in the UK for more than three months
- they were serving a prison sentence of 12 months or more

Although the overall definitions for households and CEs did not change from 2011, there were slight changes to the types of accommodation included under each category to improve clarity during the operation. Certain types of accommodation were defined as households in 2021. These were:

- sheltered housing units (which in 2011 were CEs if less than 50% had their own cooking facilities)
- serviced apartments (which were not explicitly defined in 2011)
- hotels, guest houses, bed and breakfasts (B&Bs), inns and pubs with space for fewer than seven guests (changed from fewer than ten in 2011); larger establishments were CEs
- nurses' accommodation, provided the accommodation does not include patients (which were counted as CEs in 2011)

Due to the coronavirus pandemic, we also made a change to the definition for students, as restrictions in place in March 2021 meant that many were not resident at their term-time address. For Census 2021, the term-time address was an address that the student intended to stay at regularly during term-time in this academic year, even if because of the pandemic they did not stay there as much as planned, so long as they have the right to return on or after Census Day (even if only for one night), for example, as part of a rental contract. More information can be found in the article Updates to Census 2021 online questionnaire guidance – coronavirus (COVID-19) pandemic impacts.[17]

More information on definitions can be found in the article Output and enumeration bases: residential address and population definitions for Census 2021.[18]

These definitions relate to the collection of data and are not necessarily the same as those used in our outputs. While the census collected details from people resident for more than three months, our main outputs use a usual residence definition based on 12 months.

2.5 A digital-first census

2.5.1 Designing a digital-first census

Our digital-first design for Census 2021 encouraged participants to respond to the census online rather than on a PQ if able to do so. It provided several benefits, for both the respondent experience and the quality of the data. The digital-first approach also reduced impact on the environment and increased the efficiency of the data collection operation.

The 2011 Census was the first for which respondents could complete their return online. All households were sent a PQ, which also included an access code to enable people to respond online. Just 16% of households chose to complete the census online. The then National Statistician's recommendation in 2014 was for a digital-first census in 2021 "as a modern successor to the traditional, paper-based decennial census". This approach also reflected the growing use of digital services and the government's aim of seeking to increase the provision of public services online. It also provided an opportunity to achieve cost savings and to improve data quality and processing.

Based on previous and international experience of online collection and predictions of the digital take-up of services, we made a planning assumption of at least 75% of all household responses in England and Wales being completed online. The proportion of online completions in 2021 was in fact significantly above this level, at nearly 89% (see section 4.8.3 Household return and response rates).

Digital-first census and our paper strategy

Planning for a digital-first census that was also as inclusive as possible meant encouraging people to respond online where they could but enabling them to complete on paper if they preferred. To deliver this, we devised a paper strategy that supported people to respond in the most appropriate way and provided appropriate support through our contact centre and field force.

The 2017 Census Test (see section 2.8.1) told us that households were more likely to respond on paper if sent a PQ and were more likely to respond online if sent a letter with an access code. Maximising the number of people responding online gave us the best chance to optimise the collection operation and improve the quality of the data. To strike the balance between encouraging people to respond online if they could and ensuring that those who were likely to need a PQ were able to get one easily, we sent the majority (89%) of households in England and Wales a letter with an access code as their invitation to take part in the census.

The areas that were sent PQs as initial contact were those where we assessed that households were likely to respond to the census without follow-up but may have had difficulty in doing so online. These were areas where households responded before our follow-up period in the 2011 Census but might not have done so without PQs in 2021. The decision about which areas would get PQs was not therefore based just on estimated levels of digital exclusion in an area, but importantly also considered how likely households in an area were to respond prior to follow-up. More information can be found in our publication Designing a digital-first census.[19]

This approach led to higher levels of paper-first contact in Wales, where 50% of households received paper questionnaires, compared with 9% in England. Whether an area was paper-first or digital-first was decided for each Lower layer Super Output Area (LSOA, containing 1,000-3,000 people), with all households

in paper-first LSOAs receiving a PQ as initial contact. There was considerable variation across local authorities in the proportion of paper-first households: in England from zero (including City of London and Stevenage) to 60% (Boston); in Wales from 29% (Vale of Glamorgan) to 73% (Gwynedd).

PQs were available for anyone who wished to use one. Part of our paper strategy was to send out PQs (rather than letters) as reminders to non-responding households in some areas. PQs could also be requested through our census officers, online or via the contact centre.

2.5.2 The electronic questionnaire

The electronic questionnaire (eQ) was central to the respondent's experience of the census and to the success of census data collection. The eQ was accessed via the Census 2021 website using an access code provided on an initial contact letter or PQ or requested from the website or contact centre. Section 4.4: The Census 2021 website, electronic questionnaire and online help provides more information on the provision of access codes and questionnaires, and how respondents accessed the eQ. For respondents in Wales, the eQ could be switched between English and Welsh. Section 8.3.6 describes how we ensured that the Census 2021 digital service, including the EQ, was secure.

Structure and features of the electronic questionnaire

On first accessing the eQ, the respondent was asked to confirm their address and complete the "People who live here" section, including both usual residents and visitors. This generated the remaining sections of the questionnaire:

- people who live here
- household accommodation
- individual questions (each household member had a separate section)
- visitor questions (each visitor had a separate section)

Each section began with a page describing what the respondent would be asked and what information they needed in order to answer the questions to follow. Additional information pages appeared before the individual questions on qualifications, main job and last main job. These provided information to help respondents answer those questions. A hub page showed a list of questionnaire sections and their completion status, enabling respondents to review their progress and navigate the sections of the eQ as needed.

Features of eQ question design

Census questions consisted of, at minimum, a question stem and one or more response options. A design principle for the Census 2021 eQ was to display one question per page, whereas in 2011 multiple questions had appeared together. Where possible, we sought to minimise the amount of additional information shown on screen for each question. However, testing showed that some additional information can help respondents provide more accurate answers, leading to better-quality data.

This additional information could be presented through different elements of the question page's design. The design elements were:

Question stem

The main question text, which could incorporate answers already given (such as address or person's name in a proxy response)

Question description or include panel

As on the PQ, some questions were followed by additional lines of guidance to inform respondents of what should be included in their response.

Expandable "accordion" guidance

This was additional guidance for the eQ, which respondents could expand by clicking on it. It could appear before the response options to provide additional context for questions (such as defining words used in the question), or below them to explain why we asked the question.

Response options

These were of three types: tick-box, where one or more response could be selected; radio button, where only one response could be selected; or write-in box, for a written response.

Further mechanisms to improve the user experience and reduce respondent burden within the eQ included:

- clear navigation
- welsh language toggle, allowing respondents in Wales to switch languages on each page of the eQ
- automatic routing, so that respondents were presented only with questions that were relevant to them, based on answers previously given (such as their age or whether they had ever worked).
- automatic text fill, so that a respondent's previous responses, such as a name or address, were automatically used elsewhere in the questionnaire. For people answering on behalf of another household member, that person's name appeared rather than 'you' in the questions.
- search-as-you-type and address look-up functionality.[20] Search-as-you-type provided a list of suggested answers when the respondent started typing a write-in response for some census questions (including ethnic group, religion, country of birth, passports held and main language). This did not prohibit writing in a different response, but allowed people to select an answer rather than typing it in full. Address look-up similarly enabled respondents to type in the first few characters of an address or postcode and access a list of UK addresses in a drop-down to help them complete their answer.
- preventing mutually exclusive response options being selected. For example, this prevented "None of these apply" being selected along with another response, while radio buttons prevented multiple responses where a question asked for only one response.

- validating responses, through error messages and additional questions. For example, asking the respondent to confirm their age after entering their date of birth, and providing an error message if an invalid date of birth was entered.
- responses were saved after every question, so that if a respondent closed or logged out of a partially completed questionnaire to complete it at another time, their responses were not lost.

Testing and development of the eQ

A central component of our preparation for the digital-first census was designing the questionnaire to optimise online response. With a planning assumption of at least 75% of all household responses being completed online, the eQ was also designed to work at scale and to be resilient, able to cope with large volumes of submissions at any time of day.

The eQ was developed according to Government Digital Service (GDS) standards.[21] We worked closely with the GDS to ensure that Census 2021 met the required standards. As part of this work, we assessed the electronic questionnaire used for the 2017 Census Test and published the findings.[22]

This research focused on:

- problems preventing successful completion of the online questionnaire
- respondent ability to navigate around the questionnaire
- respondent understanding of the questions
- overall respondent burden

The eQ was designed to be accessible and inclusive for all citizens. To deliver this we worked with charities and other groups across England and Wales to understand user needs and conducted user experience (UX) testing. The UX testing was done on a rolling basis from November 2017; by October 2019, 458 interviews had been conducted at 99 events. Participants were purposively selected to cover a wide range of ages and digital abilities, and we included participants with physical and mental health conditions or illnesses. The research took place using a range of devices and assistive technologies. The 2017 Test and the 2019 Census Rehearsal (see section 2.8) represented large-scale tests of the eQ itself and as part of the user journey for respondents. Of the 101,774 household returns in the rehearsal, 83,316 were submitted online – an 81.9% online share. This successful test also confirmed our expectations about the time taken to respond online, with average completion time for the household eQ being 21 minutes 13 seconds. We continued our research after the first coronavirus (COVID-19) pandemic lockdown by switching to remote research, using screen-sharing software and phone calls.

The eQ featured a responsive design. This means the layout of questions and web pages adapt to be optimised for different devices, such as mobile phones, laptops and tablets. We tested the electronic questionnaire on all web browsers

used by more than 2% of the population. The design was also inclusive, accessible and worked with a range of assistive technologies. The design conformed to level AA of the Web Content Accessibility Guidelines (WCAG) 2.1.[23]

As chapter 8: Confidentiality, security and privacy sets out, the Census 2021 website was built to be secure by design and was subject to testing and independent assurance. We also conducted extensive user testing of the website – including exercises to understand how users would navigate around the main site, the online help sections, and respondent services. The respondent services were then usability tested in isolation but also as part of the wider end-to-end journeys.

Impact of the coronavirus (COVID-19) pandemic on the electronic questionnaire

In 2020, we assessed the Census 2021 questionnaires to understand the potential impact of the pandemic on how respondents answered questions. These impacts may have been because of changes in respondents' circumstances, or in their understanding of the question. We developed and tested additional guidance to support respondents in answering in line with data users' needs for information. As the questions and response options had already been finalised through the census secondary legislation and PQs and letters were already being printed, this work focused on identifying potential issues and methods of mitigating these via census products still under development, particularly the guidance provided in the eQ.

The changes included a new introductory page at the start of the eQ stating "Circumstances may have changed during the coronavirus pandemic. Answer based on the situation as it is now", and a similar page at the start of each individual section. A similar message on the information page before the 'main job' question advised respondents to "Answer all questions based on your situation as it is now." Specific advice was also added to the page for the questions on address one year ago, and to four of the labour market questions (including travel to work). Guidance specific to the circumstances of the pandemic were also added in relation to people who were furloughed, and to state that the supervisory status question could include remote supervision. More detail can be found in our publication Updates to Census 2021 online questionnaire guidance – coronavirus (COVID-19) pandemic impacts.[24]

2.6 Development of the wave of contact approach

The 'wave of contact' approach for Census 2021 shaped when and how we contacted households, particularly following up non-responding households. This was designed to optimise response and enable us to reach both our strategic aim of 70% of households responding without needing any follow-up and our response rate target of 94% with minimal variation between local authority areas.

The approach was developed through modelling and testing, including the 2017 Census Test and 2019 data-collection rehearsal (see section 2.8). Central decisions shaping the approach included the number of reminder letters (or PQs) that should be sent to non-responding households, the number of visits by field officers, and the timings of these interventions.

In the 2017 Test we were able to test initiatives to maximise response. This included options for maximising overall response through field follow-up. We tested visits by field officers starting 4 days or 10 days after the test reference day (equivalent to Census Day). Our results demonstrated that starting field follow-up earlier increased response, but suggested that it could be most cost effective to target specific areas for early follow-up.

In the 2017 Test, we also tested initial contact and reminder letters using behavioural insights (or "nudge") techniques, alongside ONS-style letters and not providing reminder letters. Behavioural insights-style reminder letters drew on principles of social norms, endowed progress and general costs, using deadlines and conveying that non-response was monitored. Using either reminder letter type was demonstrated to increase response. Both the behavioural insights-style initial contact and reminder letters performed better than the ONS control letters, increasing the likelihood of completion by 5 percentage points. We continued to refine our letter design after the 2017 Test. The test also helped us to optimise self-completion through providing PQs. We tested the provision of PQs using different "treatments" (including sending a letter or a questionnaire), which helped us to understand the impact on response rates and who is likely to require a PQ. This informed the paper strategy described in (section 2.5.1)

Through the 2019 Rehearsal, we were able to test the impact of follow-up activity, alongside support services and engagement. Spikes in response were observed for each of the batches of reminder letters, sending out PQs as a reminder, and sending a reminder to households who had started but not completed an online response. Testing of field follow-up showed less of an impact than posted material and helped to shape our plans to optimise the use of the field force in Census 2021.

The final wave of contact for Census 2021 and how decisions on the deployment of letters, the field force and other interventions are covered in chapter 4: Data-collection operations.

2.7 Address frame

The creation of an effective address frame was essential for the Census 2021 collection operation and in the production of high-quality statistics. The Census 2021 address frame was used to send initial contact letters and PQs to all residential addresses.

AddressBase Premium (ABP) was the primary source for the household address frame, supplemented by other administrative data sources. ABP uses data from the Local Land and Property Gazetteers (LLPGs) in conjunction with a range of address intelligence sources, such as from the Valuation Office Agency (VOA), Royal Mail and Ordnance Survey. It was used in conjunction with Council Tax data to build the residential household address frame.

Known limitations meant that we did not use ABP as the primary dataset in the creation of the CE and Special Population Group (SPG) address frame (SPGs were enumerated by the CE field operation). A variety of administrative data sources were used to create the frame for these addresses, set out in more detail in our publication Administrative Data Used in 2021 Census.[25] ABP was used only when no high-quality address data source existed for a specific CE or SPG type.

We planned to carry out desk-based clerical work and field address checks on the Census 2021 address frame. As a result of the coronavirus pandemic, it was not possible to carry out the planned field address check, involving field staff visiting uncertain addresses to confirm their status. Instead, the planned clerical address check was increased in size and scope, covering a sample of addresses and CEs; this led to the address-checking processes becoming more efficient and effective. As our Design for Census 2021[26] publication set out, we were able to check more addresses than initially planned by the field address check; by the end of 2020 over a quarter of a million addresses had been checked. The process also led to the development of linkage tools that could be used to improve the quality of the frame up to Census Day and for subsequent use (such as in the sampling frame for ONS social surveys). Due to the success of the address frame, quality assurance checks and systems developed, the clerical team remained fully utilised throughout the census period. They were initially used to resolve addressing queries where handwritten addresses failed to be matched to an expected address and went on to resolve issues relating to second addresses and workplace addresses. In total, the team were responsible for resolving over half a million address issues.

In addition, work was undertaken to create unit-level address information for rooms within student halls of residence, and to review other CE addresses for reclassification as households or removal from the frame.

The first version of the address frame contained over 27 million addresses across households, CEs and SPGs. This version was created in June 2020, because of the time needed to print initial contact letters and PQs. An ‘address delta’ updated the address frame in January 2021, adding over 100,000 household addresses

and 2,200 CE and SPG addresses and removing 63,000 addresses. The statistical and operational design for Census 2021 allowed for continual updating of the address frame during the collection, through information received from the public, our census field officers, or other data sources.

The address frame met its main objective of providing a comprehensive list of addresses through which to contact the public to complete their census form. Some issues arose in creating the CE and SPG frame, including some buildings within larger CEs being duplicated in the frame or erroneously listed as households; other challenges encountered during the live operation are covered in section 4.9 Communal establishments and special population groups. More information about the creation and quality of the address frame can be found in our publication Evaluation of Addressing Quality.[27]

2.8 Large-scale census tests

2.8.1 2017 Census Test

In April 2017, we carried out a series of carefully designed large scale field tests to provide evidence to show what approaches in a digital-first census worked best for different population groups. We also tested the impact of new questions on response rates. We invited 100,000 households across seven local authorities in England and Wales to fill in a test questionnaire online. The invitation letters included a unique access code so householders could access the online questionnaire. We also sampled 100,000 randomly selected households across England and Wales, as well as 8,000 households on the Isle of Wight, to test different approaches including paper-first or online-first with initial contact letters (see section 2.6: Development of the wave of contact approach).

The local authority areas for the main test were: Barnsley, Blackpool, Powys, Sheffield, South Somerset, Southwark, and West Dorset. We chose these areas because they included: a mix of rural and urban locations; some areas with a substantial student population; areas with different levels of broadband coverage; areas with concentrations of ethnic minorities; and multilingual areas. The overall response rate for these seven areas was 42.7%, which is comparable with other census tests in previous decades.

The 2017 Test[28] gave us a chance to make sure our systems and services worked correctly. During the test, more than 300 census officers worked across the seven main test areas. They visited households that had not completed the questionnaire to offer help and encourage them to return it. We also tested the proposed new question on sexual orientation as part of our question development.

Through our follow-up Census Test Evaluation Survey we invited a sample of households that had been selected for the 2017 Test for interviews to help us gauge people's understanding, ability, willingness and attitudes towards completing the census test online. These data helped us improve the content and the coverage and quality of responses to Census 2021.

2.8.2 2019 Rehearsal

In autumn 2019, we undertook a data-collection Rehearsal,[29] focussed on a 'Rehearsal Day' on 13 October 2019 with field follow-up continuing until 14 November 2019. The rehearsal showed that the systems tested worked and integrated end-to-end in the way we expected. It achieved response rates comparable with our rehearsal in 2009.

The 2019 Rehearsal took place in four local authority areas: Carlisle, Ceredigion, Hackney and Tower Hamlets. These locations were selected so that we could rehearse in different types of areas, including urban and rural; densely populated and hard-to-count areas; areas with many hard-to-access properties (for example, managed apartment blocks); areas with poor internet connection; areas with a large population from a single minority ethnic group, along with areas with diverse ethnic groups; and an area with Welsh language speakers.

It was an integral part of testing our systems and processes for Census 2021 in England and Wales and enabled us to test:

- the quality of our preparations (including the address frame underpinning the rehearsal)
- the main processes and systems for the operations for carrying out the census for households and some communal establishments
- our community engagement and communications strategies
- the Census Coverage Survey (CCS)

In addition, it enabled us to work with our suppliers in a live-operation simulation. There were some limits to what was rehearsed, which affected the live operation. For example, most communal establishment types and some of the more complex respondent journeys were not included.

The rehearsal covered 331,359 households across the four rehearsal areas. In total, we received 101,774 household returns (return rate of 30.7%), of which 83,316 were submitted online (81.9% online share). It taught us many lessons, including the need to improve our management information to quickly identify areas or groups with lower-than-expected response rates. It also identified the need to improve our recruitment and training processes. Following this data-collection rehearsal, we also carried out a processing rehearsal. However, the implementation of improvements in data-collection post-rehearsal limited the benefit of rehearsing census processing based on the 2019 rehearsal data.

2.9 Legislation and parliamentary engagement

The Census Act 1920 provides the legal framework to carry out a census in England and Wales. Secondary legislation is also required for each census in the form of an Order covering England and Wales together and separate regulations for England and for Wales. The new voluntary questions required primary legislation to amend the 1920 Act.

As for previous censuses, the UK Government published a white paper in December 2018[30] setting out the ONS's recommendations for Census 2021, prior to the introduction of the census legislation. The white paper described the plans for a digital-first census, the recommended topics for Census 2021, plans for the publication of census data, and the context of the wider transformation work being undertaken by the ONS.

2.9.1 Primary legislation

The statutory authority for taking a census of population and housing in England and Wales is the Census Act 1920.[31] The Act also provides for a separate devolved census in Scotland, and similar legislation provides for a census in Northern Ireland. The 1920 Act empowers the UK Statistics Authority to undertake a census in any year that is at least five years from the year of the previous census. The ONS is the executive arm of the Authority.

The 1920 Act includes both the statutory duties on the ONS to deliver a census and the duty on households to complete the census, along with the penalties for non-completion. The details of the date of the census and the questions are set out in the secondary legislation. The Schedule to the Act sets out the "matters in respect of which particulars may be required" in a census, subject to their inclusion in the secondary legislation.

For Census 2021, new questions on sexual orientation and gender identity were made voluntary by amending the 1920 Act in a similar way to how the new religion question was made voluntary ahead of the 2001 census through the Census (Amendment) Act 2000. The Census (Return Particulars and Removal of Penalties) Bill[32] was introduced in the House of Lords on 1 May 2019. It provided for the two new topics to be added to Schedule to the 1920 Act and to section 8(1A) of that Act, which disapplies the penalty for not answering a question in the census for specific topics. In the absence of a functioning Northern Ireland Executive and Assembly, the Bill covered Northern Ireland as well as England and Wales. Primary legislation was taken forward in parallel in the Scottish Parliament for voluntary sexual orientation and trans status/history questions.

Scrutiny in the House of Lords focussed on the mechanism by which the questions (and the existing religion question) were made voluntary, ensuring that their voluntary nature was clear to respondents, and what guidance would be provided to respondents. The House of Commons second reading stage in July 2019 covered wider questions about Census 2021, particularly around the ethnic group and national identity questions.

The Commons committee stage debate, where a Bill can be amended, was postponed at short notice prior to the September 2019 prorogation of Parliament, meaning a new Bill would be needed in the new parliamentary Session, reducing the time available to pass it and the secondary legislation. Following a Supreme Court ruling, the prorogation was quashed and the existing Bill was able to complete its remaining stages on 7 October. The Bill passed unamended and gained Royal Assent as the Census (Return Particulars and Removal of Penalties) Act 2019[33] on 8 October.

Following the passage of the 2019 Act, the Schedule to the Census Act 1920, as it applies in England and Wales, lists as "matters in respect of which particulars may be required":

1. Names, sex, age
2. Occupation, profession, trade or employment
3. Nationality, birthplace, race, language
4. Place of abode and character of dwelling
5. Condition as to marriage or civil partnership, relation to head of family, issue born in marriage

5A. Religion

5B. Sexual orientation

5C. Gender identity

6. Any other matters with respect to which it is desirable to obtain statistical information with a view to ascertaining the social or civil condition of the population

2.9.2 Secondary legislation

The first piece of secondary legislation required for a census under the Census Act 1920 is an Order in Council, specifying:

- the date the census will take place
- the question topics to be included
- the people who need to fill in the census questionnaires
- the people to be included on the census questionnaires

A single Order covers both England and Wales; it is laid before the UK Parliament by UK Government ministers, following consultation with the Welsh Government.

Parliamentary passage of the Order for Census 2021 had to take place after the new primary legislation was passed, removing the penalty for non-completion of the new voluntary questions. The draft Census Order was laid in both Houses of Parliament on 2 March 2020, giving parliamentarians an opportunity to debate the census, including our proposed topics and questions. Census Orders are unusual because they involve both affirmative and negative resolution procedures. The whole Order is subject to annulment by either House during a period of 40 non-recess days, but any topics included under paragraph 6 of the Schedule to the 1920 Act require an affirmative vote by both Houses and, even more unusually, are open to amendment (these topics are italicised in the Order). In practice, as for previous censuses, the whole Order was debated prior to a vote on the affirmative elements.

The debate on the Order was delayed by the disruption caused by the coronavirus pandemic, when both Houses had to rearrange how they held debates and divisions. It was debated on the floor of the House of Commons on 6 May 2020 in a hybrid session, with some members taking part online, and then debated virtually in the House of Lords on 12 May. While there were debates on the merits of a proposed Cornish tick-box for the national identity question and Sikh tick-box for the ethnic group question, no amendments were laid, and the affirmative elements of the Order were approved.

The Census (England and Wales) Order 2020[34] became law on 20 May 2020, and came into force the following day. Census Regulations were then made in parallel for England by UK Government ministers and for Wales by Welsh Government ministers and laid before their respective parliaments. The regulations set out the comprehensive arrangements that will be made to carry out the census. These include:

- how the census will take place
- the delivery and response options for the census questionnaires
- the duties of census employees
- confidentiality requirements for handling the forms containing personal information

- facsimiles of the paper questionnaires (PQs) and a description of the online questionnaires

A significant change from previous census regulations was the need to reflect the digital-first nature of Census 2021, including describing the online questionnaire, in addition to reproducing the paper questionnaires as in previous census regulations. They also reflected the distribution of online access codes as well as PQs and the differences in the data collection operation that the digital-first approach required, including response tracking and the fieldwork management tool.

The Census (England) Regulations 2020[35] were made by a Cabinet Office minister on 1 June 2020 and laid before the UK Parliament on 2 June, coming into force on 23 June. The Census (Wales) Regulations 2020[36] were made by the Minister for Finance and Trefnydd on 28 May 2020, laid before the Senedd on 1 June, and came into force on 26 June.

2.9.3 Parliamentary handling

Parliamentary handling for an England and Wales census principally includes support for the passage of census legislation and engagement with parliamentarians to promote census data-collection and call on them to amplify messages about the importance of completing the census. This is in addition to responding to correspondence received from parliamentarians directly or via the responsible Minister at the Cabinet Office, and any parliamentary questions.

Primary and secondary legislation

Officials from the UK Statistics Authority and ONS worked closely with colleagues in the Cabinet Office to support the passage of the Bill, including engagement by the Ministers taking it through Parliament, Lord Young of Cookham and Kevin Foster MP, the Minister for the Constitution. Letters were sent to all peers and all MPs when the Bill was introduced. Mr Foster also wrote to the chairs of the House of Commons Public Administration and Constitutional Affairs Committee (PACAC) and Women and Equalities Select Committee (WESC).

Drop-in sessions were arranged for MPs and peers. Separate engagement also took place with parliamentarians who took a particular interest in aspects of the Bill and with frontbench representatives of the parties and groups in each House.

A similar approach was taken for the secondary legislation, focussing on the Census Order and its parliamentary debates in May 2020, with letters sent to MPs and peers and to the chairs of PACAC and WESC, and engagement with frontbench members. Members of each House and All-party parliamentary groups (APPGs) with a known interest in particular topics or population groups were also engaged with ahead of the debates, particularly where additional tick-box response options were being sought and amendments to the Order might be proposed (such as for Cornish national identity, and for Kashmiri and Sikh in the ethnic group question).

Supporting Census 2021

Following the passage of the legislation, our main objective for parliamentary engagement was to help achieve a high response rate nationally and across population groups. The strategy for engaging parliamentarians for this was twofold, aiming to increase awareness and ensure advocacy of completing the 2021 Census among parliamentarians, and to engage with communities and population groups facing barriers to participation, through parliamentarians and their networks.

To increase awareness, we created communication packs for MPs with seats in England and Wales and members of the Senedd (MSs). These packs included messaging about the importance of the census, alongside information from the 2011 Census about the recipient's constituency. It also contained answers to frequently-asked questions, to help parliamentarians assist constituents with simple queries about the census and how to access support, as well as downloadable content and resources that they could use on social media. Politicians in Wales were sent the packs in both English and Welsh. At least 40 MPs used social media to amplify Census 2021 messaging.

As well as helping to promote the census and answering a range of queries, the communications packs provided parliamentarians with a point of contact in our Parliamentary Unit. This meant that MPs, MSs and their offices were able to send questions directly to officials where appropriate (for example, for simple factual queries), enabling them to get a more rapid response than a letter or email to the National Statistician or the Minister via a written parliamentary question. These more formal channels could then be used more effectively for raising parliamentarians' concerns. In 2021, we responded to 286 items of official correspondence (including letters from MPs) and 43 parliamentary questions relating to the census of which 229 and 25 respectively were received in the peak period of March to May.

On 26 January 2021, in partnership with the Parliamentary Office for Science and Technology, we held a virtual panel event on Census 2021,[37] chaired by Lord Lipsey and with representatives from the ONS and the House of Commons Library. On 4 March 2021, we held a Census 2021 seminar for the Senedd, with representatives from the ONS and Senedd Members Research Service, opened by the responsible Minister Rebecca Evans MS.

Following our 22 January 2021 statement confirming that Census 2021 would go ahead to the planned timetable (see section 1.11.1 Responding to the pandemic), the Minister for the Constitution and Devolution, Chloe Smith MP, updated parliamentarians about the census with a written statement[38] and an article in parliamentary magazine 'The House'.[39] We also included an update on Census 2021 in a letter to the chair of PACAC in February 2021.[40]

2.10 Accessibility

We aimed to make Census 2021 as inclusive and accessible as possible. This was built into the general approach described across the chapters of this report, for example in:

- the development of an electronic questionnaire that met government guidelines for accessibility
- the provision of comprehensive online help (including question guidance and British Sign Language videos with audio and subtitles in English and Welsh)
- the availability of PQs and Large Print questionnaires for those who needed them
- the focus in the communications, media and engagement on communities and groups who faced barriers to participation
- the provision of language support and telephone capture through the website and contact centre, and in-person support at census support centres

A team within ONS reviewed the support provided to overcome barriers to completion across the elements of the data collection campaign, communications, engagement and other census products and services. Engaging with relevant stakeholder groups, the team mapped out the route for people with different lived experiences of disability, considering visual, mental or physical disabilities, and language barriers, through the journey of awareness, completion and accessing support for the census. This approach helped to identify where existing products and services met respondents' needs and where more were needed to fill any gaps in the support required. This work helped to deliver an accessible census, ensuring that the products and services were in place to support respondents in these population groups to complete the census.

2.11 Equality Impact Assessment

The ONS is committed to ensuring that the principles of equality and diversity are at the heart of all of its decision making. To help achieve this goal we undertook an Equality Impact Assessment (EIA) for Census 2021. Completing this aligns with the requirements laid out by the Public Sector Equality Duty (PSED) as set out in section 149 of the Equality Act 2010. This requires public sector bodies to pay due regard to the need to:

1. eliminate unlawful discrimination, harassment and victimisation and other conduct prohibited by the Act
2. advance equality of opportunity between people who share a protected characteristic and those who do not
3. foster good relations between people who share a protected characteristic and those who do not

The nine protected characteristics are: age; disability; gender reassignment; marriage or civil partnership; pregnancy and maternity; race; religion or belief; sex; and sexual orientation.

The "due regard" element of the PSED allows consideration to be proportionate. It is also clear that there is no requirement to give priority to equality matters over other necessary considerations, such as the overall quality of the census.

Planning for the 2011 Census largely took place prior to the enactment of the 2010 Act. For that census, we completed an EIA in relation to the development of the ethnicity, identity, language, and religion questions. For Census 2021, our assessment was more wide-ranging covering both the questions being asked and the operation of the census. We published an EIA[41] alongside the white paper in December 2018 and an updated EIA[42] alongside the Census Order in March 2020.

The two main considerations for us in evaluating the equality impacts of Census 2021 were whether our proposals for the information we wish to collect from the census and for the operation of the census were in accordance with the Equality Act 2010. The first part of the EIA focussed on operational considerations. This outlined the inclusive approach to the census, covering data collection (online, on paper or by telephone), provision of support, communications and community engagement, and the targeted interactions with key population groups. It also covered differences between the online and paper questionnaires, accessibility and assistance, staffing, and the processes and criteria around the topics and questions in the census. The second part addressed the protected characteristics in turn, looking at both the most relevant census question or questions (for example ethnic group and national identity for 'race') and any specific operational concerns. No significant impact relevant to pregnancy and maternity was anticipated, so this was not covered in the census EIA.

Endnotes

1 **Quality and methodology information (QMI) for Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/qualityandmethodologyinformationqmiforcensus2021

2 **Quality Assurance Framework of the European Statistical System**
https://ec.europa.eu/eurostat/documents/64157/4392716/ESS-QAF-V1-2final.pdf/bbf5970c-1adf-46c8-afc3-58ce177a0646

3 **Design for Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/censusdesign/designforcensus2021

4 **Methodological Assurance Review Panel**
https://uksa.statisticsauthority.gov.uk/the-authority-board/committees/national-statisticians-advisory-committees-and-panels/methodological-assurance-review-panel/

5 **2021 Census topic consultation**
https://www.ons.gov.uk/census/censustransformationprogramme/consultations/the2021censusinitialviewoncontentforenglandandwales

6 **Assessment of initial user requirements on content for England and Wales: Response to consultation (pdf)**
https://www.ons.gov.uk/file?uri=/census/censustransformationprogramme/consultations/the2021censusinitialviewoncontentforenglandandwales/assessmentofinitialuserrequirementsoncontentforenglandandwalesresponsetoconsultation.pdf

7 **2021 Census topic research: December 2017**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/2021censustopicresearchdecember2017

8 **2021 Census topic research update: December 2018**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/2021censustopicresearchupdatedecember2018

9 **Help Shape Our Future: The 2021 Census of Population and Housing in England and Wales**
https://www.gov.uk/government/publications/the-2021-census-of-population-and-housing-in-england-and-wales

10 **Summary of testing for Census 2021**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/summaryoftestingforcensus2021

11 **Question development**
https://www.ons.gov.uk/census/planningforcensus2021/questiondevelopment

12 **Ethnic group tick-box prioritisation report for Census 2021 in England and Wales**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/ethnicgrouptickboxprioritisationreportforcensus2021inenglandandwales

13 **Cymraeg Clir**
https://www.bangor.ac.uk/canolfan-bedwyr/cymraegclir

14 **Conduct of the censuses across the UK: November 2020 progress update**
https://www.ons.gov.uk/census/censustransformationprogramme/legislationandpolicy/conductofthecensusesacrosstheuknovember2020progressupdate#census-working-groups-being-used-to-promote-uk-harmonisation

15 **Census 2021 dictionary**
https://www.ons.gov.uk/census/census2021dictionary

16 **Question and questionnaire development overview for Census 2021**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/questionandquestionnairedevelopmentoverviewforcensus2021

17 **Updates to Census 2021 online questionnaire guidance – coronavirus (COVID-19) pandemic impacts**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/updatestocensus2021onlinequestionnaireguidancecoronaviruscovid19pandemicimpacts

18 **Output and enumeration bases: residential address and population definitions for Census 2021**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/outputandenumerationbasesresidentialaddressandpopulationdefinitionsforcensus2021

19 **Designing a digital-first census**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/designingadigitalfirstcensus/2021-10-04

20 **Search-as-you-type and address look-up functionality for Census 2021**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/searchasyoutypeandaddresslookupfunctionalityforcensus2021

21 **Service Standard**
https://www.gov.uk/service-manual/service-standard

22 **Census Test 2017 - Beta Assessment**
https://www.gov.uk/service-standard-reports/census-test-2017-beta-assessment

23 **Web Content Accessibility Guidelines (WCAG) 2.1**
http://www.w3.org/TR/WCAG21/

24 **Updates to Census 2021 online questionnaire guidance – coronavirus (COVID-19) pandemic impacts**
https://www.ons.gov.uk/census/censustransformationprogramme/questiondevelopment/updatestocensus2021onlinequestionnaireguidancecoronaviruscovid19pandemicimpacts#updated-online-question-guidance-for-census-2021

25 **Administrative data used in Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/administrativedatausedincensus2021englandandwales

26 **Design for Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/censusdesign/designforcensus2021

27 **Evaluation of Addressing Quality**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/evaluationofaddressingqualitycensus2021

28 **2017 Census Test Report**
https://www.ons.gov.uk/census/censustransformationprogramme/testingthecensus/2017test/2017censustestreport

29 **2019 collection rehearsal evaluation report for Census 2021**
https://www.ons.gov.uk/census/censustransformationprogramme/testingthecensus/2019collectionrehearsalevaluationreportforcensus2021englandandwales

30 **Help Shape Our Future: The 2021 Census of Population and Housing in England and Wales**
https://www.gov.uk/government/publications/the-2021-census-of-population-and-housing-in-england-and-wales

31 **Census Act 1920**
https://www.legislation.gov.uk/ukpga/Geo5/10-11/41/contents

32 **Census (Return Particulars and Removal of Penalties) Bill**
https://bills.parliament.uk/bills/2396

33 **Census (Return Particulars and Removal of Penalties) Act 2019**
http://www.legislation.gov.uk/ukpga/2019/28/contents/

34 **Census (England and Wales) Order 2020**
https://www.legislation.gov.uk/uksi/2020/532/contents/made

35 **Census (England) Regulations 2020**
http://www.legislation.gov.uk/uksi/2020/560/contents/made

36 **Census (Wales) Regulations 2020**
http://www.legislation.gov.uk/wsi/2020/555/contents/made

37 **Event summary: Census 2021**
https://post.parliament.uk/event-summary-census-2021/

38 **Written Ministerial Statement, 3 Feb 2021: Census 2021, England and Wales**
https://questions-statements.parliament.uk/written-statements/detail/2021-02-03/hcws755

39 **The public deserves a say on local issues after the pandemic, and the 2021 Census will help deliver it' The House, 24 Feb 2021**
https://www.politicshome.com/thehouse/article/the-public-deserves-a-say-on-local-issues-after-the-pandemic-and-the-2021-census-will-help-deliver-it

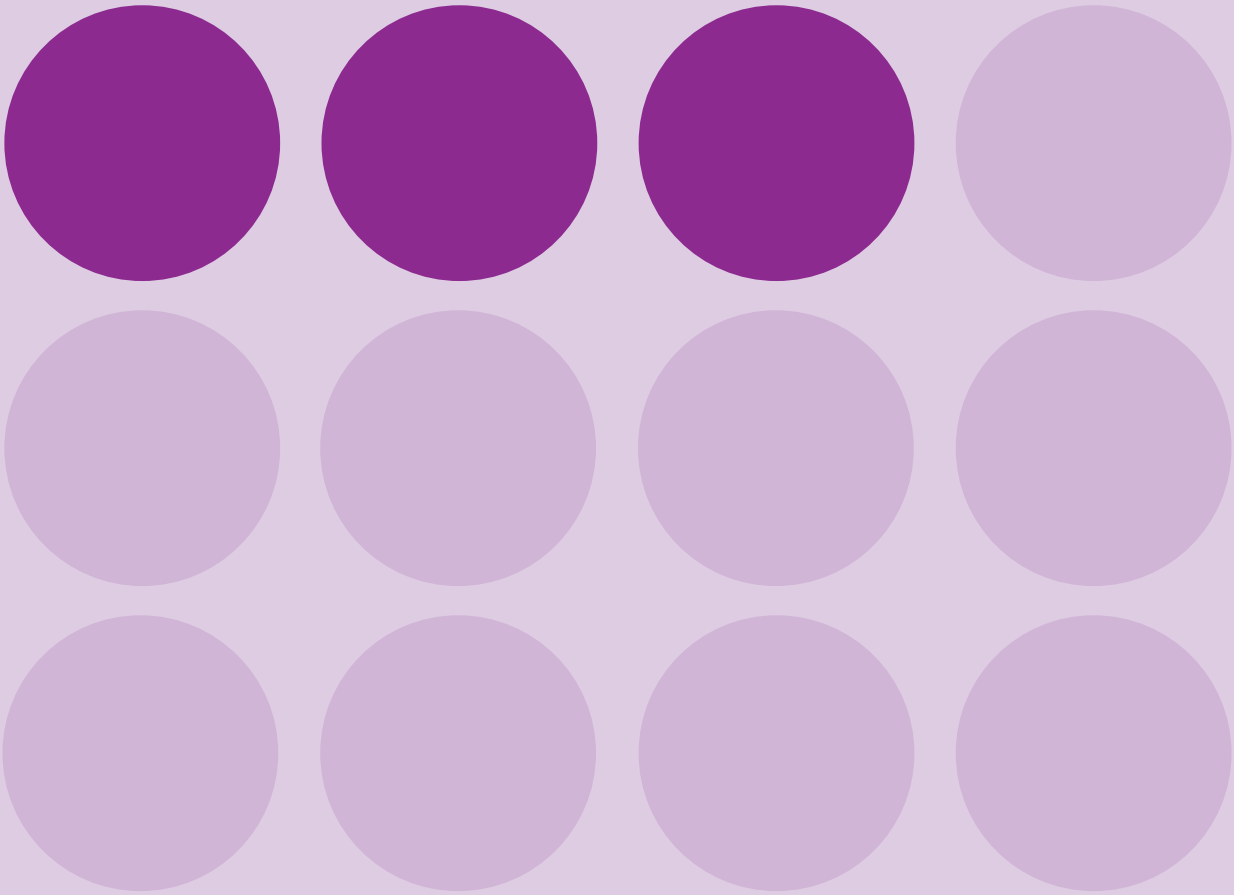
40 **Letter from Sir Ian Diamond to William Wragg MP, 9 Feb 2021**
https://uksa.statisticsauthority.gov.uk/submission/ons-written-evidence-to-the-public-administration-and-constitutional-affairs-committees-inquiry-on-data-transparency-and-accountability-covid-19/

41 **Equality Impact Assessment for the 2021 census (pdf)**
https://www.ons.gov.uk/file?uri=/census/aboutcensus/legislationandpolicy/equalityimpactassessmentforthe2021census.pdf

42 **Updated Equality Impact Assessment for the 2021 census (pdf)**
https://www.ons.gov.uk/file?uri=/census/aboutcensus/legislationandpolicy/updatedcensusequalityimpactassessmentmarch20201.pdf

Managing the Census

03



3. 1 Introduction

To manage a large, complex programme like the census requires strong, well-defined central services, support, and guidance. This chapter outlines how Census 2021 was delivered from a governance perspective, including staffing, costs and use of external suppliers.

3.2 Programme organisation

3.2.1 Census and Data Collection Transformation Programme

The ONS delivered Census 2021 through the Census and Data Collection Transformation Programme (CDCTP). In line with the National Statistician's recommendation in 2014 and the 2018 white paper commitment to deliver a recommendation on the future of population and migration statistics, the programme had three core elements. These were:

- delivering a digital-first census of England and Wales in 2021, making increased use of administrative data and surveys
- providing evidence to enable a decision about the future provision of population and migration statistics based primarily on administrative data
- the renewal of our technology infrastructure will support the delivery of the data collection transformation and the census through common digital platforms (supporting transformation across the whole of ONS).

Chapter 11 summarises the recommendation and the programme's wider transformation work. This chapter focusses on the delivery of Census 2021.

3.2.2 Ways of working

Census 2021 was planned and conducted around specific phases covering:

- research and proposals for new topics, the 2017 Test, and the 2019 Rehearsal (all described in chapter 2: Preparing for Census 2021)
- the data-collection operation described in chapter 4: Data-collection operations and chapter 5 Communications and Engagement
- the processing of the data, production of the outputs and dissemination described in chapter 6: Processing and Estimation and chapter 9: Outputs and dissemination

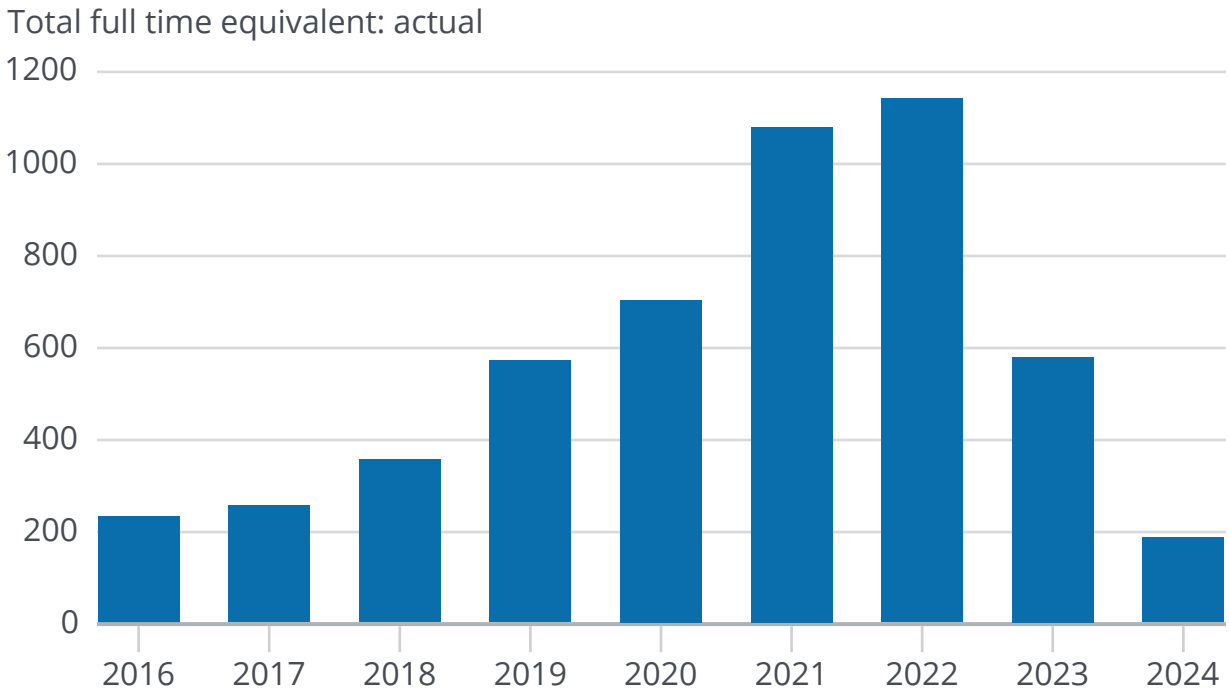
Programme management arrangements were based upon Managing Successful Programmes[1] and PRINCE2, as had been the case in previous censuses. Arrangements were tailored for each phase of the programme to best support delivery.

3.2.3 Staffing

The core number of staff allocated to the programme increased from 176 full time equivalent (FTE) in the financial year ending (FYE) 2016 to a peak of 1,125 in FYE 2022. The highest monthly planned resource was 1,242 in April 2021. This does not include roles recruited for the delivery of the census field operation, such as area managers, census officers and community engagement staff (see chapter 4: Data-collection operations).

Figure 3.1 shows the actual FTE staff levels in the programme for each financial year. The figure for each financial year is the average of the actual FTE at the end of each of the four quarters in that financial year

Figure 3.1 Staff levels for Census and Data Collection Transformation Programme, financial years ending (FYE) 2016 to 2024:



3.2.4 Governance

Throughout the life of the programme, governance was in place to ensure delivery of the required services and to support effective decision-making. Governance consisted of Advisory, Management, Monitoring and Control Boards. The programme governance was supplemented when necessary, such as the temporary operational governance structure in place during data-collection operations described later in this section.

Boards ranged from Project Boards chaired by Project Managers or equivalent, which provided direction and management for each project, through to the CDCTP's Programme Board which supported the Deputy National Statistician as Senior Responsible Owner (SRO) in providing direction, management and assurance across the programme. The Programme Board reported to the ONS Portfolio and Investment Committee, which has oversight of the ONS's

portfolio of transformation programmes and executes decisions related to funding bids and ONS investments to support the successful delivery of the UK Statistics Authority's strategy.

Census operational governance consisted of a series of daily and weekly boards that fed into the Operations Board. This Governance was led by a central Operations team. Operational governance changed focus according to the phase of the operation, for example data-collection operation forums focused on the field operation but then changed focus during the processing and outputs phase. A key daily meeting during data-collection was the Optimising Response Group which provided a forum to monitor response to the census using up-to-date management information (see section 4.6.1: Operational decision-making). Other meetings included the media briefing, the operational management forum, census management group, the escalation and decision forum, senior management briefing and the census director's board.

3.2.5 Projects

All work contributing to the programme was managed within a formal project, each overseen by a Project Board. The division of work and the development of projects changed in response to demands after each phase of the programme. Examples of Projects include:

- Data collection services
- Fieldwork management tool
- Household collection
- Legislation
- Question and questionnaire design
- Communications campaign

3.2.6 Census delivery model

Following lessons learnt during the 2019 Rehearsal, a new delivery model was implemented that consisted of defined "horizontal" and "vertical" delivery teams working across Operational Services, Integration Groups and Specialist Functions. The horizontals were major aspects of the Census 2021 programme that needed to be delivered, such as household collection, communal establishment collection, the communications campaign, and the Census Coverage Survey; these consisted of individual projects or grouped together closely linked projects. The verticals were the cross-cutting teams and specialist functions that were required to deliver them, such as public support, security, and various aspects of the field operations.

Integration groups brought together groups of products that had to be designed and built, with Integrated Delivery Managers managing the design and build and the integration of those products into delivery teams, acting as conduits between the business and technical delivery areas and unblocking issues with delivery. This model ensured that the complexities of the work and the dependencies

between areas could be more clearly understood and monitored. It avoided duplication of work and ensured delivery was completed in the most efficient way possible. An example of how this worked can be seen with the household collection (a horizontal), which was dependent on inputs from every vertical and relied on the integration groups to provide the interfaces to technology and management information.

3.3 Business planning and allocation of costs

Funding for Census 2021 was obtained through HM Treasury (HMT) Business case process over a number of years. Approved funding for the whole Census and Data Collection Transformation Programme totalled £906 million. The final Full Business Case for CDCTP was approved in 2019 with a refresh being submitted to HMT in summer 2020. The final cost of the programme was £820 million. The underspend compared to the approved funding was due to a number of factors, set out in our annual Government Major Projects Portfolio data.[2] These factors included a smaller spend on the field operation and contracts.

The overall identifiable cost of Census 2021 was £539 million across the period of the programme's work, 2015 to 2024. As it was part of a wider programme along with the transformation of population and social statistics, some spend allocated to each will have benefited the other part of the programme. For example, some products, processes and methodologies developed for Census 2021 will be utilised for the transformed statistics system (see section 1.10: Census legacy). The cost of the programme for each year and of the census as part of that are set out in Figure 3.2.

Figure 3.2 Cost of Census 2021 and of the Census and Data Collection Transformation Programme, financial years ending (FYE) 2016 to 2024 (£ million)

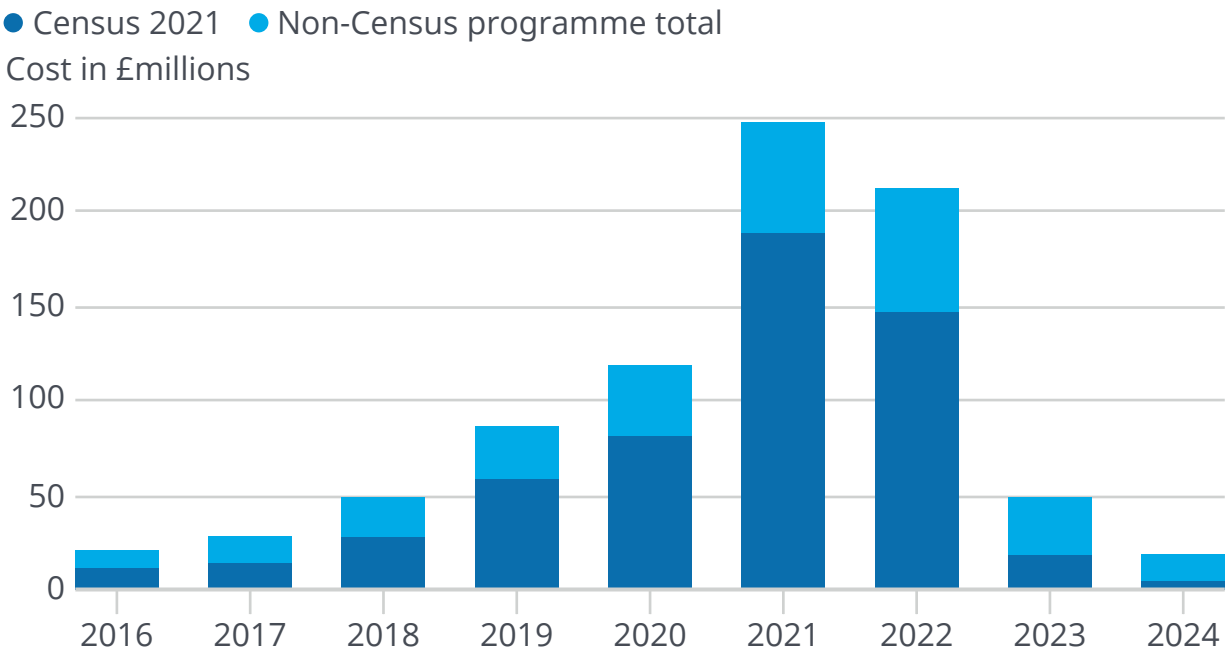


Table 3.1: Census 2021 costs by component activity

Component activity	Cost (£ million)	Proportion of cost of Census 2021
Census field operations	180.0	33%
Census data collection services	115.7	21%
Programme management and support (including policy, security and commercial capability)	109.1	20%
Communications and stakeholder engagement (including media)	37.5	7%
Census outputs and dissemination	25.8	5%
Digital services and technology	24.1	4%
Operation management and control	20.3	4%
Census statistical and outputs design	14.0	3%
Data processing	9.7	2%
Administrative data research	0.2	0%
Other	3.0	1%
Total	**539.4**	**100%**

Table 3.1 sets out the costs attributable to Census 2021 by component activity. Of these costs, £205.8 million (or 38%) was spent through contracts with external suppliers. Table 3.2 provides more information about these costs, showing them broken down by contracted activities where the costs were more than £1 million.

The costs described in table 3.2 can also be grouped into the component activities in table 3.1 as follows: £113.5 million for census data collection services; £62.9 million on census field operations; and £29.4 million on communications and stakeholder engagement (including media). Section 3.7 provides more information on the main contracts and suppliers used for Census 2021.

Table 3.2: Costs of external third-party commercial contracts to support Census 2021

External third-party activity	Cost (£ million)	Proportion of total cost of contracts
Questionnaire management	63.2	31%
Census field force people services partner	40.6	20%
Print and post out	19.6	10%
Public contact centre	19.1	9%
Media buying agency	17.1	8%
Campaign agency services	10.0	5%
Fieldwork management tool	9.2	4%
Assisted digital services	8.0	4%
Census field operations devices and services	7.1	3%
Field force logistics and replenishment	5.3	3%
Paper questionnaire return service	3.3	2%
Social media support service	1.0	1%
Other	2.1	1%
Total	**205.8**	**-**

Notes:

- Named rows include all activities with contract costs over £1 million. Activities with smaller costs are included in 'Other'.
- This table reflects the costs throughout the work on the census, including the 2017 Test, 2019 Rehearsal and Census 2021. In some cases, separate suppliers were used at different stages, so these figures do not necessarily reflect the value of the contracts described in section 3.7.

3.4 Programme support

A Programme Delivery Division (PDD), led by the Programme Director, was introduced for the first time in Census 2021. Responsible for driving delivery, the team consisted of a programme manager and one or more project manager or project support officer on each project. PDD worked across the programme to facilitate the achievement of objectives and ensure delivery. The team worked to coordinate and assure programme adherence to budget, timescales, and quality. The Programme Management Office (PMO) sat in the centre of the Division and provided services, processes, guidance, and support. The PMO managed programme-wide activities such as reporting and governance, risk and assurance, planning, change control, configuration, and finances.

3.5 Project management

3.5.1 Planning

In a time-critical programme like a census, planning and monitoring are crucial. Although each project manager (PM) could plan their own project, a minimum level of planning was required so that the programme had consistency across different activities. Working closely with the PMO, a dedicated census planner managed the census programme plan. The programme plan was detailed and contained milestones at all levels which were essential for 'telling the story'. The detailed nature of the programme plan reflected the complexity of the programme and the high volume of dependencies that needed to be viewed and managed as a whole.

The census planner also managed the census dependency log. This log was simple, with acceptance criteria for every dependency. Dependencies were reviewed fortnightly with project teams and our delivery confidence assessment updated using RAG (Red, Amber, Green) indicators. A visual roadmap was also produced to complement the programme plan. This plan was easier to understand and digest for a wider audience. Once baselined and agreed, all plans were subject to change control.

3.5.2 Reporting and evaluation

Regular progress updates on the Census Projects were provided by each PM to the PMO and during collection operations this was also shared with the Operations team. Each area identified within the Delivery Model provided a formal report to ensure full understanding of progress and issues. Operational updates were provided daily to the Operations team to help formally manage the day-to-day operation of the census, this included low level detail to aid in daily decision making. As part of the formal closure and decommissioning of each project, projects and workstreams were asked to record their work and main lessons learned, which informed the content of this general report.

3.6 Programme procedures

3.6.1 Change management

Learning from previous censuses, change management procedures were in place from the initiation of the programme. These procedures managed any changes required to baselined plans, including contractual changes. This ensured the impact of changes were thoroughly assessed and approved or rejected through an Integrated Change Control Board, and communicated to all stakeholders.

3.6.2 Risk and issue management

Within the programme, risk and issue management were dealt with at the lowest possible level until any escalation was required via the governance structure. Discussions were held and supported by the programme risk team to identify, assess, evaluate, and implement a robust approach. Anyone within the programme and across ONS could raise a risk or issue using the corporate management system.

The Operations team worked extensively with consultants on a series of risk-based scenarios in the build-up to the intensive data-collection operation to assist with planning and ensure they were fully prepared and ready for any eventuality or incident that may occur (see section 4.2.2: Preparing for uncertainty section). The process for managing incidents during the data-collection operation is described in section 4.6.2: Incident management.

3.6.3 Configuration management

With such a vast programme, a configuration manager was appointed in 2020, to construct, monitor and oversee the configuration log. This housed all the digital artefacts relating to the programme, ensuring a clear audit trail was maintained to a high standard.

3.6.4 Financial management

Financial management was coordinated by the PMO engaging with a dedicated finance business partner, project managers and business leads as necessary. ONS standard financial procedures were followed to produce plans, and corporate systems were used to estimate, monitor, and report monthly.

3.6.5 Assurance

Assurance activity during Census 2021 was based on the 'Three Lines of Defence' model. Assurance activity ranged from risk/issue management and health checks through to internal audits and independent reviews conducted by the Infrastructure and Projects Authority (IPA, now part of the National Infrastructure and Service Transformation Authority). The programme was supported by an overarching Integrated Assurance and Approvals Plan and returns made through Government Major Projects Portfolio.

IPA Gateway Reviews for the Programme were held in January 2016, July 2017, March 2019, July 2020, November 2020, November 2021, and January 2023, each of which provided an Amber RAG rating. A Programme Assurance Review in January 2017 rated the programme Green, and in July 2018 Amber. A Critical Friend Review by the IPA in July 2019 found that there was no risk to the delivery of the rehearsal, and another in November 2020 rated the programme Amber. A final Gateway Review was held at the end of January 2024 and received a highly praised Green RAG status.

3.7 External suppliers

As in previous censuses, the ONS outsourced elements of the delivery of Census 2021. Our approach differed from the previous census with both more suppliers used and more use of internal development. In 2011 one contract covered questionnaire tracking, printing of census questionnaires and related information leaflets, paper questionnaire data capture and coding, internet response and coding, and the public contact centre and online help. For Census 2021, we used a wider range of suppliers across this range of activity. Among the elements of Census 2021 delivered in-house by the ONS were the website, electronic questionnaire, online help, the processing and coding of online responses, and all statistical processing including estimation and adjustment.

Section 3.3: Business planning and allocation of costs sets out the amount spent on outsourced activities for Census 2021, itemised for the contracts worth over £1 million. The most significant of these contracts were:

Questionnaire management

Paper questionnaire production, returned questionnaire processing, data capture, coding and secure destruction. There was a competition for this contract through a restricted procedure which is part of The Public Contract Regulations 2015. The contract was awarded to Leidos Innovations UK Ltd.

Census field force people services partner

A complete outsourced, output-based solution to recruit, train, payroll and HR manage the entire field force, covering the 2019 Rehearsal, Census 2021, Census Coverage Survey (CCS) and Non-Compliance operations. There was a competition for this contract through an open procedure which is part of The Public Contract Regulations 2015. The contract was awarded to Adecco UK Ltd.

Print and post out

Production and dispatch of all initial contact and reminder letters, as well as other printed materials to support the public and the collection operations. There was a competition for this contract through the Crown Commercial Service Managed Print and Digital Solutions Framework RM3785. The contract was awarded to HH Associates Ltd.

Public contact centre

Delivering a multi-language omni-channel (voice, webchat, webmail, Short Message Service (SMS) and social media) contact centre solution to the public providing respondents the opportunity to engage across their preferred channel. Included option to request a paper questionnaire and census completion by telephone using the Telephone Capture service. There was a competition for this contract run through the Crown Commercial Service Contact Centre Services Framework RM3815. The contract was awarded to Serco PLC.

Media buying agency

The contract for the provision of media buying services was awarded to OMD Group Ltd. This was a direct award to the sole supplier on the Crown Commercial Service Media Buying Framework RM6003.

Campaign agency

Provision and support of a marketing and communications solution. This included all forms of media together with the production of material for education facilities. There was a competition for this contract run through the Crown Commercial Service Campaign Solutions Framework RM3774. The contract was awarded to M&C Saatchi.

The other contracts included in table 3.2 were:

- Census media buying agency, to Manning Gottlieb OMD
- Census field operations devices and services, to XMA Ltd
- Fieldwork management tool, to Total Mobile
- Assisted digital services, to Good Things Foundation
- Paper questionnaire return service, to Royal Mail
- Field force logistics and replenishment, to Granby Marketing Services Ltd
- Social media support service, to M&C Saatchi

More information on our suppliers can be found on the Census 2021 suppliers webpage.[3] In addition to these public-facing Census services, a number of support contracts were utilised to provide professional technical, legal and service integration advice, guidance and support to the Programme throughout all phases.

Endnotes

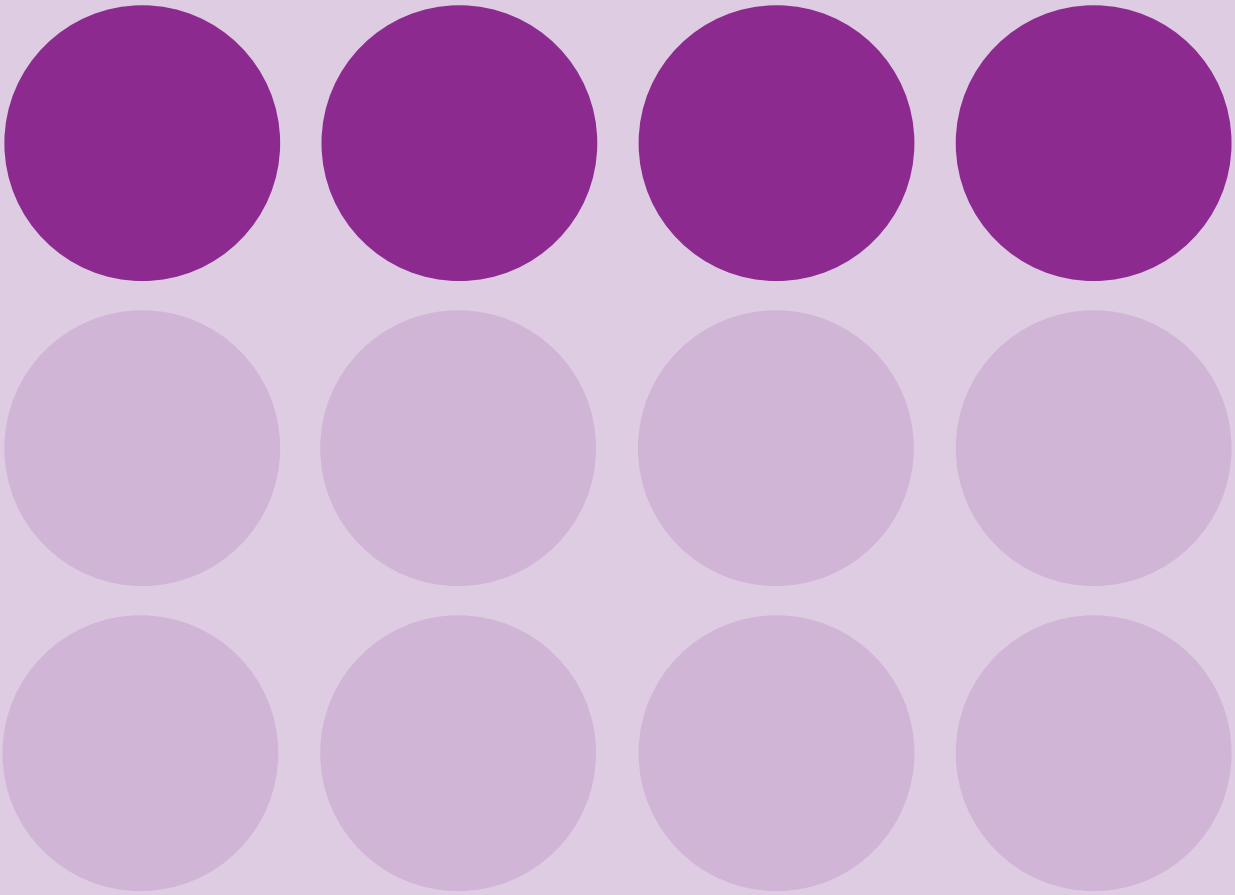
1 **MSP®: Managing Successful Programmes**
https://www.axelos.com/certifications/propath/msp-programme-management

2 **Office for National Statistics Government Major Projects Portfolio data**
https://www.ons.gov.uk/aboutus/transparencyandgovernance/officefor nationalstatisticsgovernmentmajorprojectsportfoliodata

3 **Census 2021 suppliers**
https://www.ons.gov.uk/census/censustransformationprogramme/2021 censussuppliers

Data-collection operation

04



4.1 Introduction

The collection of data is central to the delivery of a successful census, and in 2021 we exceeded our expectations both for the household response rate across England and Wales and minimising variability between local authority areas.

This phase of the census was focussed on ensuring that the public knew about the census, were provided with the means to complete it in a way that suited them, had the support they needed, and were reminded of the need to take part if necessary. It had to cover the whole population of England and Wales: those in households and in communal establishments (CEs); those who were receptive to our messages and keen to take part and those who faced barriers of different kinds; people wanting to complete online, or on paper, or who needed assistance to complete their census return. After the main data-collection campaign, we ran the Census Coverage Survey (CCS), an essential part of the process of producing high-quality census estimates.

Effective communications, media relations and engagement are essential to data collection. How they supported these operations in 2021 is described in chapter 5: Communications and engagement. This chapter covers the restof the data collection operation, including how we contacted households and CEs; the role of the census website in hosting the electronic questionnaire, online help and other support; the role of the field force in following-up and assisting non-respondents; the support services provided online, by phone and in person; the CCS; and our non-compliance operation, which focused on those refusing to take part.

In Census 2021, the data-collection operation ran smoothly and effectively, achieving a 97% return rate from households across England and Wales and more than 90% in all local authority areas.

As in previous censuses, the enumeration of residents in CEs and special population group (SPGs) was more challenging and we achieved return rates of 73% and 76% for residents in these groups respectively. The coronavirus (COVID-19) pandemic had an impact across the operation, potentially making the receptive part of the population more likely to respond without follow-up and reminders. However, it made the field operation, and particularly the CE and SPG operation, more challenging, but it was still effective. The CCS coverage rate was lower than expected (at 59%) but the risks this created for the production of high-quality estimates were much reduced by the high response rates to the census itself.

4.2 An integrated and flexible operation

A major theme in the preparation and delivery of Census 2021 was flexibility. This continued through to the processing and census outputs and was central to the data-collection operation. While this chapter reflects what happened over the course of the live operation, it is important to note that the operation was designed to be adaptable and to cope with different scenarios. This account of the operation therefore reflects decisions made at the time, whether around maximising responses or reacting to events and risks affecting the operation. This section outlines how we prepared the operation to be responsive to the unfolding situation.

4.2.1 A digital-first census with responsive design

The change to a digital-first census in 2021 marked a step-change from its predecessors. The change to self-completion and post-back of paper questionnaires in 2001 meant a change to the role of the field force from collecting responses to encouraging people to complete the census, and the 2011 Census introduced an online option for those responses. The shift to being digital-first in 2021 did not just mean an increase in the online option, but a system-wide change in the census operation.

With real-time management information (MI) on online responses, and a slight lag for completed responses on paper, we were able to track responses at a very local level and feed that information more quickly to the field force than previously possible (see sections 4.5.3 and 4.6). The wave-of-contact model described in section 4.3.1 saw targeted follow-up through reminder letters and visits from the field force after Census Day, using local response MI. A more flexible approach to field force deployment was designed for the campaign to enable more responsive deployment. The live MI also enabled us to identify trends in responses that required additional field force attention or, conversely, a pause in follow-up for particular areas or for paper-first households. This approach to the census meant that we could be flexible and adaptable to the evolving situation across England and Wales.

4.2.2 Preparing for uncertainty

The success of a census is reliant on the willingness of the whole population of England and Wales to take part and the external conditions that impact on that. As such there are a large range of factors that can affect that success. These could arise within the operation, such as technical difficulties with online access or people being unable to get the support they needed. They also include a wide range of external events that could affect the practical delivery of the census, distract the public from the campaign or undermine confidence in it; for example, extreme weather or a disease outbreak (such as foot and mouth in 2001), major political events, the death of a member of the Royal Family, or malicious interference such as hacking or scams directed at the census. The run-in time for our preparations was lengthy and decisions on the design of the operation were needed in summer 2020, to allow the printing of census materials (such as letters and questionnaires) and to prepare to recruit and train the field force. This meant that the design needed to be responsive to things that might occur after this point.

The coronavirus pandemic and uncertainty about how and the extent to which the virus and lockdown restrictions would affect the census operation had an impact on our preparations and brought to the foreground the need to keep both our staff and the public safe. We made changes to the operation to deal with known pandemic risks, but also had to be prepared to deal with uncertainty over how the pandemic and restrictions could affect our operations.

While we could not prepare for every possible scenario, whether due to the pandemic or more generally, we were able to make ourselves ready for anything that might happen. Over the months before the live operations began, we built up our capability to handle whatever scenarios might arise. This work included undertaking risk study and scenario planning to understand our risks and vulnerabilities, and active risk management. This preparation included the 2019 Census Rehearsal and subsequent contingency planning work, as well as the pandemic scenario planning undertaken during 2020 (see section 1.11: Impact of the coronavirus (COVID-19) pandemic). We also prepared for the operation by conducting 'mock operations', which replicated the normal

running of our operations, and 'war games' of various types and scales to test that operational running under stressed and crisis conditions. This preparation meant not only that we understood a broad range of risks and how we would respond to them, but also that we were well practised in how to manage any events that might come up during the operation.

In addition to the UK-wide working groups mentioned in section 1.6.2 Co-operation and harmonisation, our preparations included a range of operational level working groups that brought together the ONS, National Records of Scotland (NRS), the Northern Ireland Statistics and Research Agency (NISRA) and Welsh Government to create and share plans and lessons around the management of the census data-collection operation.

4.3 Delivery of census materials to households

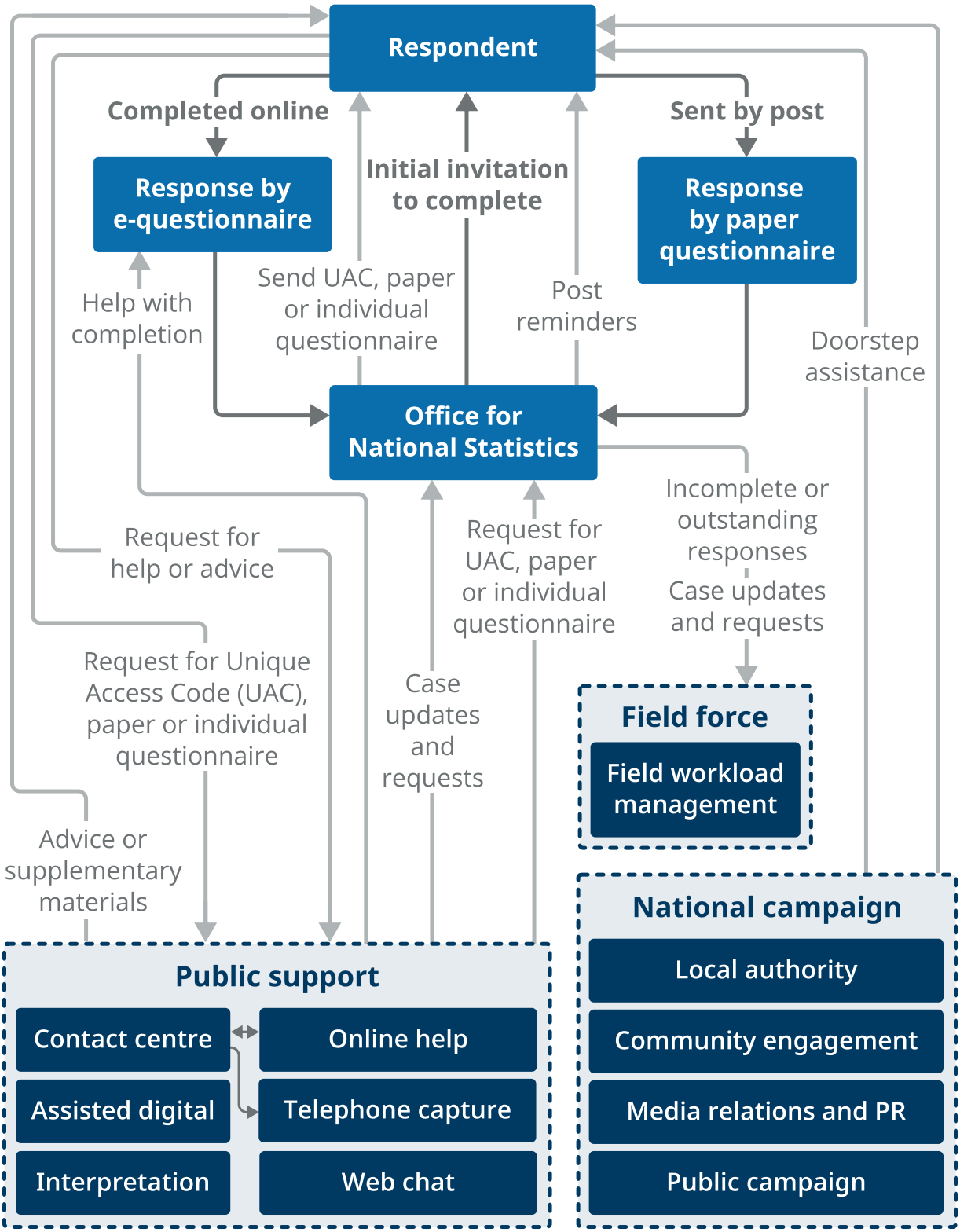
As the first digital-by-default census in England and Wales, we wanted participants to respond to the census online rather than using a paper questionnaire (PQ) if they were able to. However, we also needed to enable people to respond using a PQ if they could not complete online or preferred not to, and provided support to those who needed it via the field force, public contact centre and census support centres.

The digital-first design was built with the intention to benefit both the respondent and the quality of the data. This included:

- improved quality, for example through a reduced reliance on scanning hand-written responses, and features such as 'search as you type', validating responses
- reducing burden for respondents, for example by routing them only to the questions they needed to answer based on their previous responses
- timeliness of data about responding addresses allowed us to monitor and react to small area return rates daily and to use the field force more efficiently
- reduced environmental impact by replacing printed booklets with single-page letters for most households and removing the need for return delivery

Figure 4.1 shows how different elements of the data-collection operation described in this chapter worked together to optimise response from the despatch of letters and questionnaires, through the work of the field force and public support, alongside the communications and engagement covered in chapter 5.

Figure 4.1 Illustration of the components of the data-collection operation



4.3.1 Wave of contact approach

Our national communications campaign began on 12 February 2021 and direct contact with households began on 22 February 2021. Our 'wave of contact' approach had a succession of timed despatches of letters and PQs before and after Census Day. This encompassed our initial, pre-Census Day contacts, and the reminder and follow-up process after 21 March 2021 (the development of the wave of contact approach is covered in section 2.6). The CE and SPG operation had a different, phased approach that ran in parallel to the household operation, described in section 4.9.

Schedule for contact with households for Census 2021

- 22 February 2021: Postcards to 25.6 million households across England and Wales.
- From 3 March: Initial contact letters or paper questionnaires to all households.
- 8 March: Tranche 1 of household field force deployed.
- 21 March: Census Day.
- From 22 March: First despatch of reminder letters (digital-first households only).
- 23 March: Tranche 2 of household field force deployed.
- From 29 March: Second despatch of reminder letters (including first letters to paper-first households, and from 31 March where online responses started but not completed).
- 30 March: Tranche 3 of household field force deployed (all of field force now deployed).
- From 12 April: Further reminder letters.
- From 19 April: Response-driven reminder letters.

Our flexible approach meant that decisions on the deployment of field staff and reminders after Census Day were based on the latest MI and intelligence gathered from the field force and other parts of the operation. (see section 4.6: Operational management and decision-making).

4.3.2 Contacting households before Census Day

Direct contact with households in England and Wales began with 25.6 million postcards sent to households from 22 February 2021 to raise awareness of the census. This was timed to coincide with the electronic questionnaire (eQ) going live on 22 February and the contact centre opening from 1 March to provide support to respondents (see section 4.11). People were able to complete the census ahead of census day if their circumstances were not expected to change before 21 March.

From 3 to 12 March 2021, all households in England and Wales received either an initial contact letter (ICL), with a unique code to access the census online, or a PQ. PQs also included an access code, so any household could complete the census online irrespective of the type of initial contact. People could also request new PQs or access codes, including for individual responses separate from their household (see section 4.5 Reminders, replacements and responses). ICLs and reminder letters were printed and despatched by HH Global. PQ printing, despatch and management was carried out by Leidos Innovations UK Ltd.

As in previous censuses, the front page of the PQ provided respondents with information about the census, including that completion was compulsory and that information provided would be treated confidentially. It also included instructions on how to access the census online, and information about how to get help with the census. A freepost envelope was included to return completed PQs. ICLs included similar information, with greater emphasis on online completion and advice on how to obtain a paper form.

Both ICLs and PQs were accompanied by information leaflets designed to support the respective modes of completion. For example, while both included information about the census and who should be included, information about which questions did not need to be completed for people under certain ages was not needed for digital-first households as the eQ automatically routed respondents to the relevant questions. The larger leaflet sent with the PQs also included more information on privacy, while the digital-first leaflet included some information and the URL for the Census 2021 website's privacy page.

In 2011, all households were sent PQs with online access codes. For Census 2021, 89% of households (24 million) received ICLs and 11% received PQs (3 million). As set out in section 2.5.1 Designing a digital-first census, the proportion of paper-first areas was higher in Wales, with just over 50% of households receiving PQs compared with just under 9% in England. The full numbers are set out in table 4.1 and more information on how areas were designated digital- or paper-first can be found in section 2.5.1.

Table 4.1: Numbers and proportions of digital-first and paper-first households

Country	Region	Households	Digital-first households	Paper-first households	Percentage of Households digital-first
England & Wales		27,054,300	24,036,700	3,017,600	88.9%
England		25,559,400	23,290,300	2,269,000	91.1%
	East Midlands	2,210,500	1,771,900	438,600	80.2%
	East of England	2,826,400	2,654,300	172,100	93.9%
	London	3,813,000	3,767,800	45,300	98.8%
	North East	1,268,200	1,198,700	69,500	94.5%
	North West	3,464,400	3,302,500	162,000	95.3%
	South East	4,133,100	4,009,300	123,800	97.0%
	South West	2,696,100	2,329,400	366,700	86.4%
	West Midlands	2,603,500	2,030,900	572,600	78.0%
	Yorkshire and The Humber	2,544,200	2,225,600	318,600	87.5%
Wales		1,495,000	746,400	748,600	49.9%

The post-Census Day contacts with households are covered in section 4.5: Reminders, replacements and responses and section 4.8: Household operation).

4.4 The Census 2021 website, electronic questionnaire and online help

4.4.1 Role of the Census 2021 website

With at least 75% of households expected to complete the census online, it was important to have a robust and user-friendly website to support online completion and those looking for practical help and guidance. That nearly 90% of responses were submitted online owed much to the success of the website and electronic questionnaire (eQ), as well as the communications, engagement and initial contact with households.

During the census data-collection period, the Census 2021 website served as the host for the secure eQ. It also provided a wide range of information to support citizens with questions about how to complete the census, enabled people to request a PQ or online access code or to locate their nearest census support centre (see section 4.11.4 Assisted digital via census support centres), and hosted a comprehensive set of materials for local authorities, community groups and others to use to explain and promote Census 2021. Its role in the communications campaign is covered in section 5.2.6: Census 2021 website and social media channels.

The Census 2021 website was provided in English at census.gov.uk and in Welsh at cyfrifiad.gov.uk. Users were able to toggle between the two languages at any time, including inside the eQ for those completing it in Wales. Welsh translations of web pages and all other census materials was carried out by Prysg, our Welsh translation partner. The ONS also supported the Northern Ireland Census by hosting their website and eQ (some figures in this chapter, where stated, relate to the whole census digital system covering England, Wales and Northern Ireland).

The website had three phases to deliver its objectives to support the census, CCS and the Census Quality Survey (see chapter 7: Quality of Census 2021 data). These phases and the role of the website were:

- Engage, January-February 2021, as an information source for local authorities and partners who would support the census operation, with some general information about the census
- Respond, February 2021-May 2021, as a gateway to the eQ and as a source of help and route to request a new access code or questionnaire
- Post Census, May 2021-October 2021, after the closure of the eQ, the focus shifted to supporting the CCS and the Census Quality Survey

The website was also used to support the census outputs consultation in summer 2021 and the publication of census outputs from June 2022 (see chapter 9).

4.4.2 Accessing the website

Overall, the Census 2021 website, including the eQ, recorded over 19 million user sessions and over 2 billion pageviews during the census collection period. While most of the recorded pageviews were eQ pages, there were 85 million recorded pageviews for other pages. The most visited non-eQ pages were those through which people accessed the eQ (such as the census homepage and 'start the census' page) or requested access codes and questionnaires. As these counts were recorded through voluntary web analytic cookies, the total number ofuser sessions and pageviews is likely to have been considerably higher, with potentially around 3.3 billion pageviews in total. These counts also include the Northern Ireland Census 2021 website, which was hosted by the ONS.

We built the Census 2021 website to work across most browser platforms, to ensure that it was accessible to citizens who were not using the latest technology. Through the period 1 March to 18 April 2021, covering most visits to the website and eQ, the breakdown of devices used was:

- 34.6% desktop (including laptop computers)
- 56.4% mobile
- 8.9% tablet

The most popular recorded browsers used were Safari and Chrome (developed by Apple and Google respectively), each of which were used by over 7 million recorded users across the three device types, including 'in-app' Safari users. These two browsers were each used by nearly 40% of recorded users, while no other browsers were used by more than 10% of recorded users (although it should be noted that some browsers do not accept cookies so are not represented in the data). More detail on devices and browsers can be found in our article Delivering the Census 2021 digital service.[1]

4.4.3 Hosting the electronic questionnaire (eQ)

At the core of the Census 2021 website was the eQ and the secure route to access it, known as 'Respondent Home'. With every household and CE resident receiving a unique access code, and 89% of households being digital-first, the eQ and related pages had to be robust and able to support very large volumes of traffic, particularly on Census Day, 21 March.

The user journey started with the 'start the census' page, which took people to 'Respondent Home' where they were asked for their unique access code to launch the eQ.

Figure 4.2: Recorded unique visitors to the 'Start Census' page by day, from 22 February to 22 April 2021

England, Wales and Northern Ireland users accepting non-critical cookies

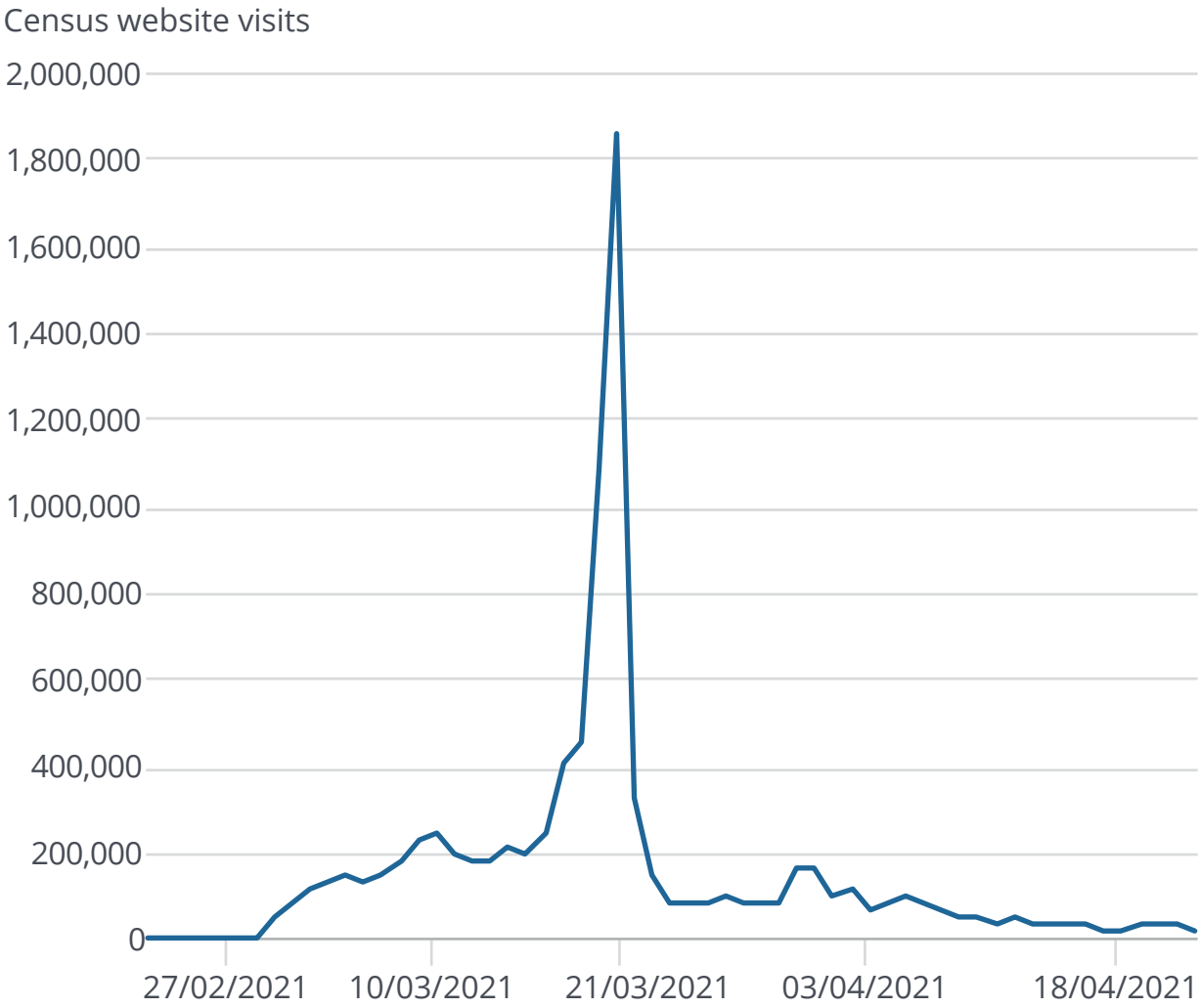


Figure 4.2 shows the unique visitors to the 'start the census' page, across the busiest period for the census, showing a clear spike on Census Day with 1.8 million unique visitors recorded. The pattern reflects the pattern of online responses shown in Figure 4.4. During the peak period on Census Day, between 10:30am and 11:30am, there were 427,800 census submissions. The high volume of interactions made the eQ one of the most used national digital services so far developed.

The average completion time for the household eQ was 23 minutes 0 seconds (measured as sessions reaching the completion page, excluding outlier sessions under a minute or over an hour in duration). This aligned with our expectation, reflected in the guidance in the census letter, that the census would take around 10 minutes per person to complete. As in 2011, there was an average of 2.4 residents per household in 2021. The most common duration of sessions that reached the completion page (the mode) was 16 to 17 minutes, indicating large proportions of respondents being able to complete the eQ quickly.

The eQ remained live to support extended field operations, closing on 24 May. During the whole census period, the eQ product served 5.8 billion HTTP requests. We had a total of 1,097 HTTP errors, equating to a 0.00001862% error rate. On Census Day, there were no HTTP errors and the eQ experienced no service outage either before, during or after Census Day.

4.4.4 Online help

The online help part of the website aimed to answer any question a respondent might have had that could have affected their ability or willingness to complete the census questionnaire. Launched alongside the eQ on 22 February, it served as the one source of definitive guidance for a wide range of internal and external audiences, including:

- the public, catering for a range of needs and abilities
- our Contact Centre advisers, field staff, assisted digital advisers and internal ONS staff (and underpinning our text message (SMS) chat bot guidance)
- strategic partners, such as devolved governments
- local authorities and government departments

As well as providing guidance for the census itself, the pages evolved to support the CCS and non-compliance phases after the main data-collection period. Information about the Census Quality Survey was also added to the 'About the census' section of the website.

The online help pages had 2.1 million recorded pageviews across 1.1 million visits. The pages with the highest recorded views were:

- Help with the census, with 375,100 recorded views
- Get an access code or paper census, 293,200
- Completing your census online, 211,500
- Online questions help, 203,400
- Languages, 94,100

Many pages had parallel versions for paper and online completion to accommodate different needs. The "Completing your census on paper" page received at least 32,000 views, broadly tallying with the ratio of paper and online responses when compared with the equivalent page for online completion. "Paper questions help" received at least 43,100 pageviews.

Guidance for answering the census questions was included on the website, again separated into those for online completion and for paper to accommodate differences in design, such as the presence of the search-as-you-type functionality online. We aimed to keep the question guidance static during the campaign, but the sex question guidance was revised on 9 March 2021 following a successful legal challenge against the ONS. Compared to the general help pages, the numbers visiting the question guidance pages was relatively small, with fewer than 5,000 page views recorded for most guidance pages for completing online,

and under 1,500 for completion on paper. The most visited online guidance pages mainly related to who should be recorded in the census, such as "Who lives here?", "Are there any visitors staying overnight on 21 March 2021 at this address?" and household relationships. Similar numbers visited the general pages on who to include. Guidance for people living in different types of accommodation was also popular, such as rented accommodation, homes of multiple occupancy and, particularly, our guidance for students.

4.4.5 Language and accessibility support

In addition to the online help pages being available in Welsh, we provided wider language support through the Census 2021 website and the public contact centre (see section 4.11). The website hosted information about the census in 49 languages including downloadable 'Translation Guidance Booklets', containing translated specimen PQs, translated by K International Ltd. The most visited language support pages were Polish, Romanian, Spanish, Arabic and Mandarin.

Information about the census was also available via the website and Contact Centre in easy read, braille and large print formats, and respondents could request a large-print paper questionnaire. The Census 2021 website also hosted videos with British Sign Language (BSL) translations providing information about the census and the questions and response options.

4.5 Reminders, replacements and responses

4.5.1 Providing new and replacement access codes and paper questionnaires

People could obtain new or replacement online access codes or PQs via the Census 2021 website or the public contact centre, as well as from field staff. As well as household codes or PQs, this enabled people to get an individual code or PQ to complete the census separately from their household.

Access codes requested through the website could be received by text message (SMS) or in a letter. Requests were made using an address look-up on the website, which then generated a new code in our Response Management (RM) system (see section 4.5.3]. PQs could be ordered through the same route. Contact centre advisers could also order codes or PQs for people. During the busiest period for the contact centre, we set up an additional phone number for PQ requests, which reduced the pressure on the main lines.

Table 4.2 shows the number of requests we received during the live census operation, coming to a total of 5.1 million, of which almost half were for online access codes and over a third for the standard household PQ. Requests for access codes peaked over Census weekend, with almost 370,000 requested on 20 March and over 520,000 requested on 21 March. The peak for PQs was from 8 to 12 March, when over 100,000 were requested each day (see Figure 3 in Designing a digital-first census[2]).

Table 4.2: Requests for new or replacement access codes and paper questionnaires (PQs)

Request Type	England	Wales	England and Wales
Household paper questionnaire	1,799,150	74,100	1,873,250
Household continuation questionnaire (for Households with more than 5 usual residents)	17,000	1,100	18,100
Individual paper questionnaire (for those living in CEs or wishing to respond separately to their household)	20,300	1,250	21,550
Large print Household paper questionnaire	36,500	1,550	38,050
Large print Individual paper questionnaire	1,300	50	1,350
Household Unique Access Code (UAC) sent by letter	283,800	9,850	293,700
Household UAC sent by SMS	2,398,400	105,150	2,503,550
Individual UAC sent by letter	60,900	1,600	62,550
Individual UAC sent by SMS	305,900	10,900	316,850
Total	**4,923,350**	**205,650**	**5,128,950**

Notes:

- Totals may not sum due to rounding

In Wales, people requesting an access code by SMS or a new PQ could specify whether it was in Welsh or English. Like the ICLs, access code letters were bilingual. Just over 2,000 household PQs were requested in Welsh, and 200 PQs of other types. More information can be found on our publication on delivering Census 2021 in Wales.[3]

Across England and Wales, 1.6% of households in paper-first areas requested new PQs and 6.6% requested new online access codes. In online-first areas, 7.5% of households requested PQs and 10% requested new access codes.

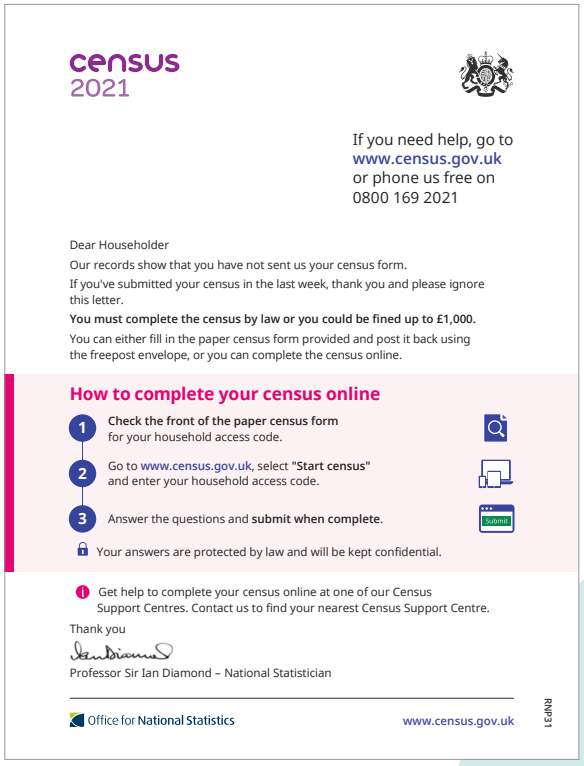
4.5.2 Reminder letters and questionnaires

Reminder letters were sent to households that had not completed the census after Census Day. This was one of the most complex parts of the print and post operation, owing to extremely tight timetables and unknown volumes, as return rates could not be predicted precisely. Non-responding households also received visits from census officers in the field force, covered in section 4.8: Household operation.

In line with the wave of contact schedule, the first reminder letters (for digital-first areas) were sent from 23 March, two days after Census Day, arriving from 25 March. In total, 11.3 million reminder letters were sent: 5.8 million in the first batch, 4.5 million in the second batch from 29 March, nearly 890,000 in mid-April, and another 240,000 later in April and May. These figures were lower than anticipated, due to the high return rates.

The despatch of reminder letters was paused for households with PQs following an issue with receipting of returned questionnaires (see section 4.5.4), and to avoid delivery at households on the day of the funeral of HRH the Duke of Edinburgh on 17 April.

Each round of reminder letters included stronger messaging about the urgency to complete the census and a more prominent warning about the liability to prosecution and fine of up to £1,000 for non-completion. In some areas, PQs were judged to be more effective as reminders later in the operation; we sent 329,000 in England and 7,000 in Wales.



census 2021

If you need help, go to www.census.gov.uk or phone us free on 0800 169 2021

Dear Householder

Our records show that you have not sent us your census form.

If you've submitted your census in the last week, thank you and please ignore this letter.

You must complete the census by law or you could be fined up to £1,000.

You can either fill in the paper census form provided and post it back using the freepost envelope, or you can complete the census online.

How to complete your census online

1. **Check the front of the paper census form** for your household access code.
2. Go to www.census.gov.uk, select **"Start census"** and enter your household access code.
3. Answer the questions and **submit when complete**.

Your answers are protected by law and will be kept confidential.

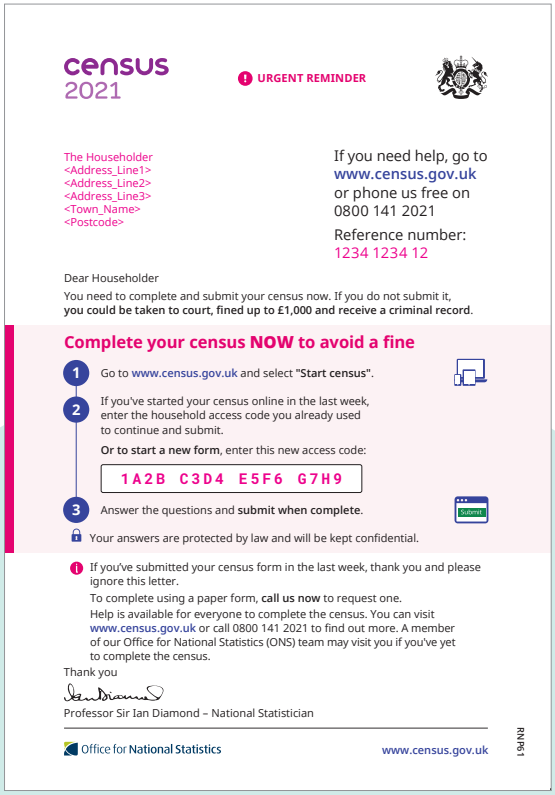
Get help to complete your census online at one of our Census Support Centres. Contact us to find your nearest Census Support Centre.

Thank you

Professor Sir Ian Diamond – National Statistician

Office for National Statistics www.census.gov.uk

RNP31



census 2021

URGENT REMINDER

The Householder
<Address_Line1>
<Address_Line2>
<Address_Line3>
<Town_Name>
<Postcode>

If you need help, go to www.census.gov.uk or phone us free on 0800 141 2021

Reference number: 1234 1234 12

Dear Householder

You need to complete and submit your census now. If you do not submit it, **you could be taken to court, fined up to £1,000 and receive a criminal record.**

Complete your census NOW to avoid a fine

1. Go to www.census.gov.uk and select **"Start census"**.
2. If you've started your census online in the last week, enter the household access code you already used to continue and submit.
   Or to start a new form, enter this new access code:
   1A2B C3D4 E5F6 G7H9
3. Answer the questions and **submit when complete**.

Your answers are protected by law and will be kept confidential.

If you've submitted your census form in the last week, thank you and please ignore this letter.

To complete using a paper form, **call us now** to request one.

Help is available for everyone to complete the census. You can visit www.census.gov.uk or call 0800 141 2021 to find out more. A member of our Office for National Statistics (ONS) team may visit you if you've yet to complete the census.

Thank you

Professor Sir Ian Diamond – National Statistician

Office for National Statistics www.census.gov.uk

RNP61

4.5.3 Tracking responses

Our Response Management (RM) system was central to keeping track of responses and organising follow-up activity, enabling us to understand the status of each access code or PQ, and therefore to direct replacements, reminders and field force visits. Building on the innovation of Questionnaire Tracking in 2011, RM for Census 2021 developed this service significantly and sat at the heart of the data-collection operation. It went live in November 2020 to provide files to print ICLs and operated until July 2021.

In essence, RM was a set of services based around a database of each live access code or PQ, the address to which it was attached, and the actions planned or undertaken in respect of it. It contained the actions in the 'wave of contact' stages that would apply for each case, for example whether the address would receive an ICL or a PQ as initial contact and when it would receive reminder letters and in-person follow up in the event of non-response to the census. This was updated by information from different sources, including requests for new codes and PQs (which RM received from the website, contact centre or field staff, and actioned), notice of a completed online or paper census return, and any information from the contact centre, field staff or others about the case (for example, flagging an invalid or incorrect address, which was passed on for address resolution, or recording a refusal to complete, which was passed on to the non-compliance team (see section 4.12: Non-compliance operation). This information could then affect the future actions for the address, for example pausing follow-up if an access code or PQ had been ordered, and ultimately closing the case when a census return was received.

This meant that the most up-to-date information was being fed into field staff workloads through the fieldwork management tool (FWMT, see section 4.7.3), to the printers for reminder letters, and as management information (MI) into operational management. It also meant that issues about specific cases could be investigated and resolved using up-to-date information, both for individual issues escalated through the contact centre or other routes (such as letters or emails direct to the ONS or via people's MPs) and wider issues such as problems with 'receipting' some returned PQs.

4.5.4 Return and receipt of paper questionnaires

With the change from paper-first to digital-first for Census 2021, the volume of PQs received was dramatically reduced. While in 2011 we received 19.8 million completed questionnaires, in 2021 we received 3,176,000.

Our partners in this part of the process were: Royal Mail, providing the Post Back service, delivering PQs to the data capture site at Hellaby, South Yorkshire, and Leidos Innovations Ltd, responsible for questionnaire management. These services supported both the England and Wales, and the Northern Ireland censuses.

PQs were returned using an envelope provided in the paper-first pack. During the weeks after Census Day, an unexpectedly large number of households reported being followed-up when they had submitted a completed PQ, both by field staff and with reminder letters, particularly in the East of England. Using information from the RM system, the public contact centre and the field force, we were able to identify that a number of completed and returned PQs had not been 'receipted', meaning that their record was not updated as completed and they remained on the system as requiring follow-up. Unnecessary visits and letters to these addresses had a knock-on impact with increased calls to the contact centre, as well as causing reputational damage as people complained online and to their MPs about the follow-up. We were able to pause follow-up activity while the issue was resolved, with minimal impact on the operation as a whole.

4.6 Operational management and decision-making

4.6.1 Operational decision-making

As noted in section 3.2.4: Governance, managing the data-collection period required a daily routine of meetings bringing together the relevant officials to share information, make decisions and disseminate information to teams across census. The pattern and role of these meetings was rehearsed and refined in the 2019 Rehearsal, and evolved again during the data-collection operation in 2021.

The Optimising Response Group (ORG) met for an hour each morning and brought together field operation and statistical design teams to collaborate, balancing statistical quality considerations with the challenges of delivering a major field operation. This came to be the most important governance meeting of the day, its role expanding to become the decision forum for the entire census operation. It was informed by real-time MI on completions and our response-chasing algorithm, which compared expected and live return rates at Lower layer Super Output Area (LSOA) level and recommended appropriate interventions to return response levels to those required to meet the quality targets (such as reminders or additional field staff resource). This meant that ORG was able to make decisions using up-to-date data down to very local levels. It was able to make decisions around the wave of contact and follow-up activity, including whether to despatch or pause scheduled reminder letters, and the deployment of the field force.

Other daily meetings included: the Senior Management Briefing, providing operational updates to the senior leadership team; the Census Media Briefing, in which senior leaders reviewed media coverage; and a Census Directors Briefing at the end of the day for senior leaders to give an operational update to the Deputy National Statistician and the National Statistician.

4.6.2 Incident management

Operational management of Census 2021 benefitted from well-run incident management. As set out in section 4.2.2: Preparing for uncertainty, preparations for Census 2021 included war-gaming and scenario planning to ensure that we knew how we would respond to different types of incidents.

Incidents were rated on a hierarchy from 1 (Critical) to 4 (Minor) and any that were considered less than a 'minor' incident were treated as 'issues'. Priority 4 incidents and issues were dealt with by individual teams and monitored by the incident management team for emerging trends or risk of escalation. Priority 1, 2 or 3 were managed by the Census Central Operations team, who could bring in representatives of relevant teams to meet and resolve the incidents.

The range of incidents and issues varied in priority, subject matter, duration and impact. They included a technical failure in the Lone Worker Solution (see section 4.7.4: Staff health and safety), which resulted in the field force being withdrawn, and responding to the death of HRH the Duke of Edinburgh, following a prepared contingency plan and which also included the withdrawal of the field force. There were 5,502 incidents and issues between March 2020 and November 2021, with 4,318 of those between 23 February and 9 July 2021. There were 4,743 reported issues and no priority one (Critical) incidents. Of the incidents recorded, three were priority 2 (High), 20 priority 3 (Medium), and 736 priority 4 (Minor). These incidents covered the full range of the census, not just live operational activity, so included low field recruitment rates (a priority 2) as well as technology and health and safety incidents. The timely and appropriate response to incidents during the operation was an important part of the operational management of the data-collection operation.

4.7 Census 2021 field force operation

The field operation and census field officers are one of the most prominent parts of the data-collection operation and probably the element most closely associated with the census in the public's perception. For Census 2021, we employed over 25,500 people in a variety of roles in our field operation, with the aim of enabling and encouraging the public to take part in the census and the CCS.

While this role of the field force has changed significantly in recent decades with the introduction of post-back for census questionnaires and online completion, the part the field force played in following-up households that had not yet completed the census was fundamental to meeting our response rate and variability aims. As set out in the 2018 white paper, the expectation was for 30% of households to need follow-up contact from census officers or

reminder letters. With a high initial return rate, significantly fewer households needed to be visited or contacted, but this was still a substantial effort and, in combination with communications and engagement, it was important for us to reach those who had not responded and to overcome any barriers to completion. As in previous censuses, the enumeration of communal establishments was a particular challenge.

Improvements to the field operation for Census 2021 included the first digital field work management solution, the introduction of field-based engagement roles ahead of the census collection operation, and support for field staff through a self-help facility.

4.7.1 Field force recruitment and training

As in 2011 we outsourced elements of the recruitment and support of the field force. Adecco became our partner from 2018, covering both the 2019 Rehearsal and Census 2021. They were responsible for: Recruitment, Training, Human Resources, Health and Safety, and the payroll, expenses and pension service.

The advertising campaign for the field force was predominantly online, even more so due to the pandemic, as any outside advertising would have little reach or impact. For the majority of the roles the campaign yielded far more applications than anticipated, with some managerial roles achieving a 50:1 application ratio. For some of the more numerous roles, however, the number of applicants fell below the expected 5:1 ratio, including for the second and third tranches of census officers and for CCS interviewers. The candidate experience could have been improved with better communication with candidates and a higher level of resource allocated to the helpdesk. There were longer than forecast wait times and high call abandonment rates, resulting in a negative reaction on social media, picked up by the traditional media and by parliamentarians, and in correspondence sent to ONS, as well as higher than expected numbers of candidates dropping out.

There was a smaller shortfall in recruitment for the CCS (see section 4.10). As in the Household and CE field force, this was particularly at the interviewer and mobile interviewer level, while the area-level roles were filled. All 210 non-compliance roles were filled.

The final numbers of staff recruited to different elements of the field operation are set out in table 4 .3. Details of the numbers of posts and recruits in the roles with them is covered in the relevant sections of this chapter. The shortfall in recruitment was greater in Wales, where only 58% of posts were filled, and only 40% of posts for Welsh-speaking field staff; more information can be found in our publication on delivering Census 2021 in Wales.[4]

Table 4.3: Expected and actual numbers of staff recruited to the Census 2021 field force, England and Wales

Operation	Expected Numbers	Actual Numbers	Percentage of expected roles filled
Household	29,459	19,779	67%
Communal Establishment (including Special Population Groups)	1,828	1,426	78%
Engagement	325	317	98%
Census Coverage Survey	4,718	3,838	81%
Non-Compliance	210	210	100%
Total	**36,540**	**25,570**	**70%**

Field force training also moved online between the 2019 Rehearsal and 2021, due to the pandemic. The course had 22 curricula, made up of 32 modules, of which ten were generic (such as security) and 22 were role-specific. At the point of deployment, 96% had completed the training, the remainder mainly being people who had dropped out.

4.7.2 Central management, support and logistics

As in 2011, we had a Regional Management Team (RMT) supporting the field teams throughout the operation, providing an essential interface between the field teams and the wider Census teams.

There were 15 regions covering England and Wales, each represented in our RMT by a Regional Manager and an Assistant, plus a Mobile Regional Manager and Assistant (in 2011 there were 11 regions, including three in London). The Regional Manager oversaw that region's Household and CE Area Managers and its Census engagement staff (Census Engagement Managers and Community Advisers, see section 5.4: Engagement).

The operational regions for Census 2021 were:

- Central
- Cheshire and Liverpool
- East Midlands
- East of England
- London A
- London B
- London C
- London D
- Manchester and Lakes
- North East
- South East
- South West
- Wales
- West Midlands
- Yorkshire and Humber

The RMT supported the field teams throughout the operation (Household, CE, CCS and Non-Compliance teams, in addition to the mobile field team). They worked alongside the wider Census Field Operations teams, including headquarters, logistics, census field people services, Census Field Support, and the subject matter experts for each of the surveys. This model worked well, particularly as some of the RMT were in place before the 2019 Rehearsal so were therefore able to learn from that experience and help with the design of Census 2021

Support was also given to field staff through Census Field Support, which was made up of three separate contact centres. An in-house ONS team, known as CFS, were the first port of contact and could redirect callers if they were not able to resolve queries. The Adecco contact centre covered human resources, pay, training, and health and safety queries. The distribution and support for a mixture of leased and bought technical kit was outsourced to XMA (Field Technical kit supplier), who set up a contact centre to deal with support. The CFS team dealt with everything else and were responsible for delivering messages to the field force as and when required, via the most appropriate channel. CFS also provided general clerical support for all field operation teams.

The logistics function, supplied by Granby Marketing Services Ltd, provided a procurement and delivery service to ensure field staff had the non-technical equipment, documentation and questionnaires required to deliver the operation. At the end of the operation, they provided a collection and disposal service for allequipment and paperwork. As noted in section 4.7.4, the pandemic meant an additional logistical requirement including large volumes of facemasks, wipes and hand gel.

4.7.3 Fieldwork management tool and devices

This was the first census operation to use a digital solution for managing field visits. Overall, this was successful and a more efficient way of managing the field operation compared to the previous non-digital model.

Visits were driven by a fieldwork management tool (FWMT), accessed through mobile devices issued to field officers. Officers identified the days and hours they were to be working across the week each Sunday evening, then the scheduler downloaded the addresses to census officers overnight each night.

The FWMT was designed to deliver daily dynamic workloads to Household field staff (and pre-allocated workloads to CE, CCS and non-compliance officers), to allow officers to capture new addresses and the outcomes of their visits to households, manage workloads, and to deliver 'real-time' MI to enable HQ teams to monitor progress and manage resources. It was made up of three elements, developed by TotalMobile: a case management system (called COMET), the user-interface for COMET (TotalMobile Manager), and the TotalMobile App used by field officers on their issued devices. The system dealt with huge volumes of cases and Household dynamic workloads were created and delivered daily by 8am without issue.

The devices provided to the field functioned well, although feedback from the field staff indicated that the mobile device used by the census officers and CCS interviewers, being only a telephone, had a small screen.

Self-help facility

The self-help facility (SHF) was a web-based application designed to support census field staff in their day-to-day activities. It was available to field staff via an icon pre-installed on both Chromebooks and mobile devices for easy accessibility. The application held all the information any member of field staff required to complete their role. The application was downloaded to all devices with all the content included, when documents were updated, the application automatically replaced content with new versions. This enabled field staff to have access to all information even when out of data or broadband range. The SHF included information on pay, health and safety, Covid policy, training, technology support, doorstep routine and anything else required to complete a role in the field teams. The team supporting the product ensured all documents were uploaded and published as required. The team checked all submitted documents and used the systems to ensure they were published in line with process and expected time frames.

The SHF was able to provide readily accessible, instant support for the field staff, and to reduce the number of phone calls being received by CFS. As a dynamic site, the SHF could be updated regularly, enabling field staff to always have access to the most up to date information available. SHF was developed and supported by Worth Internet Systems (field content and management system supplier), alongside ONS teams.

4.7.4 Staff health and safety

The health and safety function supporting the field force ensured field staff were exposed to the lowest practicable level of risk; minimising injury and illness at work; building and maintaining staff confidence that their health and safety was taken seriously; and minimising personal injury claims arising as a result of an incident or accident at work. The number of incidents and accidents across the field operation was low, with 717 in the main (household and CE) data-collection operation, 63 in CCS and 18 in non-compliance. This works out as one incident for every 1,970 hours worked for the main data-collection operation, 3,075 hours for CCS and 1,398 hours for non-compliance. These rates are lower than for other comparable ONS operations. The low numbers of incidents and accidents demonstrate the importance and effectiveness of our health and safety preparations and training for the field force. This was primarily achieved by the development of bespoke risk assessments for all aspects of field operations, effective, robust, and modern training solutions, as well as ensuring health and safety was at the forefront of any decisions that might impact the field force. In addition, two important features of these preparations were the Lone Worker Solution and the additional health and safety response, and required adaptations, that kept staff safe and enabled a field operation during the pandemic.

Lone Worker Solution

A Lone Worker Solution (LWS) application was installed on the devices issued to the field force to help ensure the safety of our staff. The LWS allowed staff to raise alerts if they felt at risk, an amber alert flagging a potentially risky situation and a red alert an immediate risk. It had a safe check system for lone workers to log in regularly to confirm that they were safe, with an alert activated if they did not. This provided both a proactive and reactive approach in safeguarding field staff. Background services for the LWS included a dedicated alarm response centre, which could contact emergency services to provide a rapid response in the event of a red alert, with information on the staff member's location. Early in the campaign, the number of red alerts was unexpectedly high due to the LWS being misused and initial technical issues. The volume of usage made it difficult for the supplier to identify genuine security concerns being raised by field staff. This led to the field force being withdrawn for one day, with bespoke health and safety arrangements deployed after this for a period in place of the LWS. Following this, the operational guidance was updated and the LWS was well used and functioned as expected. Overall, the

LWS became an integral part of operational MI to confirm who was actively working in the field, with the proportion of staff using it as instructed comparing well with other ONS field roles. The LWS was also used to send alerts to field staff, for example when the field force was withdrawn following the death of the HRH Duke of Edinburgh, as it was a trusted means of immediate communication with those active in the field.

Pandemic-related safety

The pandemic had a major effect on the census field operations. Lockdown restrictions and the need to keep census staff and members of the public safe meant that the role of our field officers changed. This included the removal of the field address checking role from the first tranche of census officers and measures introduced to ensure the safety of our field staff and the public. A redesign of the census officer role meant that household census officers did not collect census data at people's houses and the doorstep routine was designed to be carried out without anyone ever needing to enter a house, with all contacts socially distanced. Health and safety advice and involvement was key to the development of these changes. More information on operational changes due to the pandemic can be found in our publication Coronavirus and the operational impact on Census 2021.[5]

Field staff were given bespoke training to align with government guidance, and issued with personal protective equipment (PPE), including over 280,000 facemasks and nearly 7.5 million wipes, as well as over 30,000 litres of hand gel. The ONS also arranged the provision of lateral flow tests, to support testing in line with government guidance. Just under 600,000 individual test kits were dispatched by our logistics supplier (Granby) to field force teams, distributed by team leaders. Health and safety involvement and advice on all aspects of these requirements ensured government guidance was always followed. ONS staff were also provided with a Census 2021 facemask as part of a toolkit to help them promote the census.

4.8 Household operation

4.8.1 Structure and roles of the Household field force

Roles in the household field force were varied and duties were based on operational objectives. The introduction of the digital fieldwork management tool (FWMT) allowed real-time MI on progress and performance to be shared with HQ and field-based managers, enabling effective line management and decision making (see section 4.7.3).

For the Household campaign, the 15 operational regions (see section 4.7.2) were split into 183 areas, with area managers and area support officers overseeing nearly 2,000 local team leaders who managed the work of the field officers in their district.

Table 4.4: Household field force roles and numbers appointed

Role	Numbers appointed
Area manager	183
Area support	180
Team leaders	1,981
Census officers	17,239
1st tranche	2,106
2nd tranche	6,498
3rd tranche	8,635
Mobile team leaders	40
Mobile officers	156
Total	**19,779**

Household field force roles

- Census area managers were responsible for making sure the day-to-day household field operation ran smoothly. This included maximising local response rates, leading a team of team leaders, and working closely with the census engagement manager to help keep them up to date with information on the local area.
- The census area support role was responsible for supporting the area manager with administrative tasks, such as arranging meetings and collating information. They were also a point of contact for other field or engagement staff should the area manager be unavailable.
- Census team leaders managed up to 12 census officers, ensuring they carried out their field work effectively and in line with correct procedures.
- Census officers were responsible for contacting households who had not completed their questionnaire after Census Day, providing encouragement and support to the householder to do so.
- Mobile team leaders managed teams of 12 mobile census officers.
- Mobile census officers carried out field follow-up work like census officers, and were deployed in different areas where needed most, determined each week.

As noted in section 4.7.1: Field force recruitment and training there was a shortfall in recruitment to the household field force, with just over two thirds of posts filled. Levels of recruitment varied considerably, with almost all area-level posts filled, along with nearly 90% of team leader and mobile team leader posts. While our overall headcount of over 17,200 census officers was lower than planned, the

high return rate meant that teams could be deployed where they were needed. The shortfall in team leaders led to region managers and other area team leaders being required to step in and cover work to ensure that census officers could complete their roles. These leadership roles had to be covered to enable work to be delivered to census officers, so in each case somebody else within the operation was named within the FWMT to enable work distribution.

4.8.2 Work of the field force

The work of the field force began before Census Day. It had been planned for a proportion of our census officers (tranche 1) to be deployed ahead of census day to support with field-based engagement activities. Due to the pandemic, officers were instead given other supporting tasks such as confirming vacant address and holiday homes, ahead of Census Day.

Visits to households began after Census Day. With 76% of households responding by 23 March, well above the pre-campaign 70% target for households responding without any follow-up activity, the field force was able to target its resources on a smaller number of properties.

Visit schedules for census officers were updated in real-time and allocated through the FWMT, based on information from the Response Management (RM) system (see section 4.5.3: Tracking responses) including on outcomes of previous visits and MI on census completions. Officers were able to offer advice on the doorstep and direct householders to support channels, to enable householders to complete their census. If no response could be gathered from a household, census officers were able to return a 'dummy form' for the address, which described the non-responding address to the best of their knowledge.

Areas with low return rates were additionally targeted by our mobile field force, deployed based on real-time response data. The flexibility of this mobile force was beneficial, as the model for the other teams was based on them working in specific locations, which were not adaptable to response levels or staffing levels. We were also able to redeploy some field staff from areas needing less follow-up as a mobile resource deployable to lower-response areas, using work-arounds. A more flexible system or a larger field force would have made this redeployment during the operation easier.

Our census officers conducted over 16,685,000 visits to over 5 million households. Of these visits, 4.5 million resulted in contact with the household. There were 11 million 'no contact' visits, including over 8 million occasions when the householder was out, 1.5 million visits to inaccessible properties and 837,000 to vacant properties. Another 823,000 were non-valid properties, such as those that were under construction, non-residential or had been demolished, which could be removed from our address frame; other properties listed as Households had been converted into Communal Establishments. Table 4.5 shows that 20.7% of households were visited by the field force, including 'no contact' visits. Just over half of the households visited received more than one visit, these were 11.2% of all households (11.2% in England and 10.9% in Wales).

Table 4.5: Number and proportion of households receiving field force visits in England and Wales, by country and by English region.

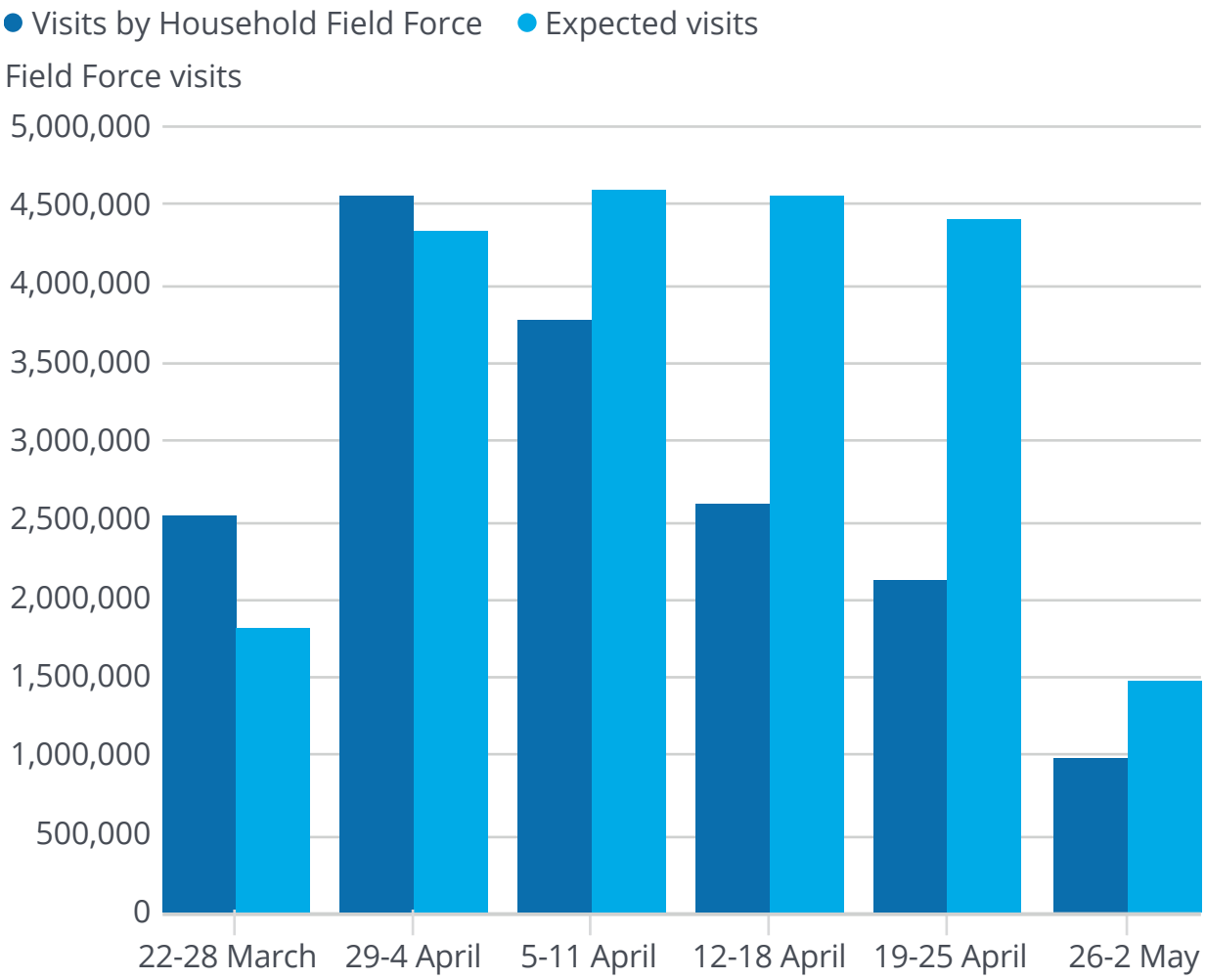
Country	Region	Number of households receiving one or more visits	Households receiving one or more visits as percentage of total households
England & Wales		5,260,300	20.7%
England		4,963,800	20.7%
	East Midlands	363,100	17.4%
	East of England	485,700	18.1%
	London	1,103,100	31.6%
	North East	235,500	19.6%
	North West	691,900	21.4%
	South East	684,500	17.6%
	South West	455,200	17.9%
	West Midlands	476,900	19.3%
	Yorkshire and The Humber	467,900	19.6%
Wales		296,500	21.2%

Note:

- The denominator is number of households used to calculate return rate (see table 4.6)

The number of visits made was lower than our planning expectations, which envisaged over 21 million visits. The pattern of visits also differed, with more visits than expected in the first two weeks after Census Day, but fewer than expected thereafter and particularly after the operation paused temporarily following HRH the Duke of Edinburgh's death on 9 April, by which point the household return rate was over 92%. The operation also paused for the funeral the following week (17 April). Additionally, the field operation was paused in late March in some areas, particularly in the East of England, due to a PQ receipting issue causing visits to be scheduled to some households that had returned a completed questionnaire (see return section). Figure 4.3 shows the weekly visits compared with expected visits in the six weeks after Census Day; after 2 May, daily household visits were fewer than one thousand for the remainder of the operation.

Figure 4.3: Weekly visits and expected visits by the Census 2021 household field force, England and Wales, 22 March to 2 May 2021



4.8.3 Household return and response rates

The response from households exceeded our expectations, with high household return rates and both person response rate and local authority variability far surpassing our targets. This section explores elements of that response using both our operational return rates and the final response rates. Both the household return rate and the person response rate for Census 2021 were 97%.

Return rates were our operational measure during the collection phase. They were calculated by dividing the count of unprocessed household census form responses received by the count we expected to receive, based on our collection address frame. We use these to ensure we give sufficient attention to each area to achieve our aim of consistent coverage and quality across areas. Return rates are calculated for households and CEs rather than individuals. Response rates are our output measure. They are calculated, using information from the CCS, by dividing the count of sufficiently complete responses by the number we estimated should have responded. We use these to produce a measure of observed characteristics we collected, which we can compare with our estimate of the true population. Response rates can be calculated for both persons and households.

Return rates and mode of response

By the end of Census Day, we had received 18.96 million responses online or on paper, over 70.2% of households. This was well above the target of 60% responding by that stage and of 70% responding without follow-up. Census Day saw the largest daily proportion of online responses, with 19.1% of all online responses submitted that day, while 23 March saw the daily peak of receipt of PQ at 19.6%. By the end of 23 March, the household return rate was 76.0% and by 1 April it was 87.6%.

Figure 4.4: Proportion of household census questionnaires received each day, by mode of completion, England and Wales, March and April 2021

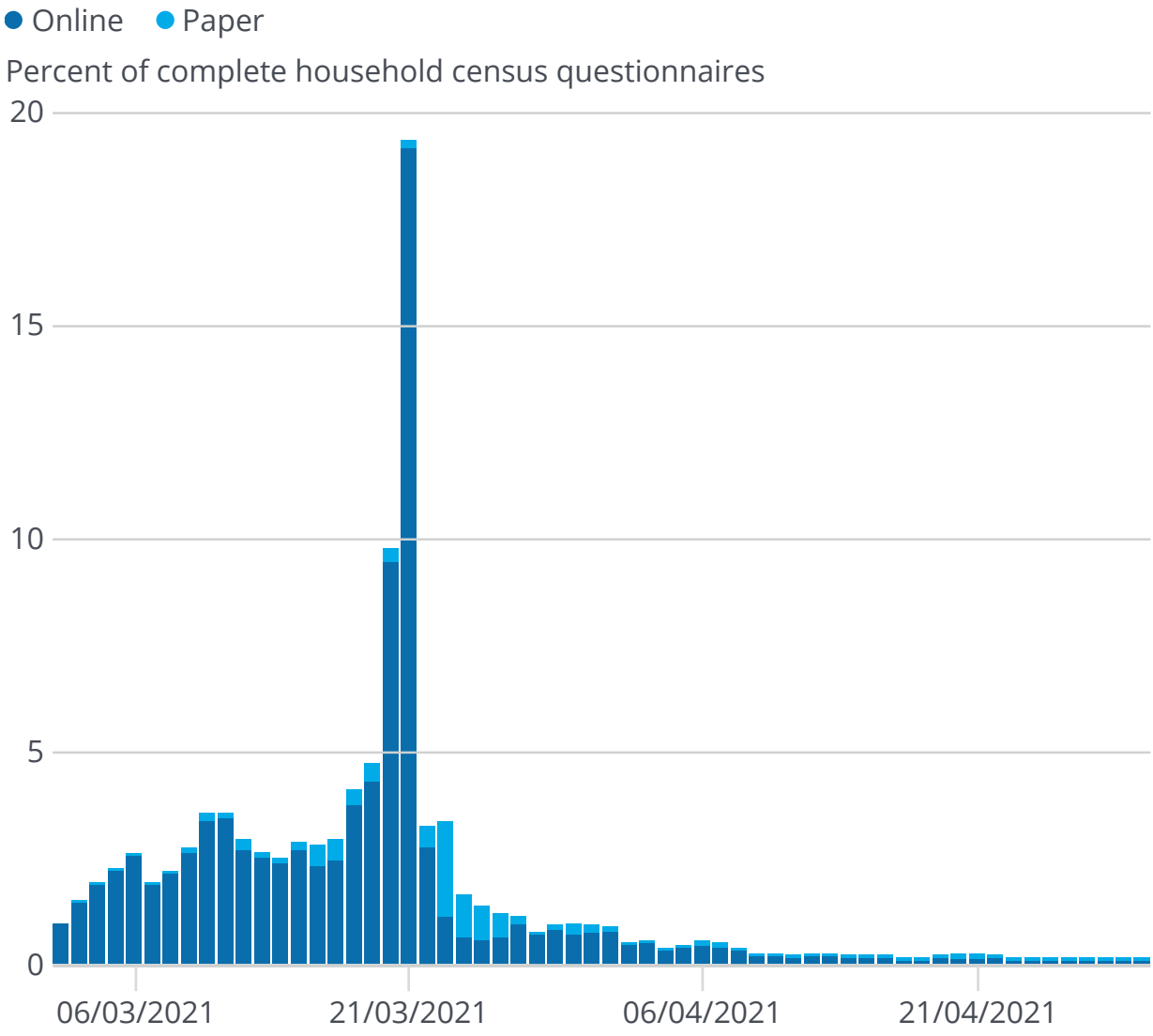


Table 4.6 shows the household return rate and online response share for England, Wales, and the regions of England. Readers should note that the number of households differs from that for the initial contact (in table 4.1). As section 4.5.3 sets out, RM was updated during the operation with information about addresses, for example that a listed address was invalid or incorrect.

Table 4.6: Household return rate and online response share, for England and Wales, by country and by English region.

Country	Region	Number of households	Household Returns	Household Return Rate	Online share of Household returns
England and Wales		25,403,100	24,753,900	97.4%	88.9%
England		24,001,600	23,400,300	97.5%	90.1%
	East Midlands	2,092,300	2,047,100	97.8%	84.7%
	East of England	2,688,300	2,640,400	98.2%	91.3%
	London	3,487,900	3,364,100	96.5%	95.5%
	North East	1,199,500	1,166,500	97.2%	91.0%
	North West	3,235,100	3,127,900	96.7%	92.1%
	South East	3,899,400	3,837,800	98.4%	93.2%
	South West	2,536,500	2,492,200	98.3%	86.3%
	West Midlands	2,473,200	2,406,200	97.3%	83.6%
	Yorkshire and The Humber	2,389,400	2,318,100	97.0%	88.0%
Wales		1,401,500	1,353,600	96.6%	67.6%

The level of online response in part reflects the proportion of digital-first areas in each region or nation, particularly the lower proportion in Wales compared with England. Our 2021 publication Designing a digital-first census[6] shows that the online completion share in digital-first areas was similar in Wales (93.2%) and in England (94.2%) and the online share of responses in paper-first slightly lower in Wales (42.1% compared with 47.9% in England).

Our analysis looking at mode of completion and characteristics of the household reference person (HRP, a single member of each household that submitted a census response), found that a higher proportion of younger respondents

completed their census questionnaire online compared with older respondents. More than 98% of HRPs in each five-year age group from 16 to 49 completing the census for digital-first households did so online, as did 60% in those age groups in paper-first households. Online completion rates were lower in older age groups, with the lowest rates in paper-first areas being those aged 80-84 (22.5% completing online) and in digital-first areas those aged 85-89 (75.8%). HRPs in older age groups than these were more likely to respond online. This is likely to be because of higher rates of proxy completion, or possibly because these HRPs received assistance when completing their census questionnaire. Male respondents were slightly more likely to complete their census questionnaire online across almost all age categories. Proportions of online completions also varied depending on other demographic characteristics such as ethnic group, disability status, and highest qualification of respondents. More information can be found in our 2023 publication Characteristics of Census 2021 respondents by mode of completion.[7]

In total, 23,500 households completed the census in Welsh equating to 1.7% of household responses in Wales. There was a broadly even split between modes of completion with 12,350 doing so online and 11,150 on paper. As paper responses made up only a third of census responses in Wales, however, this means that the proportion of Welsh responses was higher on paper: 2.6% compared with 1.4% online. (For online responses, where users in Wales could toggle languages, these figures reflect households that used the Welsh language pages to launch or submit their census response, or both). More information can be found in the publication Census 2021 in Wales.[8]

Response rates

Our quality targets, published in the December 2018 white paper and set out in section 1.5 Strategic aims and objectives for 2021 Census, were framed in terms of the response rate. These included response rate targets of 94% for England and Wales as a whole and no less than 80% for any LA, and challenging targets to minimise variability of response rates across local authorities. With a final person response rate of 97% and at least 88% in all LAs, these targets were exceeded. Chapter 6: Processing and estimation sets out how we used the data from the households and CEs that responded to the CCS to produce estimates for the whole population. Chapter 7: Quality of Census 2021 data sets out the measures of the quality of the census data. Figure 7.1 shows the person response rates at local authority level for 2011 and 2021, demonstrating the improvement in response rates and local-area variability in Census 2021.

4.9 Communal establishments and special population groups

A separate field operation was responsible for the enumeration of communal establishments and special population groups.

Communal establishments (CEs) are places providing managed residential accommodation; the definition is included in section 2.4: Population bases. Unlike Households where one ICL or PQ was delivered, there was a separate questionnaire to be completed by the CE manager and individual ICLs or PQs for residents. The CEs for the Census 2021 operation were:

- approved premises (bail hostel)
- boarding school
- care home
- education other (college accommodation)
- hall of residence
- high secure mental health facilities
- hospice
- hospital
- hostel
- hotel
- immigration removal centre
- low / medium secure mental health facilities
- military single living accommodation (SLA)
- United States Air Force SLA
- prisons
- religious establishment
- residential children's homes
- rough sleeper accommodation
- staff accommodation
- youth hostels

Special population groups (SPGs) were people in residential household accommodation that required additional or specialised intervention or training. The residents of these accommodation types are often more difficult to access and enumerate. The SPGs for the Census 2021 operation were:

- caravan parks (sites without unit addresses)
- embassies
- marinas (sites without unit addresses)
- military service family accommodation (SFA)
- Royal Households
- people with no fixed address (for example boaters, continuous cruisers, fairs and circuses, and rough sleepers)
- travelling persons
- United States Air Force SFA

4.9.1 CE and SPG field force structure

The CE and SPG field force had a similar structure to the household field operation, with area managers and support officers, team leaders, and CE officers. As with the household field force, CE area managers reported to the relevant Regional Manager. The roles were similar to those of Household field officers, with additional CE-specific elements, such as engaging with CEs and SPGs to deliver census products, and team leaders engaging with secure establishments. Also as with the household field force, there were fewer staff in place than we had planned for. While the area-level posts were filled (25 area managers and 25 support officers), we had planned for 190 team leaders and 1,588 CE officers, but at the start of operations had only 90% (171) of CE team leaders & 62% (993) of CE officers in post. Continued recruitment drives resulted in 95% (181) of CE team leader & 75% of CE officer posts being filled (1,195, with a maximum of 1,140 in post during the operation). Although this did alleviate numbers across the country, some areas had very low recruitment uptake. For example, recruitment was very low in Oxford, where the student population was expected to make up the bulk of the field force but were absent due to the pandemic. Despite challenges with under-recruitment, the field staff workloads were completed.

4.9.2 Census CE and SPG operation

Unlike households, active engagement with CEs and SPGs started before Census Day. Initial engagement was carried though liaising with relevant stakeholde groups to establish contacts, and work through the ONS partnerships teams to reach out to local authorities and SPG groups to discuss the strategy for their respective enumeration. This was initially through ONS user research and then targeted engagement for all CE and SPG groups, from 2017 through to and during the census 2021 operation. The operation itself had four phases: Engagement, Delivery, Census Weekend, and Follow-up.

Engagement

Initial contact was made in this phase for relationship building and information gathering well before the delivery of census materials. CE team leaders and officers were allocated addresses to enumerate and made contact for introductions, to build relationships or obtain points of contact that would be beneficial during any follow-up required. It also helped CE staff to ensure that addresses were correctly categorised and to establish the correct numbers of ICLs or PQs needed.

Specific engagement was carried out with universities in June 2020 to determine the impact of the pandemic on the levels of student residence within halls, to obtain a point of contact for field staff, and to understand vacation dates. Other pre-engagement activities were carried out with other CE and SPG groups leading up to the operation, for example with Ministry of Justice, Ministry of Defence, Royal Households and local authorities to ensure enumeration strategies were communicated and agreed.

Letters were also sent to certain CE types, including care homes, boarding schools and colleges, hospitals, hostels, and religious establishments. The letters advised that the census was coming, what to expect, what the person in charge would be required to do and how to support the residents.

Delivery

This delivery phase lasted from 23 February until Census Day, with a focus on despatch or hand-delivery of ICLs and PQs. The different CE and SPG types were categorised into four routes. These were:

- ICLs sent by post to SPG addresses with high confidence in address register addresses, including military service family accommodation, embassies and consulates
- hand delivery of ICLs to digital-first addresses, such as halls of residence, hotels, boarding schools, and religious establishments
- hand delivery of PQs to paper-first addresses, such as care homes, immigration removal centres, detention facilities, and high security psychiatric units
- hand delivery of PQs to population groups with no fixed address

Census weekend

A specialised operation over Census Weekend (20-22 March) focussed on population groups with no fixed address, such as continuous cruisers living on boats, those living on the road in a moveable residence, and rough sleepers, to ensure these population groups had the opportunity and means to complete the census. With the census being address-based, enabling people with no fixed address to take part required different approaches to other population groups. For example, prior engagement was needed to identify residence locations and organise delivery of census materials, and bespoke arrangements were needed to enable households and individuals whose residence was moveable to receive and use an online access code. The particular challenges of enumerating rough sleepers are summarised in section 4.9.4. This special operation was restricted to three days to prevent the over-counting of people in population groups with no fixed address, as they were more likely to be identified in several places over the six-week span of the census operation. The messaging for these groups was complex, with different messages being needed from the contact centre to advise some groups on how to take part, and the work to enable and support these groups to access the census was made more challenging by the pandemic.

Follow-up

Once Census Day had passed, the field activities turned to following up non-responding addresses to encourage and support returns. Field staff were given different follow-up targets based on types of CE or SPG. The operation was adaptable to the different return rates expected from different establishment types and SPGs. Tracking SPG completions was particularly challenging as they tended to complete household questionnaires, meaning they could not easily be distinguished from other households in the MI.

In-person visits by CE officers were intended to be the main route for follow-up activity, but this was restricted heavily due to the pandemic lockdown and differing restrictions across the country. Field staff instead relied more on making telephone calls, although face-to-face follow up was undertaken where it was possible, and the resulting contact rates were positive. Reliance on telephone contact, being quicker than a physical visit, meant higher number of contact attempts, but with less personal-feeling contact. Designation of census field staff as critical workers enabled them to make more face-to-face visits, with a positive impact on engagement.

The pandemic had a negative impact on the enumeration of many CEs, with some sites (such as care homes) restricting access and some population groups not being present in their usual accommodation, including students, military, and some groups with no fixed address. The CE follow-up period was extended by a further five weeks with a slightly smaller CE field force of 19 Area Managers and Assistants, 123 team leaders and 674 officers. The extension period

increased the overall CE return rate by 4.2%. There was a particular focus on halls of residence, where the return rate increased by 2.9%, care homes where it went up by 5.5% and hotels where the increase was 6%. There were also increases in other CE and SPG types.

4.9.3 Visits and return rates

CE officers made nearly 600,000 visits, successfully making contact on just over 120,000 occasions. Up to 1 June 2021, the individual return rate for CEs was 72.8% and the return rate for CE Manager forms was 85.6%. Chapter 6: Processing and estimation shows a final response rate of 79% for CEs and includes a break-down of the response rates by types of CE.

The individual return rate for SPGs up to 1 June was slightly higher, at 76.4%. Within this there was considerable variation, largely in line with variations expected from previous experience, for example low return rates for some groups with no fixed address and high rates for Royal Households.

4.9.4 Particular challenges of CEs and SPGs

Address frame

The CE-SPG address frame was created from administrative sources as well as AddressBase Premium, refined to support enumeration of the addresses section 2.7: Address frame. However, the address dataset included on the Census 2021 website included not only all the addresses on the address frame but also related entries from AddressBase Premium that were not included in the frame. This meant that, when requesting a new online access code, people accessed a list of potentially relevant addresses (for example, a general address for a CE and specific addresses within it) and could therefore acquire a code for an address other than the one to which their original ICL had been sent. This created complications and duplication in some cases which needed to be followed up at that establishment.

This was particularly problematic for student halls of residence, where the absence of students due to the pandemic meant that they did not receive their ICLs and had to request a code. The potential benefits of unit-level addressing, which had been developed to aid response tracking (with each room allocated an ICL), were severely affected by the pandemic as students were absent from these addresses and field staff were unable to conduct room-level follow-up.

Student halls of residence

Enumerating student halls of residence (HoR) has historically been a difficult part of census data-collection. In Census 2021, existing challenges were exacerbated by the pandemic and the absence of many students who would otherwise have been resident in an HoR.

Discrepancies were identified between common understanding of the addresses for HoRs by hall managers and the lists provided from the address frame. As well as HoRs missing from the list or listed but no longer active, more complex issues included: changes in ownership, with the address provided no longer being used by the establishment; addresses matched to incorrect unique property reference numbers (UPRNs); and addresses covering part of an HoR or several HoRs.

Establishing contact with the right people at HoRs was challenging for a number of reasons, including the pandemic meaning that they were often closed or their management focussed on other concerns, and changes of contact (with more privately-owned HoR that were more like flats or student villages than a traditional CEs). Direct communication with bursars and HoR managers in the initial early university enumeration phase was, however, beneficial in in identifying issues with addresses.

The absence of many students due to the pandemic affected CE work, beyond the issues with addresses described above. Some HoR were reluctant to admit field staff in the delivery and follow-up phases due to the low numbers of resident students on-site. The number of international students also affected response rates for HoR, as many had returned to their home countries but may still have come within the definition of usual resident (see section 2.5: Population bases). As well as potentially not finding out about the census, those wanting to take part would not have been able to gain a unique access code unless they had a UK mobile number. The wider bespoke census campaign in relation to students is covered in section 5.2.4: Student Campaign and the steps we took during the processing stages to ensure that we were able to produce accurate estimates of student populations are described in chapter 6: Processing and estimation.

Some of the issues affecting HoRs, including the complexity of sites and the difficulty of establishing correct points of contact, also affected military sites and hospitals.

Rough sleepers

Rough sleepers are a particularly vulnerable and difficult to enumerate sub-group within the homeless population. Other homeless people include those in temporary accommodation or 'sofa-surfers' who should have been counted where they were staying on census night. For the census, rough sleepers had to be linked to an establishment such as a day or night shelter and were asked to complete an individual questionnaire. Engaging with rough sleepers, establishments, charities, LAs, and especially day and night shelters, was essential.

We engaged with LAs and charities Housing Justice and Homeless Link, who provided information that helped shape how best to enumerate those classed as rough sleepers. Census Engagement Managers (CEMs) were trained to work closely with individual LAs and charities to identify individual homeless shelters that would be involved in the enumeration of rough sleepers. Engagement with

rough sleeper venues was not straightforward. Part of the engagement was carried out by CEMs and part of it by CE field teams, which created additional complexity. The presence of some rough sleepers in hotel accommodation due to the pandemic also caused confusion over whether they should be recorded as rough sleepers or not.

Health and safety was a concern prior to census weekend, not only because of the situations in which field staff may find themselves but also because of the pandemic. Other than brief delivery visits, CE field staff had not been out engaging with the public, but the health and safety protocols were understood and well-implemented. Field staff reported feeling safe and enjoyed the opportunity to be out in their local area supporting their communities.

Complexity of the CE and SPG operation

With 28 CE and SPG categories, a complicated delivery model and a need to enumerate at unit level for halls of residence, this part of the census field operation was very complex, while much of the focus in the design and development process was focussed on the larger household population. It could have been improved by having less segmentation, potentially having some SPGs as part of the household operation, and a simpler design for completion and delivery across different CE and SPG types. A more agile approach with greater flexibility to respond to field issues would also have assisted the operation. Only part of the CE operation was rehearsed in 2019, meaning that the other elements of the operation were delivered in 2021 without the benefits and lessons from that large-scale live test.

4.10 Census Coverage Survey operation

Beginning six weeks after Census Day and after almost all census responses had been received, the Census Coverage Survey (CCS) was an independent survey of the population in a large sample that covered all local authorities in England and Wales. It was used to measure coverage of the census. It consisted of a short doorstep interview by CCS interviewers to gather basic demographic information (such as age, sex, marital status, ethnic group, and economic activity) and about the residents' circumstances on Census Day. The structure of the sample and how the data were used are described in section 6.4: Coverage estimation and adjustment. For Census 2021, the sample for the CCS was 1.45% of postcodes in England and Wales, or 325,600 addresses including households and small CEs.

The CCS field operation was designed to run for 29 days, from 4 May 2021 to 1 June 2021. Initial contacts and listing were undertaken from 4 May, with interviews undertaken from 6 to 28 May, after which self-completion forms were distributed and there was a targeted fieldwork extension until 21 June. The field operation structure was similar to that for the Census data-collection operation, with an area manager and area support covering each of 30 CCS areas. Geographically-based team leaders, and a smaller number

of mobile team leaders, then led the teams of interviewers. All interviewers were required to work more than half a mile from their home, and any who had worked in the census field operation also had to work more than half a mile from any postcode they previously worked in. As in the main census operation, the more senior roles were largely filled but there was a shortfall in recruitment of interviewers, with all area-level and almost all team-level posts filled, compared with around 80% of interviewer posts. The gaps in recruitment and restrictions on interviewers working near to their home address added further difficulty to the operation. Area managers and team leaders were generally of a high calibre and adapted to the shortfall in interviewers.

Table 4.7: Numbers recruited to roles in 2021 Census Coverage Survey

Role Title	Numbers appointed
CCS area manager	30
CCS area support	30
CCS team leader	347
CCS mobile team leader	8
CCS interviewer	3,381
CCS mobile interviewer	42

The CCS's coverage rate was 59%, lower than the target of 90%. The interview completion rate was 61% (interviews completed per contacts established), with 199,100 interviews completed, of which over 3,800 were through the telephone capture service. Although the estimation methods work best when response to both the census and CCS are high, they still work well when only one falls below its target response level. This is especially true when the census response is very high, as it was in 2021. Information on how the data collected in the CCS was used is included in section 6.4.

A range of factors may have contributed to the low coverage and completion rates, which was the result of a high refusal rate rather than being unable to establish contact. These include: the shortfall in recruitment and reduced capacity for mentoring CCS interviewers after recruitment due to the pandemic; possible census fatigue, with the CCS taking place after the successful communications campaign and field operation for the census; and the need to make people aware that the CCS was voluntary. Although the doorstep routine was amended due to the pandemic, there is little evidence that this affected interview completion rates, although similar issues in relation to CEs were faced due to the pandemic as in the main census field operation (such

as difficulty accessing sites). The CCS may also have been hampered by a general lack of awareness of what it was, how it was different to the census, and why it was important. Feedback from interviewers and the Contact Centre suggested that some people in sampled areas thought they were being scammed.

4.11 Support for completion

We aimed to make Census 2021 the most inclusive census ever, including providing comprehensive support for anyone who needed assistance to ensure that everyone was able to take part. Support was available through our freephone contact centre, visiting the online help and guidance on the Census 2021 website, and in person at census support centres across England and Wales, as well as from our field staff. Online help and the field force are covered elsewhere in this chapter, this section covers the other support offered to respondents. Figure 4.1 shows how public support interacted with the other components of the data-collection operation described in this chapter.

4.11.1 Public contact centre

The contact centre provided help and support to complete Census 2021 and the CCS, through telephone advisers and via webchat, text message (SMS) and webmail. This service was provided by Serco PLC and operated from 1 March to 8 July 2021.

People calling the 0800 lines for England and Wales were offered three options by the Interactive Voice Response (IVR): to request a PQ, to hear frequently asked questions (FAQs), or to speak to an adviser. Some problems arose in the first days of the service, with larger-than-expected numbers of calls to the England 0800 number meaning that callers at peak times faced longer waits than we wanted. On 11 March a direct number for requesting PQs was opened and from 15 March the number of advisers was increased by 25%. These steps dramatically reduced waiting times. The IVR was also amended during the operation period, responding to the need for additional information students and for some population groups with no fixed address (such as boaters, see section 4.9.2: Census CE and SPG operation).

In total, almost 4.5 million calls came through to our IVR via the 0800 numbers for England (3.8 million calls), Wales (238,000) and our multi-language line (80,000), and the number for PQ requests (353,000). Of these callers 1.5 million reached an adviser, another 1.5 million requested PQs and 86,000 accessed the FAQs. Of the remainder, the majority used the pre-recorded messages in the IVR, while a minority ended their calls early, for example, while in a queue to speak with an adviser. Callers to the Wales line were asked the language in which they wanted to continue: 189,000 chose English, 26,000 chose Welsh, and the remainder made no choice and ended their call.

Callers to the multi-language line were connected by a contact centre adviser to the appropriate language interpreter once the language needed was determined. At busy times or when an interpreter was not available, an appointment was made to call the respondent back.

A telephone capture service enabled respondents identified as requiring assistance to complete the census over the phone with an adviser. Over 181,000 people made use of this service for the census and over 3,800 for the CCS.

An Expert Resolution Team was established in ONS to work in collaboration with the contact centre to resolve any questions from members of the public that the contact centre advisers or supervisors could not answer, known as escalations. This followed the precedent of an Escalation Team used in 2011. For Census 2021, the team received and resolved more than 11,000 escalations, peaking at over 2,000 in the weeks commencing 29 March and 5 April. The team had access to case records in the Response Management (RM) system, meaning that they could advise on the details of a case, such as the receipt of a completed PQ, in correspondence regarding reminders or follow-up visits. RM could also be updated based on correspondence regarding addresses.

The Expert Resolution Team, with help from the wider public support team, also dealt with over 30,000 items of physical post received by ONS, a greater volume than was anticipated. As there was no return address on the ICL, letters came through various routes including the undelivered-return address on the envelope or directed to the National Statistician. The items sent also included returned ICL envelopes and other correspondence.

4.11.2 ONS Census Customer Services

Census Customer Services is a permanent part of the ONS's public-facing service. Part of the Census Historical Data Support team, it provides expert advice about the most recent and earlier censuses' historical data. While the contact centre was the main point of contact, this team received enquiries from members of the public requiring assistance with participating in Census 2021, including people looking for alternative contact routes for ONS when the contact centre was busy and who found the Customer Services contact details online. During Census 2021, the team dealt with correspondence received by email and letter, including those forwarded from other government departments, and responded to calls to the freephone census phone numbers outside the Contact Centre's operational period. The team dealt with 607 enquiries about Census 2021 from April to December 2020 and 18,711 during January, February and between 9 July and 15 November 2021.

4.11.3 Social media support

Social Media Customer Service provided the public with help and guidance for customer service-type queries on Twitter, Facebook, and Instagram, in both English and Welsh. This was supplied by M&C Saatchi who worked with and supported the ONS Communications Social Media team. A chatbot allowed members of the public to self-serve many of the Frequently Asked Questions developed with ONS for the Social Media Customer Service. The service was launched on 8 February 2021, with chatbot from 23 February 2021, and operated until 7 May 2021.

The service had consistent handles across Twitter, Facebook and Instagram: @Census2021 and @Cyfrifiad2021. There were over 34,000 comments and mentions via Twitter, 49,000 via Facebook and 1,000 via Instagram, in addition to over 15,000 Twitter messages and nearly 40,000 via Facebook. Over 20,000 queries were successfully handled over Census weekend. The number of Daily Active Consumers (unique customers across all channels) was lower than expected at 5,844.

4.11.4 Assisted digital via census support centres

In-person assisted digital support aimed to provide face-to-face help and support for people without the digital skills, equipment or connectivity to complete the census online, or who did not feel confident in doing so. This service was provided at census support centres operated by Good Things Foundation, primarily based in trusted or familiar locations such as libraries and community hubs. During the data-collection operation, 744 centres opened across in 266 local authority areas in England and Wales.

The pandemic had a significant impact on the volume of completions made through census support centres. In the first few weeks, very few centres were able to open because the national lockdown dictated that people should stay at home unless travelling for permitted reasons; most centres were only able to operate a telephone service at this stage. Census support centres were subsequently classified as an essential service, meaning that more could open, but by the time the legislation was in force the operation had already begun and the impact was delayed and patchy. Some centres remained closed as local restrictions precluded them from opening, particularly those located in libraries.

Notwithstanding these challenges, this was a vital service for people who would have ordinarily had difficulty in completing their census, to be helped in a professional, friendly, and sympathetic manner by Good Things Foundation and their staff. There were at least 29,400 contacts made, either on the telephone or face-to-face, where people were assisted with their queries, and at least 13,200 completions online of the eQ, increasing the census response rate.

4.12 Non-compliance operation

The non-compliance operation was designed to maximise census completion across England and Wales by following up people who had previously refused to take part. Persistent refusal cases would be referred to the Crown Prosecution Service (CPS) for prosecution. The maximum penalty for refusal to take part was a fine of £1,000, plus court costs. Letters and visits to addresses that had refused to complete, offering support and assistance attempted to convert refusals into completed questionnaires. If the householder continued to refuse completion, the field teams attempted to complete an Interview Under Caution, that would form part of the evidence for a prosecution.

At the end of the Household operation, refusals received were passed to the Non-Compliance Headquarters team. It was anticipated that the non-compliance operation would have the capacity to manage and process up to 250,000 initial refusal cases. The very high census response rate meant that the number of refusals was much lower than anticipated.

Households for non-compliance follow-up were identified from those refusals and the first warning letter was issued to 68,000 refusing addresses, resulting in 20% of those completing the census. From the remaining cases, a workload was established for the non-compliance field force, which was made up of ten field managers, 100 officers and 100 assistants. These staff were organised into five regions covering England and Wales, with two field managers in each region. This field force was allocated 15,000 cases across England and Wales and completed 97% of them over six and a half weeks. The operation was supported by the Census Field Support services provided for the main census field operation. Of the 15,000 cases, 17% completed a census return using a PQ (by this stage the eQ had closed).

Final Warning Letters were issued to 391 households for whom there were names, all of whom also received a follow-up visit. From these visits, evidence for 18 cases was put forward to CPS for consideration for prosecution. Following a review by CPS, this was reduced to 7 to be taken forward to prosecution. Of the 7 cases, one individual completed a census return prior to the court hearing; the remaining 6 cases were found guilty in court.

Endnotes

1 **Delivering the Census 2021 digital service**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/deliveringthecensus2021digitalservice/2021-10-04

2 **Designing a digital-first census**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/designingadigitalfirstcensus/2021-10-04

3 **Census 2021 in Wales**
https://www.ons.gov.uk/census/aboutcensus/census2021generalreport/census2021inwales

4 **Census 2021 in Wales**
https://www.ons.gov.uk/census/aboutcensus/census2021generalreport/census2021inwales

5 **Coronavirus and the operational impact on Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/censusdesign/coronavirusandtheoperationalimpactoncensus2021

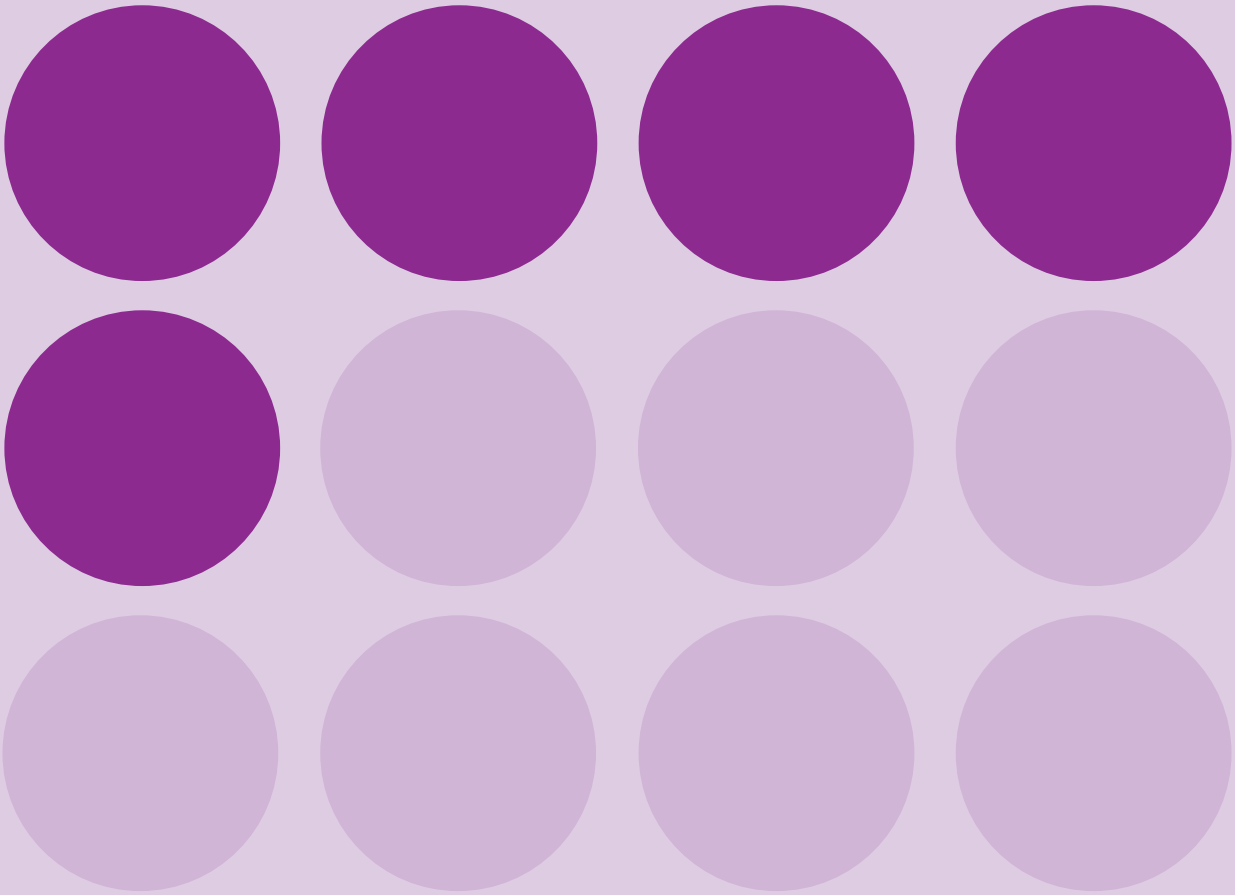
6 **Designing a digital-first census**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/designingadigitalfirstcensus/2021-10-04

7 **Characteristics of Census 2021 respondents by mode of completion**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/characteristicsofcensus2021respondentsbymodeofcompletionenglandandwales/2023-10-23

8 **Census 2021 in Wales**
https://www.ons.gov.uk/census/aboutcensus/census2021generalreport/census2021inwales

Communications and engagement

05



5.1 Introduction

Census communications and engagement were pivotal in raising awareness of the census across England and Wales, motivating and overcoming barriers to people taking part. The Census 2021 communications campaign, media relations and engagement were integral parts of the successful data collection operation described in Chapter 4, making an essential contribution to exceeding our response rate and online completion targets, particularly in the context of the coronavirus (COVID-19) pandemic. The approach was aimed at informing the whole population, but also supporting groups that faced specific barriers to taking part. The activity described in this chapter was an integrated and multi-faceted campaign, ranging from national communications to engagement with population groups in local areas. It aimed to influence the willingness of all audiences to complete the census on time, and online where possible, without the need for intervention or follow-up.

The campaign was supported by successful education programmes for primary and secondary schools, a comprehensive public relations campaign, including celebrating 'community heroes' and the 'purple light up' of buildings across the country, and other activities, culminating over Census Weekend, 20 to 21 March. Local authority (LA) and community partnerships and the deployment of local engagement staff were invaluable in reaching groups that were less likely to respond to the national campaign. The Census 2021 website and social media accounts supported this activity, providing both general information and specific messaging for particular population groups, including students.

The communications campaign was extremely comprehensive, with a 99.9% reach across the population. As noted in chapter 4, the level of responses up to and on Census Day were higher than forecast. The high level of responses submitted before follow-up activities began reflects the success of the communications campaign in raising the profile of the census, alongside the initial contact with households and effective routes for completion enabling people to complete it online or on paper. Raising the household response rate to 97% with minimal geographical variation owed much to the success of our engagement and more targeted communications through the rest of the campaign period, alongside the work of the field force described in sections 4.7 to 4.9.

5.2. Census communications campaign

5.2.1 Background and aims

The communications campaign was the public face of the census. For Census 2021, it was a vital part of the data collection operation, supporting the completion targets by encouraging as many people as possible to respond without needing reminder letters or field force visits. The communications environment is different for each census, with 2021 bringing both a much more digital-focussed and targeted campaign than in previous decades and the unique challenges of the coronavirus (COVID-19) pandemic.

We aimed to deliver an integrated and inclusive communications campaign to achieve high response rates from all communities and sectors of society. This meant encouraging 27 million households and people in communal establishments across England and Wales to complete their census on time. The campaign was delivered bilingually in Wales supported by the bilingual website and social media see section 5.2.7.

There were three main phases to the 2021 campaign complementing the 'wave of contact' approach in its operational messages and timing (see section 4.3.12: Wave of contact approach). Each messaging phase was relevant to all audiences when used in mass media, and specific segments of the population when messaging was more targeted. The phases and their main aims were:

- Announce, 12 to 22 February: to prime all audiences that the census was coming
- Address, 22 February to 21 March: to overcome barriers to completion
- Act Now, 1 March to 17 May: to drive completion pre and post Census Day

The Census 2021 communications campaign also focused on addressing potential barriers that could prevent people responding to the census. A simulation model was built, mapping expected behaviour to realise the completion targets. This modelling predicted that while most households would engage with the national campaign, a substantial minority were less likely to engage and therefore needed tailored interventions to complete the census. These tailored interventions included a separate student campaign. Communications agency, M&C Saatchi became our partners in May 2020, supporting all three strands of the communications campaign: the national campaign, overcoming barriers to taking part, and the student campaign.

5.2.2 National campaign

National communications centred on a paid-for media, which had a 99.9% reach across the population of England and Wales, and media partnerships, including specific paid media activities for the Census Weekend. We worked with Manning Gotlieb OMD on media planning and OMNIGOV, the government-appointed media buyers, to develop and deliver a comprehensive media plan. They used their expertise to ensure the campaign reached targeted audiences. Paid media utilised a range of channels from TV and radio to social media and digital.

This included a series of paid-for media partnerships to extend the national campaign and reach discrete audiences. Media partnerships with LADbible, UK News, and Reach provided the opportunity to create bespoke content. Paid media activity on Census Weekend included a bespoke TV advert in partnership with ITV, Channel 4, S4C and Sky, as well as a paid partnership with reality TV show Gogglebox and an advert take-over to help create the sense of a high-profile national event. Over 200 social media influencers were also used, ranging from mass audience celebrities to niche influencers who resonated with particular target audiences.

Messaging was integrated with the 'wave of contact' and the Announce, Address and Act Now phases. As people started to complete the census, targeted paid media was delivered to specific groups, such as students, and areas with lower response rates. Response rates were reviewed daily as part of the wider operation and used to inform the weighting and targeting of paid media where it could make the greatest impact.

The pandemic had an impact on the creative output for the campaign, but we adapted. For example, it meant reducing the numbers of people appearing together in advertising, using less out-of-home advertising as people were at home, and moving from in-person events to more targeted paid advertising.

Campaign themes and design

Informed by an extensive programme of quantitative and qualitative research and a comprehensive audience segmentation based on people's willingness and ability to complete the census, the campaign used the "It's about us" proposition to inform the look, feel, messaging and position of communications. This was tested with target audiences to ensure it was distinctive, inclusive and overcame barriers to taking part. The campaign focused on the community benefit of completing the census and its importance in helping decision-making about local public services.

Using the purple census colour scheme, the main advertising materials – both 'out of home' and in the press – used images of individuals and groups in a range of settings with a purple backdrop. Each carried a simple message beginning "It's about…", reflecting either the uses of census data (for example in planning business investment or public services) or other important census messages (such as "It's about protecting our answers", to assure respondents that their data would be secure, or "It's about getting help"). These messages were accompanied by a brief text expanding on the theme, and a reminder that Census Day was approaching (prior to 21 March) or information about finding more information or help. The "It's about us" message was also used as a postmark over Census Weekend by our partners Royal Mail, reminding people to complete the census.

5.2.3 Overcoming barriers to taking part

Alongside the national campaign there was a focus on communities and population groups identified as requiring additional interactions to encourage and enable them to complete the census. This included those where the effectiveness of the national campaign was likely to be reduced, and groups identified as being less likely to respond because of practical barriers. The populations included those identified by national identity, religion or ethnic group, those requiring alternative formats (such as large print), language support, or practical support to complete the census. The campaign also operated to raise awareness of support mechanisms, such as telephone support, large-print questionnaires and Translation Guidance Booklets (see section 4.4.5: Language and accessibility support. This operated alongside engagement activities aimed at similar population groups (see section 5.4)

We carried out extensive research and a thorough assessment to fully understand these audiences and ensure the communications we produced were effective and responsive to their needs and concerns. This campaign followed the national campaign branding and styling but used bespoke photography featuring different population groups. Messaging also differed and focused on overcoming unique barriers identified and was provided in 44 languages.

We produced over 650 bespoke campaign assets for use by LAs and community partners, and by census engagement staff, across all phases of the census campaign. In the Announce phase, assets promoted the census date and what to do next, as well as addressing barriers and providing clear reasons to take part. They were translated into multiple languages and digital versions of printed assets were included. In the Address and Act Now phases, the message was 'It's not too late' and continued to address the main barriers identified, utilising wide-spread paid media activity.

Communications toolkits were produced to support LAs and community partners, sharing key information about the census. We collaborated with social media influencers, using trusted voices from different population groups to help increase the reach of our messages, particularly over Census Weekend. Campaign assets were also produced in accessible formats, such as Easy Read, British Sign Language (BSL) and large print.

5.2.4 Student Campaign

The primary focus of the student campaign was to mitigate the specific barriers for students in taking part in the census. The campaign aligned with the overarching national campaign, but adapted to better address the student audience's needs and barriers to taking part.

This audience was large and broad in makeup. It included domestic and international students, undergraduate and postgraduate students, and both people living in student halls and student households in private-rental housing. Previous experience also suggested that students were less likely to respond for a variety of reasons, including lack of awareness. In the 2019 Rehearsal the lowest level of completions in university halls corresponded with high numbers of international students. These factors made students a critical and challenging population group to enumerate and this campaign supported the work of the communal establishment field operation to enumerate students (see section 4.9).

The student campaign aimed to clearly communicate the unique 'ask' of the student population, reflecting both the breadth of this group and the unique factor that students were included in the census return for their out of term-time address (if they had one) as well as their term-time address.

Core to the campaign were unique student campaign materials, aiming to tap into the interests of students and to cut through in a busy student-media market, and a unique website page reflecting the specific ask of students (www.census.gov.uk/students, archived in the Government Web Archive[1]). Developed with M&C Saatchi, the advertising aimed to present census completion in a fun and engaging manner by reimagining paintings from old masters and commemorating students for participating in the census by depicting six current students. Paid advertising, 'gate-keeper' stakeholders (such as universities and the National Union of Students), and influencers were used to reach students using channels and voices with which they were most likely to be engaged.

The coronavirus pandemic provided additional and specific challenges for enumerating students, as many had not returned to their term-time addresses after a further nationwide lockdown was announced in January 2021. This meant that the messaging to students had to be changed. The pandemic also meant that we could not carry out on-campus activities, which are known to be an effective way to engage students.

The communications campaign was extended from 1 to 17 May with a particular focus on students (complementing the focus on students in the communal establishments operation), reminding them of the importance of completing the census and the risk of a fine for non-completion. This utilised radio and digital audio adverts, targeted digital adverts and social media channels.

5.2.5 Primary and secondary schools campaigns

Primary and secondary education programmes were developed as a campaign strand to raise awareness of the census and develop statistical literacy. These programmes were also designed to reach parents, particularly those in areas where high proportions faced other barriers to taking part. By encouraging schools and pupils to act as census ambassadors, the programmes aimed to reach a wide proportion of the general population, at a community level, filling gaps where the national campaign could not reach.

The Census Secondary Education Programme (CSEP) aimed to increase statistical literacy and confidence in the general population. A creative primary school education programme called Let's Count! (LC) aimed to drive awareness and excitement about the census among population groups who might have been less likely to take part. Delivery of the CSEP was subcontracted through our contract with M&C Saatchi and LC was delivered with Family & Education, a division of iChild Limited.

A list of high-priority schools was based on schools with higher numbers of pupils receiving free school meals, along with census audience insights and the wider identification of populations facing barriers to taking part. This provided a target location of schools and audiences with a potentially lower willingness to complete the census.

The coronavirus pandemic created challenges for both LC and CSEP, with many schools closed or delivering teaching virtually. When schools started to re-open after lockdowns, teachers' priorities were with the 'catch-up' curriculum, pupils' safety and ensuring that pandemic guidelines were adhered to. LC and CSEP lessons were adapted to enable them to be taught virtually or in the classroom and the marketing was adapted to reflect this and to promote the ease of use when teaching the lessons virtually.

Across LC and CSEP, a series of free education resources were developed, informed by the national curriculum and tailored to focus on educating pupils on the census, the use of census data to shape services locally and nationally,

and the importance of everyone taking part. Both also included take-home materials and activities providing children with the opportunity to tell family and guardians what they had learned. Schools were encouraged to share their participation with the wider community, with newsletter, social media and press release content provided. LC and the CSEP worked closely with, and fed into, the wider census public relations and media strategy, for example with historian David Olusoga recruited to support the census campaign appearing on The One Show on BBC One to promote his live census lesson.

A total of 9,035 primary schools registered for Let's Count. This was 43.6% of primary schools in England and Wales and included over 81% of high-priority schools, giving the programme a reach of 2.18 million children and 2.05 million parents. CSEP saw 38.7% of secondary schools register, including 33% of high-priority schools. These exceeded our uptake targets of 40% for LC and 35% for CSEP (which had been reduced to account for the impact of the pandemic).

Both programmes included a competition to further engage schools, pupils and their local communities with the census. We asked secondary school students to create a community campaign that would persuade people in their local area to take part in Census 2021. The winning school received £1,000 worth of information technology (IT) equipment and a Question and Answer session with Tom Malone Junior (a former Gogglebox star, choreographer and TikTok star). The winning entry, from a year 7 pupil at St Anselm's Catholic School in Canterbury, Kent, and those of six runners-up were archived as part of the official public record by The National Archives.

LC included a competition for children to count objects around their school or community and create a wall display showing the results. St Alban's C of E Primary School, Havant, Hampshire was the winning primary school. Pupils from the school and the runner up, Ysgol Gynradd Gymraeg Tonyrefail, Porth, announced the official Census 2021 population figures for England and Wales and for Wales respectively on 28 June 2022.

The main value of the schools programmes was in increasing awareness of and participation in Census 2021. When surveyed, 95% of secondary and over 98% of primary school parents said they had completed the census;

20.2% of primary parents said they were not aware of the census until they heard about it through LC. Our surveys also showed an increase in awareness of and positive sentiment towards the ONS and trust that information collected through the census would be kept securely. Relationships forged during the collection phase of the census were also useful in sharing census outputs (see section 9.13).

5.2.6 Census 2021 website and social media channels

Census campaign website

As well as hosting the online questionnaire and providing help and guidance, the Census 2021 website played an important part in supporting our communications and engagement work, including providing information and resources. These pages were designed to dovetail with the communications campaign, particularly supporting its focus on overcoming barriers to taking part, including a dedicated page for students.

The website also included dedicated pages to support LAs and communities, with information, toolkits and downloadable resources to tailor and promote census messages through their networks. Website resources also included written and video case studies on the benefits of census data, and practical videos such as how to access and complete the electronic questionnaire. Archived versions of the census website at different dates through the campaign can be accessed through the UK Government Web Archive,[2] and links to resources can be found on our Census 2021 resources page.[3]

Social Media

Social media was used to build an audience engaged with important census campaign messaging and to amplify the messages of the national census campaign, as well as directly driving online census completions. This was achieved through paid, owned and earned activities across all major social media channels. Paid social was undertaken by the national campaign, while owned and earned content was undertaken by the social media team, supported in content development by M&C Saatchi.

Owned and earned social media included census social channels across each of the major social media platforms, including Twitter (now known as 'X'), Facebook, Instagram, LinkedIn, YouTube and Reddit. Social media channels were established for our Census Engagement Managers (CEMs) and

Community Advisers (CAs) (see section 5.4.3: Local engagement). Earned coverage came through partnerships with LAs across England and Wales. We also worked in partnership with social media channels such as Facebook, Twitter, and Google.

Census social media channels were used to support the 2019 Census Rehearsal, and launched across England and Wales in September 2020 for the main census operation. Segmentation insight informed channel choice and content strategy. The census social media team published 6,224 social media posts and, working with M&C Saatchi, produced 84 animations to convey our main messages. Census 2021 content was engaged with 191,143 times and drove over 79,000 people to the census website.

As part of our wider engagement with LAs (see section 5.4.4) we provided social media content packs, which allowed us to leverage their existing social media audiences and gain a wider reach from a trusted source (see section 5.3: Media and public relations). LA partners also tweeted important census campaign messages over 8,000 times; their combined efforts on social media reached over 44 million people.

The CEMs and CAs were provided with social media channels, following feedback from the 2019 Rehearsal, where many staff reported that using social media would have facilitated more effective engagement with target audiences. Providing the CEMs and CAs with social media also allowed the campaign to engage through an authentic, trusted voice, which was essential for speaking to these audiences, particularly at a time when in-person communications were constrained.

In addition, working directly with social media platforms was important in ensuring misinformation and disinformation about the census did not spread online during the campaign. Following negotiations, all Facebook owned platforms and Twitter agreed to specifically prohibit the sharing of any misinformation and disinformation about the census and any content that aimed to disrupt or discourage completion of the census. This collaboration also provided a secondary benefit in enabling us to use additional platform features to push census messaging, such as search prompts and reminders. We worked closely with Facebook and Twitter to develop prompts, which created a huge amount of free promotion, increasing awareness and driving completion.

Monitoring wider social media activity about the census using social media monitoring tool, Brandwatch provided us with valuable insight into public sentiment across England and Wales towards the census, which in turn informed the development of both reactive and proactive content. This work was closely aligned with our wider media relations activities.

5.2.7 The communications campaign in Wales

The different aspects of the census communications campaign described in this chapter targeted the whole of the population of England and Wales. All campaign materials and content used in Wales were produced bilingually. This ranged from adverts and videos to posters and leaflets.

We undertook quantitative and qualitative research with Welsh speaking audiences to ensure that the campaign proposition and messaging resonated with Welsh audiences. We also worked closely with Welsh Government on many aspects of the campaign.

As well as the Welsh-language website (cyfrifiad.gov.uk), we had Welsh-language social media channels promoting Census 2021. Working with social media platforms Twitter and Facebook (see section 5.2.6) we ensured that there were bilingual search prompts, the first time that Twitter had produced a prompt in Welsh.

The campaign utilised Welsh media channels, both English and Welsh-language, optimising content for Welsh speaking audiences with targeted advertising.

5.3. Media and public relations

The media and public relations programme was designed to align with our communications in promoting awareness of Census 2021, how people could get support, and why they could trust the census and the ONS.

An important consideration was the need to reach audiences who were less familiar with the work of the ONS and those population groups that faced barriers to taking part. The design built in momentum to Census Day from an early 'soft' launch in September 2020. We achieved 2,900 stories and interviews from September 2020 to June 2021, including print or online coverage across 644 local titles, equating to around 93% of the market.

Two media and public relations strands were developed: a local and national print strand and one aimed at digital and broadcast channels that could also feed into social content. In addition, content was developed and delivered to promote the primary and secondary schools campaigns (see section 5.2.5), engagement with specific population groups, and to enable partner support across corporate, public and third sectors.

The public relations campaign began in earnest with a search for 22 'community heroes', marking Census 2021 being the 22nd census of England and Wales. These heroes were ordinary people doing extraordinary things to help their communities, whom we recognised with a 'purple plaque' in Census 2021 brand colours. The campaign was fronted by 'Gavin and Stacey' star Joanna Page, who made several media appearances, and also included community influencers. The heroes were announced on 11 March.[4]

Alongside this was the illumination in purple lights of over 200 buildings across England and Wales to create a sense of occasion over census weekend. This included iconic buildings such as Blackpool Tower, Wales Millennium Centre in Cardiff, and the BT Tower in London, generating a range of national and local media coverage.

Following in-house training by the ONS media team, our CEMS and CAs (see section 5.4.3) acted as spokespeople, complemented by senior ONS leaders and a range of influencers who were deployed across mainstream and community channels. For example, one of our community advisers working with the Indian community in Manchester appeared on The One Show in a film alongside the ONS's census director. Other media appearances included BBC Morning Live, every major news channel, BBC Breakfast, Regional ITV and BBC, Good Morning Britain, TalkSport, Sunday Brunch and a storyline on BBC soap opera EastEnders.

There were also over 430 pieces of coverage across community specific outlets, including in print, online and broadcast media. As well as communities based on ethnic group or religion, this included other groups such as those with physical disabilities, the digitally excluded, LGBTQ+ and students. We deployed our diverse range of spokespeople on appropriate channels including coverage through The Voice, BBC Somali, British Muslim TV, Pink News, Travellers Times, BBC Radio 4's In Touch, and Hamodia.

Bespoke media and public relations toolkits were created and delivered to all LAs across England and Wales (with Welsh translations) to ensure they had content for their own channels from late 2020. These included local, relevant case studies and census 'facts and stats'. The kits contained a variety of press releases and web content to be used at different stages during the communications campaign, as well as Frequently Asked Questions, social media messages and key census facts from 2011. The toolkits were well received with numerous councils using the initial press releases on their respective websites, newsletters and magazines, and distributing the press releases to their local media contacts. We were also responsive to requests from LAs to provide bespoke content or spokespeople for interviews.

Census media coverage was generally positive, with reactive news releases issued whenever themes emerged, such as fake census text messages. These reactive news releases received widespread pickup because of the awareness we had already created about the census.

The coronavirus pandemic had a mixed impact on media and public relations. Census 2021 gave the media a story that was not about the pandemic, which they were keen to cover, although it was difficult to land stories during the build-up due to the lockdown over the winter of 2020-21. Our wider work on pandemic

surveillance (see section 1.11) meant that ONS was more of a household name than pre-2020, which helped in building up media contacts and in our census messaging. The pandemic and lockdown restrictions shaped some of our larger events, meaning some large in-person events were not possible, but the purple plaques and building-illumination worked well as they could be done within the guidelines.

5.4. Engagement

5.4.1 General aims

The primary aim of our census engagement activity was to focus on those groups that were less likely to take part in the census without additional interactions. Engagement was one of several key interactions to encourage and support participation, alongside the communications campaign and the work of the field force and public support services described in Chapter 4: Data-collection operations.

The aim for Census 2021 was to build on the successful LA and community engagement activity we conducted for the 2011 Census. LA engagement focused on sharing and building trust in our methods and eliciting practical support to improve the effectiveness of the census data-collection operation. This not only helped make the 2011 Census a success but helped to ensure that the resulting numbers could be relied on for decision making. Community engagement focused on building trust and advocacy from charities, leaders and representatives of communities from whom we may otherwise get lower response rates. These community leaders and representatives then built awareness, trust and willingness to complete the census within communities.

For Census 2021, the activity had two core elements: national and local engagement. National engagement started years in advance of census collection and continued through to outputs and dissemination. Local engagement was delivered through a local census workforce. These staff had a critical role in making sure everyone understood why the census is important and why it is was important to take part and how to get the help they need.

The pandemic and lockdown restrictions had a mixed impact, shifting the balance between in-person and online engagement to being mainly online. This allowed us to have more meetings with larger numbers attending, but not all people or communities were able to engage online.

The volume and quality of our contacts with people and organisations, and the willingness of so many stakeholders to engage and to amplify our messages about the census were a great success. The relationships formed in the months and years before March 2021 also helped us to engage further around the census outputs (see chapter 9), and on our work on the future of population and migration statistics (see chapter 11).

5.4.2 National engagement

The national engagement approach was to form relationships in advance of the census with leaders and respected representatives of communities and population groups that faced barriers to taking part. This approach allowed the ONS Engagement team to understand the concerns of these groups, provide up-to-date information and raise awareness of the census. This activity gained buy-in from the leaders and representatives who saw the importance of the census and their communities participating.

Specifically, this included stakeholders such as charities, community businesses, faith leaders, intermediaries and community services, and organisations who were multi-community or intersectional in their scope.

Through continuing contact and encouragement, these stakeholders' influence could be used to help address any wider lack of awareness or misunderstanding about the census in the community. The work undertaken in the national engagement workstream lay the groundwork for local engagement, which attempted to close the loop by reaching grass roots leaders and representatives, and eventually individuals.

5.4.3 Local engagement

Local engagement was important to help overcome barriers to taking part in Census 2021. Delivered through a local workforce, this approach was a vital step in reaching members of communities and raising awareness of the census at the ground level. This work was a continuation of the national engagement work and used the same principles and methods to achieve awareness and buy-in of the census among population groups at risk of low response rates.

While our national engagement began well before the data-collection operation, local engagement took place around operational activities. This engagement activity was carried out by 200 Census Engagement Managers (CEMs) and 115 Community Advisers (CAs). Each CEM worked with LAs and communities in their area, between them covering the whole of England and Wales. CAs worked with specific population groups, mainly in urban areas. Their recruitment was undertaken by Adecco alongside the other field force roles described in section 4.7.1 Field force recruitment and training.

The work was split into two broad phases. From September 2020 to February 2021 the focus for CEMs and CAs was raising awareness of the census by engaging with representative organisations and charities, faith and community leaders, and the public. They also sought media and public relations opportunities and posted on social media. This phase also included working with LAs on their Local Authority Partnership Plans (see section [5.4.4]: Local authority engagement). From March 2021, this awareness-raising continued alongside a focus on assisting people to complete the census through a range of different activities. As soon as the public began to receive invitation

letters, CEMs and CAs worked with their contacts to arrange opportunities to encourage and support completions. This included seeking opportunities to link into community activities and gatherings to provide support with completing the census, for example attending places of worship.

The CEMs and CAs were successful in using a wide range of tools to engage with their communities such as social media platforms, local papers and newsletters, radio stations, video conferencing and distributing leaflets and posters in a wide range of languages. CEMs and CAs also worked together with community groups to produce materials about the census including videos specific to those communities, and in their languages. The CEMs and CAs were highly successful in generating engagement activity and extensive local media coverage. Although the coronavirus pandemic severely reduced the opportunities to meet face-to-face, engagement staff were able to utilise online forums and events and social media. They devised creative solutions to work around the lack of face-to-face engagement opportunities and worked with services that remained open, such as food banks, to share information about the census and how to take part.

Census engagement managers

Census engagement managers (CEMs) each led engagement in a specified local area. They carried out day-to-day engagement with LAs, relevant local community groups, and members of the public. They promoted the census locally and supported people to complete their questionnaire during the data-collection phase. They also managed any community advisers in the area and were the local point of contact for LAs.

Working in the same 15 regions as the household field force operation (see section 4.7 Census 2021 field force operation), each region had between 10 and 20 CEMs. CEM areas were allocated to fit to LA areas. Most LAs had one CEM, but differences in LA size and in the level of difficulty in terms of census-taking, meant that there was a range of CEM-to-LA ratios. Larger LAs, including Birmingham, Bradford, Cardiff, Liverpool, Westminster and Cornwall, had two or three CEMs. Some smaller LAs were combined in geographically sensible ways to create workloads of up to six smaller LAs.

Community advisers

Community advisers (CAs) were each responsible for local engagement with a specific population group within a geographic area. Acting as ambassadors for the census, CAs encouraged participation by engaging with community groups, charities, faith groups and local businesses.

One of the requirements for most of these posts was to speak languages widely spoken by the populations they worked with. For example, those working with the Chinese community were required to speak either Cantonese or Mandarin (see table 5.1). This approach was modelled on the successful implementation of these roles with language skills in 2011, but with a larger team of CAs for Census 2021.

Table 5.1: Population groups for which community advisers were appointed and the language requirements for those posts

Population group	Language required
Arab	Arabic
Bangladeshi	Bengali
Black African	None specified
Black Caribbean	None specified
Chinese	Cantonese or Mandarin
Haredi Jewish	Yiddish
Indian	Gujarati or Panjabi
Nepali	Nepali
Pakistani	Panjabi or Urdu
Roma	Romanes
Somali	Somali
Turkish and Kurdish	Turkish or Kurdish

In total, 115 CAs were deployed for Census 2021. Of these, 99 were in post from November 2020 until May 2021, with an additional 16 from February 2021.

CAs worked to their local CEM and the two roles collaborated to design activities and communications that helped everyone take part. Like the CEMs, they worked with local leaders to help their communities in completing the census and they ran events, answering questions and providing any other support that was needed.

5.4.4 Local authority engagement

Local authority (LA) engagement contributed significantly to the success of Census 2021 local engagement. We worked with LAs across England and Wales and with membership bodies, including the Local Government Association. This engagement ran through the whole of the census cycle from 2017 to 2023, with three broad themes over that period.

Preparation

The purpose of engagement ahead of the data-collection operation included help with development of the address frame, providing local information to identity and target local challenges, identifying and sharing local community contacts and helping us to recruit field staff.

Response

During the data-collection operation, engagement with LAs included providing practical support to the field operation, supporting online completion and our census support centres, and local publicity and media relations activity.

Outputs

Later LA engagement included providing information to support quality assurance, maximising the use of census information in LAs, and supporting the use of census data by local communities.

This was delivered through strategic engagement across all LAs in England and Wales (including county councils), and through local working between our CEMs and LAs. This collaboration, which is also covered in section 5.4.3: Local engagement, included the Local Authority Partnership Plan (LAPP). An ONS initiative, this was an agreement between each LA and the ONS, which set out local priorities and actions undertaken to support the census. It was used to promote greater LA ownership and partnership working and to provide a clear focus on those activities and areas where LAs could provide significant added value. The LAPP was produced by the ONS Engagement team. There was a LAPP for each LA, owned by the CEM and developed between them and the LA. It enabled the CEM and LA to identify and record local census priorities and challenges, and to co-ordinate and prioritise community engagement activity. The LAPP set out a programme of local census activities to be taken forward by CEMs, CAs, the LA, and other community partners to maximise return rates. Each local plan covered the sections of the population that faced greater barriers to taking part in the census.

> At the request of the ONS, almost all LAs nominated a Census Liaison Manager or Assistant Manager, or both. These were essential roles, responsible for coordinating census activity in their local area and ensuring an integrated approach to census delivery. They worked closely with our engagement team and other LAs to maximise engagement, and worked with teams across their LA including media, communications, and community support, coordinating activity across the authority and acting as 'champions' for the census.

We engaged with LAs both individually and through regional groups in the years preceding the census. Our Local Authority Operational Management Group provided advice and challenge from a group of informed LA representatives. It provided the opportunity for these LAs to quality assure our field operation plans and share their expertise.

We also had a Local Government Census Advisory Group, with members from LAs, as well as representation from the Local Government Association and the Greater London Authority. This group met every six months, with scope for interim meetings and circulation of materials for comment between meetings.

We held workshops for LAs covering aspects including maximising local engagement, campaigns and social media, recruitment and training, local data collection and field operation, and a campaign workshop for LA communications teams. We also held regional workshops in spring and summer 2020. We also kept in touch with LAs through newsletters, letters to Chief Executives and visits to LAs.

Endnotes

1 **Census 2021: Students**
https://webarchive.nationalarchives.gov.uk/ukgwa/20210413191822/https://census.gov.uk/students

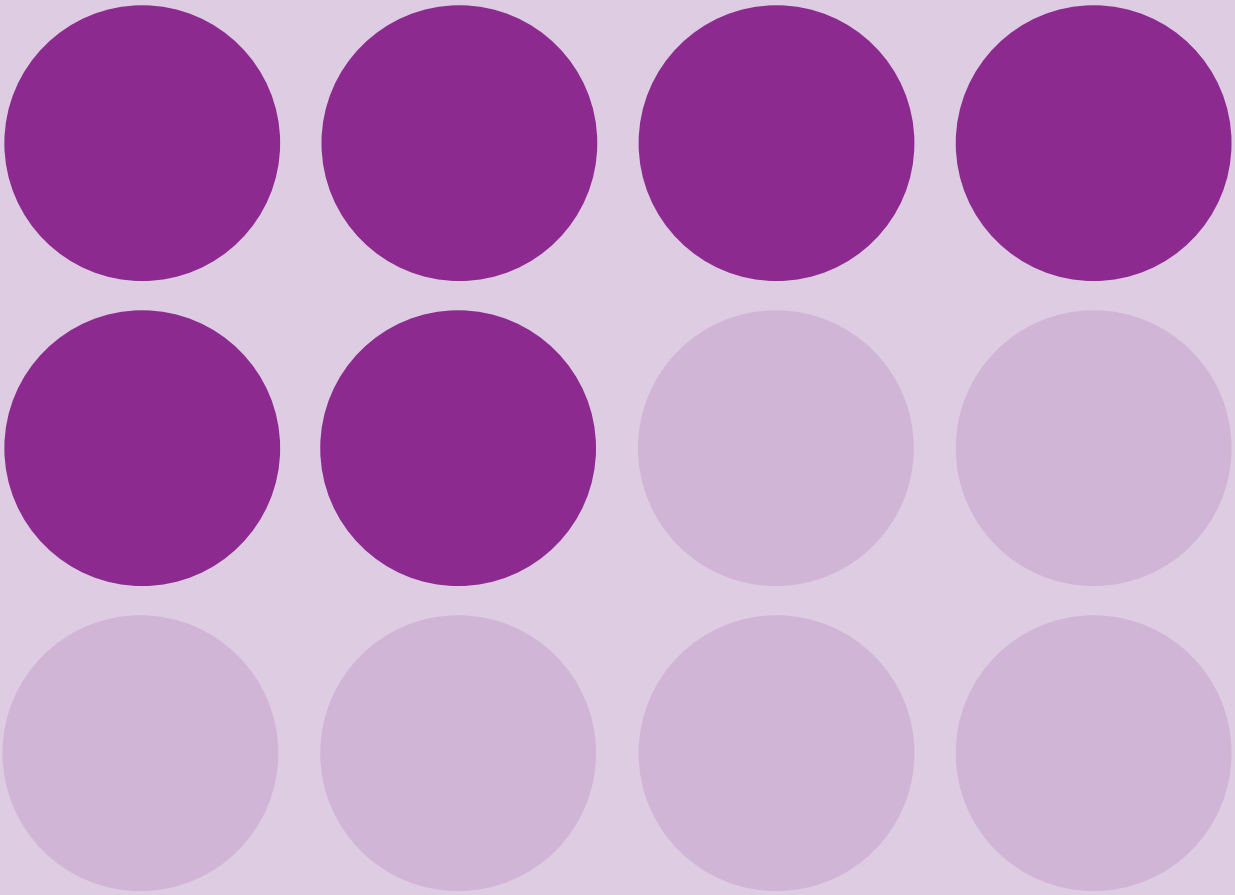
2 **Government Web Archive timeline: Census 2021**
https://webarchive.nationalarchives.gov.uk/ukgwa/*/https://census.gov.uk/

3 **Census 2021 resources**
https://www.ons.gov.uk/census/aboutcensus/census2021resources

4 **Census 2021 heroes**
https://webarchive.nationalarchives.gov.uk/ukgwa/20210504102613/https://census.gov.uk/census-2021-heroes

Processing and estimation

06



6.1 Introduction

While the census aims to count the entire population, even a highly successful data-collection operation like that in 2021 with its 97% household response rate does not provide a unique record of every communal establishment and household in England and Wales and of every resident in each occupied residence. A small proportion of the population did not appear in a census response, and others provided incomplete responses or made conspicuous errors in their answers. Additionally, some people responded more than once, sometimes in error, sometimes by design (such as students with term-time and out of term-time addresses), and others to update the information they had already provided.

Previous chapters have described how we optimised the response rate for Census 2021. Processing and estimation is how we turned those responses into accurate estimates of the whole population of England and Wales. This process can be divided into four stages. These are:

- pre-processing, which aims to provide a single response for each individual, household and communal establishment, through cleaning and coding responses, resolving duplicates and removing false responses
- edit and imputation processes, which ensure that each is a complete and valid response
- estimation and adjustment, to turn the data in those responses into estimates of the whole population of England and Wales, and adjust the dataset so that it is representative of that full population
- quality assurance of population estimates and topic data

A final step taken before census estimates are published is to ensure that personal information about individuals cannot be accessed through the census data. Our statistical disclosure approach for Census 2021 is set out in section 8.5: Protecting personal data in census outputs.

6.2 Pre-processing

6.2.1 Cleaning

Once collected, census data records are passed through a validation and cleaning process. This involves removing invalid records and responses, and resolving duplicates. These are standard data-cleaning processes used in the production of most official statistics.

Our online-first approach brought a number of benefits at this stage. Online validation was built into the online questionnaire, for example prompting the respondent to check for apparent errors like dates of birth before 1900; this helped to improve overall data quality and reduce the time taken to clean data compared with previous censuses.

Being online-first also significantly reduced the number of responses by paper questionnaire and therefore the associated scanning errors and the need for clerical capture, although it introduced scope for typographical error and items such as smiley faces (over half a million of which had to be removed from the data). It also meant that we were receiving census responses from the point at which the electronic questionnaire (eQ) response system went live, and were able to look for errors and unexpected features in the data and improve our processing in real time.

Being multi-mode and covering both England and Wales meant that pre-processing needed to reconcile data coming in from different sources. Where the 2011 electronic questionnaire had sought to replicate the paper questionnaire, for 2021 they were developed in tandem to optimise responses and reduce respondent burden for each mode of response. Although we sought to minimise differences by mode, there were some that needed to be reconciled, for example online the ethnic group question included two or three stages, whereas on paper a single tick-box or write-in provided the response. There were also some differences between the questionnaires for England and for Wales, for example Welsh appearing as the first tick-box in the national identity in Wales while British was the first option in England.

6.2.2 Rules-based edits

Rules-based edits were used to identify and determine the correct response to an individual question, where obvious errors were detected and there was a high degree of certainty about what the correct response should be. For example, data capture and coding rules were applied to resolve multi-tick errors where a respondent ticked more than the required number of responses or answered with an inconsistent combination of tick-box and write-in options. This happened primarily on paper questionnaires as the design of the electronic questionnaire prevented these errors. A further set of “filter rules” were used in association with the questionnaire’s “skip pattern”, where some respondents were not required to respond to all questions. This was to correct

"errors" such as someone who owns their house outright also answering "Who is your landlord?". This type of error was more likely to occur on paper returns as the online version had in-built "filter rules". Again, this correction was only applied where there was a high degree of certainty on what the correct response should be.

6.2.3 Text Coding

Text coding was designed to convert write-in responses into a set of consistent numerical codes that made it much easier to analyse. In general, each text-based response was coded automatically by comparing the written text against a pre-defined index. If a match was assessed to be sufficiently close (and unique), then a numerical code was assigned. Write-in responses (particularly on paper forms) can be error-prone because of spelling mistakes, unexpected characters, or new terms not included in the index. The development of search-as-you-type functionality (see section 2.5.2: The electronic questionnaire (eQ)) for some questions in the online questionnaire made matching to the index relatively straightforward, helping to reduce spelling errors and minor variants in responses by allowing respondents to select an option from a drop-down list as they started to type.

Answers that were not coded from a first pass were further assessed to determine if they could be automatically coded with updates to the indexes or using parsing strategies. This is a process by which words are broken down to determine if a match to the coding index can be made.

As the eQ was open for responses approximately four weeks prior to Census Day, data collected during this time were available to identify new terms, meaning that the coding indexes were kept up to date through real-time analysis of frequently occurring terms that failed to code and real-time quality assurance. Updating the indexes promptly meant that fewer records were sent for clerical resolution, ensuring timeliness and cost-efficiency. Having the data early also allowed for quality assurance to be undertaken sooner, meaning that any issues were resolved before the end of the live-running phase and data were delivered to later stages without delay.

As set out in our publication Automated text coding,[1] the proportion of write-in responses that were automatically coded was over 93% for most questions (including ethnic group, national identity, religion and passports held) and the Quality Assurance team (see section 6.6 assessed the quality achieved to be over 99%. The occupation and industry questions have a wide and complex array of responses, for which the level of accuracy has historically been lower but which improved in 2021 to 97.1% and 97.0% respectively compared with 94.1% and 93.1% in 2011. Our quality targets were met across all questions. The Automated text coding article sets out in detail the stages of coding used in Census 2021.

6.2.4 Removing "false persons"

In each census, some census questionnaires are completed but contain so little information it is difficult to determine whether the questionnaire is a genuine response. In the absence of certain core census variables, these questionnaires cannot be processed and used in the estimation process. A set of rules were used to determine the minimum data requirement for a record to be created to represent an individual response. These rules were developed building on analyses of the 2001 and 2011 Census data, to indicate which combinations of variables are most often present on a genuine response.

Removing "false persons" (RFP) is a process that checks the data for this combination. For a person record to be counted as a genuine response in Census 2021, the following information had to be present on the record:

- name and date of birth
- one of name or date of birth, and one of sex or marital status

If a person record did not meet these requirements, it is considered to be a "false person" and flagged as such. A total of 1.2 million records were flagged in this way in RFP. These records were not processed further and thus are not included in the outputs.

6.2.5 Student address adjustment

Students are normally included in full at their term-time address, with only basic demographic information collected at their out of term-time address (for example, their family home). Our guidance asked those with separate term-time addresses to complete the census as a usual resident at that address even if they were not there on Census Day. However, many were instead included as a full response at their out of term-time address and did not complete a return for their term-time address.

We introduced a step prior to resolving multiple responses to adjust the 'usual residence' recorded for students who had term-time addresses, in line with our population definitions (see section 2.4: population bases). This was in response to the coronavirus (COVID-19) pandemic causing many students to be absent from what would otherwise have been their term-time address on Census Day. Where a student who appeared in the census response from their out of term-time address stated they also had a term-time address, we copied their data to the provided term-time address if no response had been received from them at that address. This process identified over 90,000 students and copied them to their term-time addresses, aligning the data with our population definitions and helping to provide a more accurate estimate of the term-time student population.

6.2.6 Resolving multiple responses

Resolving multiple responses (RMR) is a process that seeks to resolve duplicate and conflicting responses to end up with a single response for each person, household or communal establishment (CE) at an address. Duplicate responses could come by design, such as the use of continuation forms by households with more than five residents or the use of individual forms by household residents in addition to the household response. Duplicates could also occur through respondent error, such as a household completing both a paper and an online response, or errors in the address frame, such as a property being converted into flats and so correctly returning multiple responses.

The process also deals with "dummy forms", which were records created by census officers for Households and CEs that had not provided a response. The data on them were therefore derived from observation rather than self-reporting. The forms included type of household (such as flat or terraced house) or CE, reason for non-response (including refusal or being vacant), and an estimate of the number of people likely to live there if not vacant.

Table 6.1: Questionnaires in the data at the beginning of resolving multiple responses (RMR)

	Residences	Individuals
Communal Establishment (CE) Forms	35,963	0
Household (HH) Forms	25,374,772	58,357,155
Dummy Forms	2,679,041	0
Continuation Forms	0	15,251
Individual Forms (CE or HH)	0	1,051,765
Total	**28,089,776**	**59,424,171**

RMR was first implemented successfully in the 2011 Census and the general approach to the 2021 design was to build on that success. It uses a series of rules to construct a single record. It also assigns persons captured on an individual form or continuation form to a household or CE, ensuring that, after RMR, every person has an assigned household or CE.

As in 2011, RMR for Census 2021 used a series of 'modules' to carefully integrate the information available on multiple responses, retaining as much as possible. These modules resolved different types of multiples and duplicates in turn, with a set of business rules designed to select one response over another. For example, prioritising online responses and individual questionnaires, or the latest provided information where there was more than one response.

The RMR process for Census 2021 benefitted from live data being available from the start of the data-collection period, 10 to 12 weeks earlier than in 2011. In addition, a substantial increase in computation processing power meant that we were able to check for duplicate residences in the same postcode, rather than just at the same address as had been the case in 2011.

RMR identified and resolved 1,737,070 multiple or duplicate residential properties and 800,459 duplicate individuals. These records would have contributed to a substantial amount of overcount in census analyses and outputs if left untreated. Conversely, RMR was able to identify and recover 1,668,152 properties and 98,226 individuals that otherwise would not have been represented in the data. For example, in cases where we received information about individuals on either a continuation or individual form but no corresponding household questionnaire, we were able to use information collected by census field staff to establish a valid response. Leaving these responses out would have led to a significant amount of undercount had we not invested a considerable amount of effort identifying ways of recognising and collecting valuable information reported beyond the basic collection design. The final structure of the census data used for statistical processing is set out in table 6.2.

More detail on the RMR process, and the numbers of records affected by the stages in the process, can be found in our publication Improving the accuracy of the Census 2021 data by resolving multiple responses.[2]

6.2.7 Census data after pre-processing

Following the pre-processing stage, the census data contained records for the 58.6 million individuals, 26.3 million households and nearly 46,000 CEs for which we had responses from the census data collection. The processes described in section 6.2 standardised the data, removed false persons, resolved many duplicates, recovered records that may have otherwise been lost, and repaired many response errors. At the end of pre-processing most of the errors in the data had been resolved. The errors that remained were those that needed to be resolved by specific statistical methods. This included the resolution of any missing and inconsistent responses within each record, and also accounting for those households, CEs, and people who didn't respond to the census. The remaining processes of edit and imputation, followed by estimation and adjustment, turned those data into census estimates covering the whole population of England and Wales, with completed responses for the appropriate variables.

Table 6.2: The final structure of the census data after pre-processing

	Residences	Individuals
Communal Establishment (CE)	45,939	858,659
Household (HH)	26,336,199	57,765,053
Total	**26,382,138**	**58,623,712**

6.3 Edit and imputation

The data at the end of pre-processing, while clean in terms of the people and residences it included, contained gaps where not all details about individuals, households or establishments had been provided, and in some cases there were inconsistencies in the data provided. The primary objective of the item editing and imputation strategy was to produce a fully populated, clean, and consistent unit-level census database by resolving missing values and inconsistencies within or between persons and within households.

The edit and imputation process is applied both to households and to persons, whether resident in households or CEs. After item editing and imputation, all responding questionnaire records were complete and consistent, after which coverage estimation and coverage adjustment processes (described in sections 6.4 and 6.5) could be applied to obtain final census estimates for the whole population, including those who did not respond.

Inconsistencies were identified by a set of pre-defined edit rules specifying invalid relationships between variables and identifying how they could be resolved with the minimum amount of change to the observed data. Missing values were replaced by a well-recognised statistical method called donor-based imputation which draws an observed value from another record in the data, referred to as a donor. A donor was selected from a small pool of potential donors with similar characteristics to those of the record being imputed. Similarity was measured by comparing the differences between the record needing imputation and each potential donor across a set of demographic and other predictive matching variables.

There are ‘hard’ and ‘soft’ edit rules. Hard edit rules check the plausibility of data and lead to imputation if the record fails a rule; for example, ‘a child cannot be older than their parent’. Soft edit rules are possible but uncommon values; for example, ‘a person aged under 16 years is unlikely to be a parent’. Soft edit rules can be applied to prevent records that fail the rule from being used as a donor, retaining the observed records but preventing an increase of these combinations. Alternatively, soft edit rules may be monitored during editing and imputation to ensure the number of cases that fail the rule is not disproportionately increased. For Census 2021, we used hard edit and both types of soft edit rules.

Donor-based imputation methods are ideal for census data because they can handle categorical and numeric variables simultaneously and, when applied correctly, will estimate the distributional properties of the data accurately. This process does not seek to impute a correct value for a missing or incorrect response. Rather it seeks to preserve the observed distribution of a variable, preserve key joint distributions or, where appropriate, adjust the distributions to account for non-response bias.

Following its successful use in 2011, we used the Canadian Census Edit and Imputation System (CANCEIS) for editing and imputation in Census 2021. CANCEIS applies nearest-neighbour donor imputation and performs consistency data editing simultaneously. This method selects donors by minimising a specified distance measure between donor and recipient based on auxiliary variables. Statistical editing is applied by implementing user-defined edit rules that identify combinations of values that are inconsistent, to make the record plausible and consistent. A single donor that offers the minimum number of changes to a record and satisfies edit constraints is used to resolve inconsistencies and non-response.

With a base population of 58.6 million people, it was not possible to impute the whole database in one pass through CANCEIS because of system resource constraints. Additionally, not all variables were imputed simultaneously because this would have reduced donor pool size below a viable level, compromising data quality. To overcome these two issues, the data were partitioned into manageable imputation groups. First, the data were split into 101 geographical processing units (PUs), containing on average 261,000 households with 572,000 person records. The data in each PU were then split into a household database containing 'household questions', where there was one response for each household, and a person database containing 'person questions' where there was one response for each person.

Each data group was then processed through two or more imputation modules, in which groups of variables were imputed simultaneously using CANCEIS. There were two main aims in forming the imputation modules: to have variables that help to predict each other and to maximise the number of donors for a given group. Other factors also influence their structure, including the order of the questionnaire and its routing, the priority of each variable, the inter-relatedness of the variables, and the edit rules.

As in 2011, CANCEIS was set up to seek a donor with the same response mode as the recipient, for example both having completed the census online. A donor was selected from a different mode only if there were no suitable donors in the same mode as the recipient. Responses to the voluntary questions on gender identity, religion, and sexual orientation were not imputed during item edit and imputation; responses, including non-response, remained unchanged throughout.

A small number of records in each PU failed to impute first time. Since statistical imputation was always preferred over manual editing, the system detected and passed failed records back through the automated system a second time. On this second pass, the potential donor pool included the imputed records from the first pass, and some parameter values were relaxed to enable larger donor pools. The relaxed parameter values enabled CANCEIS to look for donors both statistically and geographically further away from the recipient. Out of 58.6 million records, there were 1,316 records that could not be imputed after a second automated attempt. These records were manually edited by statisticians either to completely resolve a record or, more often, to enable the system to find suitable donors.

Table 6.3 shows there were 26.3 million household returns in 2021 and 2.4 million (9%) of these required one or more questions to be imputed. All household questions were imputed by joint imputation with a single donor. There were also 58.6 million person returns with 15.6 million (26%) requiring one or more questions to be imputed, of which, 93% of persons were imputed by joint imputation. Where possible, we imputed jointly within households, to preserve the between-person distributions and variance. Many variables were strongly related, both within-person and between-persons; for example, a person's main language, country of birth, and ethnicity were strongly related.

Table 6.3: Operational comparison of main item edit and imputation in 2011 and 2021, England and Wales

Persons	Census 2011	Census 2021
Person records processed	53.5 million	58.6 million
Average number of		
Records in a processing unit (PU)	530,000	580,000
Average time to impute a PU	12 hours	5 hours
Persons needing at least one question imputed	18.6 million (35%)	15.6 million (26%)
Percent imputed as a household taking account of joint distributions between questions	82%	93%
Percent imputed as individuals	18%	7%
Percent imputed using fallback methods	0.10%	<0.003%
Maximum donor reuse allowed	100	10

Households	Census 2011	Census 2021
Household records processed	24.3 million	26.3 million
Households requiring at least one item imputed	2.8 million (9.5%)	2.4 million (9%)
Percent imputed taking into account multivariate joint distribution between questions	100%	100%
Maximum donor reuse allowed	50	50

The number of persons needing at least one question imputed was lower than for the 2011 Census. As in previous censuses, the non-response and imputation rates for individual questions varied considerably, as shown in table 7.4. The table shows, for example, that among the demographic questions the need for imputation was generally low, with age and sex missing for 0.2% and 0.3% of records respectively, and second address type for 0.8% of those with a second address (all lower than in 2011), while 'position in communal establishment' was higher at 18.3% (compared with 11.1% in 2011). The labour market questions had the highest levels of non-response, again with much variation between questions: qualifications, employment status and 'ever worked' missing in 2.7%, 1.6% and 2.0% of cases respectively, while an 'industry' response was missing from 10.0% of those who were working and workplace postcode from 17.1%. More information about editing and imputation, including item non-response, edit failure and imputation rates by topic, is available in our publication Item editing and imputation process for Census 2021.[3]

6.4 Coverage estimation and adjustment

Following edit and imputation, the census data contained complete records for all people, households and CEs for which data had been received. While response rates were high across England and Wales, not everyone provided a response, and non-response was not evenly distributed geographically or among communities and sub-groups of the population. Estimation and adjustment is the process that estimates the size of the population, and adjusts the census database by adding records to provide a representative dataset.

Undercoverage is the most prevalent coverage error: when a member of the target population is missed in the census. Overcoverage, when a member of the target population is either duplicated or counted somewhere other than their usual residence, occurs less often but still at a non-ignorable rate. The ONS uses a variety of statistical methods to estimate these coverage errors to produce estimated population totals for local authorities (LAs) by key demographic characteristics. These estimates have higher accuracy than the raw census counts.

As in previous censuses, a Census Coverage Survey was used to estimate the census coverage error. The data from this survey are linked to the census data, and the linked data allows us to estimate undercoverage and overcoverage using a system known as dual-system estimation (DSE); more information on the DSE method can be found in our publication Trout, Catfish and Roach: The beginner's guide to census population estimates.[4] Variance estimation methods are used to assess the uncertainty around these estimates.

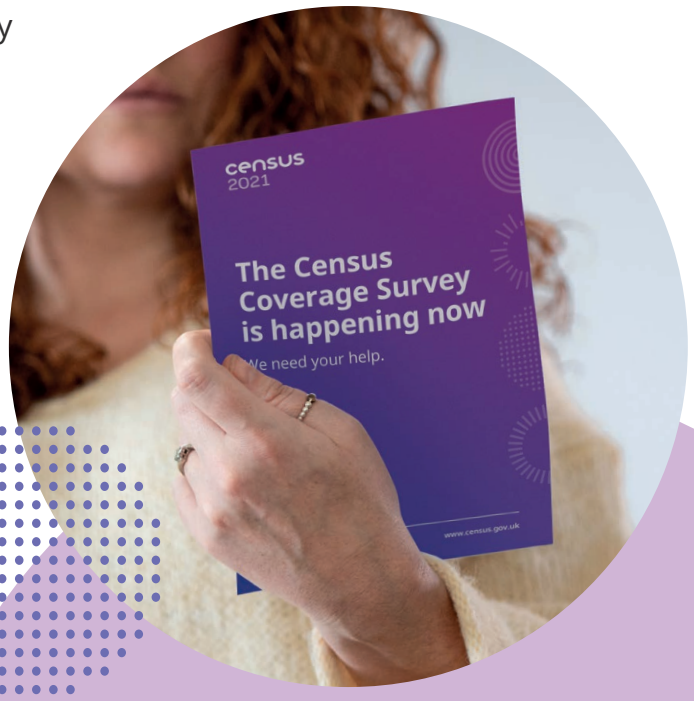
More information on the stages described in this section can be found in our publication Coverage estimation for Census 2021 in England and Wales.[5]

This section largely focusses on households, with more information on CEs in section 6.5. The stages described here resulted in adjustments to add 1.8 million usual resident people to the Census 2021 household and CE population, compared with 3.4 million people in the 2011 Census. Table 6.4 provides more detail on these adjustments.

6.4.1 Census Coverage Survey (CCS)

As in 2001 and 2011, the Census Coverage Survey (CCS) was used to measure coverage for Census 2021. The CCS operation, which is summarised in section 4.10, was an independent survey of the population in a large sample covering all LAs in England and Wales. It is important that a coverage survey is independent of the census, so an independent sampling frame was used for the CCS and there were restrictions on interviewers being involved in collecting data for two sources within the same area. The 2021 CCS sample contained approximately 16,000 postcodes: 1.45% of England and Wales postcodes, including 325,600 addresses.

The CCS is a stratified two-stage cluster sample. The sample is stratified by LA and hard-to-count index. The hard-to-count index has five levels, reflecting the expected census coverage level for a Lower Super Output Area (LSOA), approximately 1,500 households. The overall sample size is first allocated to hard-to-count strata using an optimal allocation method. This method puts more sample in strata where lower coverage is expected, to mitigate possible increase in uncertainty around estimates in these strata. Therefore, areas that are classified as harder to count are represented disproportionally to their prevalence in the population.



After this, it is then allocated to LAs in proportion to their size. The sampling process first selects output areas (OAs), which contain approximately 120 households, within each stratum. Then a quarter of postcodes were sampled from each of these output areas. With a few exceptions, at least two output areas from every LA by hard-to-count stratum were included in the sample. Within this sample of postcodes, interviewers attempted to enumerate all households within the selected postcodes.

The 2021 CCS coverage rate was 59%, lower than the target of 90%, and the interview completion rate was 61% (interviews completed per contacts established). The estimation methods work best when response to both the census and CCS are high. Our judgement, supported by external assurance, was that the methodology could still produce high-quality statistics with the achieved CCS response. The improvement from moving to a national statistical modelling approach gave additional protection. However, it was recognised there may be a widening of confidence intervals. Pre-planned quality assurance and bias adjustment methods became more important, providing assurance that any issues were detected and corrected in the final estimates.

6.4.2 Linking CCS to census and census to census

Following the removal of false persons and the RMR process, but alongside the editing and imputation (and therefore using un-edited and un-imputed data), two record linkage exercises took place. First, the CCS data were linked to census data (within and outside of the coverage survey postcodes). This linkage exercise established whether, within the sampled areas, each CCS record had a corresponding census record or if a household or individual was missing from either the CCS or the census record. The results were used to estimate undercoverage. By linking the survey to census outside the sampled areas, census duplicates and returns in the wrong locations could be identified. These results were used to estimate overcoverage.

Our publication Linkage methods for Census 2021[6] describes the methods used for this linkage, which included a combination of deterministic, probabilistic, associative, machine learning and clerical. We achieved final match rates of 97.3% and 97.1% for person and household records respectively. Of these matches, 95% were made automatically with the remaining 5% made using clerical resolution.

Another linkage exercise, linking the census data to themselves, was conducted to support overcoverage estimation by identifying duplicates across the whole census. More information can be found in our Methodology report on coverage matching for the 2021 Census.[7]

Outputs from the editing and imputation processes and the linkage results were provided to the Estimation team. At this point the data were ready for coverage estimation pre-processing.

6.4.3 Census coverage estimation

Census estimation uses information on what linked and what did not link from the linking exercises to produce population-level estimates, correcting for non-response and responses that should not be included. This process includes several tasks before the population total is obtained. It adjusts for undercoverage within the CCS sample, then uses this adjusted survey estimate to produce the population level estimate for many small groups like age-sex by LA and adjust for overcoverage.

For Census 2021, an approach based on logistic regression was used for coverage estimation, using data from across England and Wales at the same time. Improved computational power meant that we were able to produce estimates for the whole of England and Wales at once, rather than breaking down into groups of LAs as was done in 2011. Undercoverage and overcoverage propensity were modelled using demographic characteristics, geography, information on how the fieldwork was managed as well as interactions of some of these variables. This allowed us to estimate how likely a member of the population with a certain set of characteristics was to respond to the census or make an incorrect census return.

This in turn allowed us to give a weight for each census response based on the characteristics of that record which were included in the model. In order to obtain the population size for a group of interest, weights for the group of interest were summed.

Model selection for the undercoverage and overcoverage models had to be done in a careful, structured way. As each different fitted model gives different answers, it was important that the model selection process for estimating coverage was robust, transparent, and followed best practice using a combination of standard techniques.

Undercoverage

Once the coverage survey and census data were ready for estimation and linking complete, within sampled areas we knew for each CCS record whether a census response existed or not. This allowed us to model the coverage probability given the set of observed census variables and their combinations (interactions).

Logistic regression is a powerful and well-understood tool for modelling probabilities. Compared to the 2011 approach, it was possible to increase the precision of estimates by using a larger sample. Simultaneously controlling for several important variables and some of their interactions can also help to reduce certain errors. The approach used the entire dataset to relate a combination of demographic and other characteristics to the estimated probability that a member of the population with such characteristics responded to the census.

For example, based on their personal and household characteristics a member of the population might have an estimated census response probability of 0.95 (that is that 95 in every hundred people with those characteristics would have completed the census). Each person with those characteristics should therefore receive a weight of 1/0.95, or 1.053. If we observe 1,000 individuals in the census data like this person, we can sum up the corresponding weights to estimate the population total for individuals with such characteristics as 1,053. While each set of characteristics used for the probability is very specific, because all census records were given a weight it was possible to produce the undercoverage adjusted total for any group of interest.

In practice, "mixed effects" logistic regression was used both for household and person undercoverage estimation. This is similar to the model described above, but has the LA as a 'random effect' (allowing the model to reflect the area specific variability). This means that the person with a 0.95 census response probability might, with random effects, have a probability of 0.962 in local authority A or 0.934 in local authority B.

Undercoverage was estimated and corrected for both households and persons totals and certain characteristics. The general approach was the same in both cases, though the models were different. Model selection for two populations was run independently, while seeking as much consistency as possible in terms of levels of variables and interactions used. The two populations were 'reconciled' by the adjustment process.

The estimated level of undercoverage in Census 2021 was 3.6%, compared to 5% in 2011.

Overcoverage

A similar approach was used for overcoverage estimation at person level. Overcoverage occurs when a member of the census population is enumerated: more than once; in the wrong location; despite not being a member of the target population (e.g. individuals born after census day); or because of a fictitious census return. Data cleaning aimed to resolve erroneous records (in RFP) and multiple responses at the same location (RMR), so in overcoverage estimation we estimated only for overcoverage not covered by those processes.

Much like undercoverage estimation, the linked census and CCS allowed each record linked between census and CCS to have an outcome of 0 or 1, depending on if they were correctly enumerated or not. It is important here to assume there is no overcoverage in the CCS, as it is used as the correct location of census individuals. This was used to model the probability of correct enumeration, using a fixed effects, logistic regression model. Both numerical issues in the model fitting process and timescales meant that random effects were not included in this model.

As for undercoverage, a person's characteristics are used to produce an estimated census correct enumeration probability. Each observed census record therefore gets the corresponding census response probability and correct enumeration probability. For example, a person with the 0.95 response probability might have a correct enumeration probability of 0.995. The response probability can be transformed to the coverage weight by taking a reciprocal of the probability (1/0.95 = 1.053). However, for overcoverage estimation, the aim is to down-weight the census estimate and therefore the undercoverage weights are multiplied by the correct enumeration probabilities. Where undercoverage error is estimated and correcting for overcoverage error, we have a weight of around 1.047 (0.995x1.053), meaning that if we observe 1,000 individuals in the census data, we can sum up the corresponding weights to estimate the population total for individuals with such characteristics as 1,047.37.

We can estimate part of the overcoverage - duplicate responses - directly from census data, rather than relying on the much smaller CCS. To do this, we sampled from the census, and then attempted to match those cases to the rest of the census dataset. The proportion of sampled cases that matched gave us the duplication probability. This process was done by strata, to ensure good coverage of those groups at higher risk of overcoverage (for example students or those with second homes).

Following this census-to-census matching, the results from the overcoverage model were normalised to match. This allowed us to estimate correct enumeration at the person level, but using the improved sample size of the census compared to the CCS.

The estimated level of overcoverage in Census 2021 was 0.96%, compared to 0.6% in 2011.

Following both undercoverage and overcoverage, population totals were estimated from the weights produced. This was done for each LA, by key characteristic. The adjustment process then imputed records in order that the census database met these totals. Because undercoverage is larger than overcoverage, this involved adding records and not removing any records.

Bias adjustment

Based on the experience of the previous censuses, we understood that it might not be possible in practice to meet some of the assumptions needed to produce the coverage adjusted population estimates with ignorable levels of bias. For example, people who have not responded to the census are less likely to respond to the CCS, creating a potential downwards bias in the estimates. Therefore, the development of methods to adjust for certain biases was also part of the coverage estimation.

To do this, an alternative estimate was needed. Similar to previous censuses, an Alternative Household Estimate[8] was calculated. The change to using mixed-effects logic regression for Census 2021 coverage estimation meant that the way adjustment was applied was different to previous censuses, as outlined in the paper Adjusting for the dependence bias in the Census 2021 coverage estimation.[9]

There were several dependence bias adjustment methods designed and tested at the research stage for Census 2021. The approach chosen was the direct adjustment method with reweighting (apportionment) based on the initial undercoverage probabilities. In 2011, all LAs were adjusted for dependence bias; in 2021, only five were adjusted.

Confidence intervals

Confidence intervals are calculated at national and LA level as part of the coverage estimation process; they reflect the statistical uncertainty in the estimates of non-response to the census. We used standard techniques to estimate the variance in our estimates, which were used to calculate the confidence intervals. These confidence intervals are reported against the quality criteria. The headline confidence intervals for Census 2021 and more information can be found in Chapter 7: Quality of Census 2021 data. The lower and upper confidence intervals are not necessarily symmetrical around the estimate, reflecting the mixture of undercoverage and overcoverage. More information and confidence intervals for certain characteristics, by region and LA can be found on the Census Quality Measures page on the ONS website.[10]

6.4.4 Coverage adjustment

Following census coverage estimation, we had estimates of the size and characteristics of the population and housing across England and Wales and at a LA level. The purpose of census coverage adjustment was to amend the unit level census database so that it was consistent with those population estimates. By adjusting the database so that it agreed with the coverage estimates, robust census population outputs could be obtained for lower-level geographical areas that would account for types of persons and households estimated to have been missed by the census.

The coverage adjustment process sought to create a representative statistical dataset, rather than an accurate unit level database. The added records therefore ensure that the local estimates are statistically representative of the population, rather than attempting to represent specific individuals and households.

An adjusted database provides outputs that account for missed persons and households, can be produced for small geographical areas or for more detailed characteristic breakdowns, and will aggregate to any other outputs (for example, LA or national level) as they are from the same database.

The household and CE populations were adjusted separately, but the overall strategy was the same. The adjustment process imputed persons, households and CEs into the census database for the usual resident population. The 2021 adjustment strategy for the household and CE populations consisted of two main stages. This section focusses on households, with more information on CEs in section 6.5.

The first stage focussed on key demographic characteristics, identifying the numbers of persons and households each LA area needed to reflect the coverage population estimates by various characteristics. Using an integer optimisation algorithm, we chose households that had responded to the census to be the imputed households, together with the people within them. A responding household could be chosen more than once, with some limits. The algorithm ensured the donors selected would mean that the database added up to the correct household and person totals by variables such as age, sex, tenure and ethnicity. It then placed these imputed households and the persons within them into an appropriate small area within the LA area.

The second stage was to impute the remaining characteristic variables for those households and persons, as the donor records included only certain characteristics. The post-adjustment editing and imputation process imputed the remaining characteristics and information using the CANCEIS methods and software.

Some of the key changes from 2011 included:

- adjustment at LA level directly, meaning that small area outputs from the adjusted database better accounted for non-response
- whole-household imputation only
- using the Combinatorial Optimisation method for household donor selection, which provided a simpler and more transparent method for selecting households and persons that best captured the estimated non-response

The adjustment imputation methodology worked well to provide a census database that was fully adjusted to take account of the measured coverage, adding wholly missed households and persons within them, wholly missed CEs, and persons within any CEs. The coverage adjustment process added in 1.8 million usual resident people to the Census 2021 household and CE population. The 2011 adjustment process added 3.4 million people, reflecting the lower response rate to that census.

Table 6.4: Components of the census estimate of usual residents, 2021 and 2011, England and Wales

Component	Number in Census 2021	Percentage of Census 2021 estimate	Number in 2011 Census	Percentage of 2011 Census estimate
Census count of usual residents	57,787,700	97%	52,638,800	94 %
Change due to				
Undercoverage in households	2,138,900	3.6%	2,804,800	5.0%
Overcount in households	-596,200	-1.0%	-352,000	-0.6%
Undercoverage in communal establishments	220,400	0.4%	97,900	0.2%
Other adjustments	46,700	0.1%	-	-
Change due to bias adjustment	-	-	583,000	1.0%
Change due to national adjustment	-	-	303,400	0.5%
Total published census estimate	59,597,500	100%	56,075,900	100%

Note:

- "Other adjustments" includes adjusted estimates for 3 to 15 year olds in Wales and the North East (see section 6.6) and constraining the number of households to the Alternative Household Estimate

More information about the strategy and detail on the methods used can be found in our publication Coverage adjustment for Census 2021.[11]

6.5 Communal establishment estimation and adjustment

The methods used for communal establishments (CEs) were similar to those for households, but differed depending on the size of the CE. Our publication CE estimation and adjustment for Census 2021[12] provides further detail and sets out how the overall impact of estimation varied depending on factors such as age and sex, the type of establishment, and region or country.

6.5.1 Small communal establishments

Small CEs were establishments with fewer than 50 residents (a change from 2011 when the definition was fewer than 100 bed spaces). We estimated undercoverage in small CEs in a similar way to that in the general household population, using the CCS. The CCS contained around 193 small CEs and obtained a 33.38% return rate. We subsequently ran country-level regression-based dual-system estimation (DSE)[13] by collapsed age-sex groups, collapsed region and hard-to-count index.

We did not estimate overcoverage for small CEs. Overcoverage is assumed to be small compared with undercoverage, which means that it is harder to estimate (especially for a relatively small population such as those in CEs) and has less impact. The adjustment was carried out at Delivery Group level (groupings of one or more LAs) for small CEs, the donor pool being respondents in the Delivery Group.

6.5.2 Large communal establishments

Large CEs were those containing 50 or more residents, indicated by: the number of census returns against the establishment; the number of residents reported on the CE manager form; or the comparator administrative data sources used in large CE estimation. Where large CEs were missed by the census, the adjustment process added these prior to imputation of CE residents.

It was impractical to use the CCS for large CEs. Instead, administrative data sources, either collated by the ONS (such as the Student Hall Survey, an innovation for Census 2021 that was expanded due to the impact of the coronavirus pandemic lockdown) or sourced from other public bodies (such as Ministry of Justice data on prisons), were primarily used to correct for population undercounts. More information on these can be found in our publication Administrative data used in Census 2021.[14]

Roughly 4,500 large CEs were considered for estimation. In cases where estimation was required, for each age and sex cohort in the CE, the original census resident count for an establishment was compared with the administrative data. A shortfall, which is the resident non-response, was then calculated and the census resident count was amended to align with it.

Where a particular cohort (of age and sex) was over-represented in the census count, the adjustment for the shortfall in other cohorts was adjusted so that the overall total occupancy matched that in the admin data. Finally, where there was no admin data, a "borrowing strength" method was implemented which harnessed the insights on the scale of estimation occurring at a national level for each establishment type and the age and sex breakdown, applying these as scalar values to constrained targets for the remaining establishments. The adjustment for large CEs was done at Unique Property Reference Number (UPRN) level, with the donor pool being respondents within the CE.

6.5.3 Result of CE estimation and adjustment

The estimation and adjustment process added over 220,000 to the count of CE residents to provide an estimated population of 1.04 million and a response rate of 79%. Table 6.5 shows the response rates and the impact of estimation for different types of CE.

Table 6.5: Impact of the communal establishment (CE) estimation by the type of CE, Census 2021

Type of CE	Count	Adjustment	Estimate	Response rate
General hospital	1,100	200	1,300	85%
Mental health hospital	9,500	1,800	11,400	84%
Care home without nursing	161,600	24,300	185,900	87%
Care home with nursing	141,000	20,500	161,600	87%
Children's home	2,900	800	3,600	79%
Boarding school	53,500	8,900	62,400	86%
Hall of residence	322,600	89,300	411,900	78%
Defence establishment	16,800	25,100	42,000	40%
Prison	34,900	30,700	65,600	53%
Approved premises	1,000	500	1,500	64%
Detention centre	<100	100	200	34%

Type of CE	Count	Adjustment	Estimate	Response rate
Hotel, guest house, B&B, or youth hostel	11,400	3,700	15,000	76%
Holiday accommodation	1,400	<100	1,400	96%
Hostel or temporary shelter for the homeless	10,800	3,400	14,200	76%
Religious establishment	3,000	600	3,600	84%
Staff or key worker accommodation	1,800	500	2,300	77%
Other accommodation	47,800	9,800	57,600	83%
Total	**821,200**	**220,400**	**1,041,700**	**79%**

Notes:

- Totals may not sum due to rounding.
- "Other accommodation" refers to any accommodation categorised as the following: Other hospital, other medical or care establishment, education other, other detention centre, other travel or temporary accommodation, other accommodation, missing nature of establishment.

6.6 Quality Assurance

The census data went through a rigorous quality assurance (QA) process to ensure that:

- the data were being processed correctly
- unexpected features of the data were dealt with appropriately
- the final estimates were plausible in the context of the other information available to us

Our initial plans for QA activities built on the approach used in the 2011 Census. We used the 2019 Census Rehearsal as a test of our first methods and tools and, in January 2020, published our planned strategy and approach to census

QA.[15] The published planned approach evolved as a result of users' feedback, developments in availability of comparator data, and the priorities that emerged from analysis of the census data. The final approach is summarised here and described in more detail in How we assured the quality of Census 2021 estimates.[16]

The first strand of QA was checking that the data were being processed correctly. This was conducted in two stages. First, the team responsible for each process described in this chapter carried out their own checks to ensure that the process had worked as intended. Second, a separate specialist QA team looked at the data coming out of that process with a view to identifying unexpected patterns resulting from the process or aspects of the processed data which could have caused problems elsewhere in the census data process.

The second strand looked at whether the statistics based on the census data were plausible in the context of other information available to us. This considered the national and subnational population estimates and the estimates for each topic covered in the census. This work benefitted from the greater availability, compared to previous censuses, to ONS of other data sources that could be used in assessing the census data, though comparisons of sources needed to take account of differences in definitions and reference dates of the data. The latter was particularly important where the pandemic might have had a material effect on where people were recorded as living, or how the comparator data was collected. Much of the information used in this part of our QA was taken from the administrative sources described in the publication Administrative data in Census 2021, England and Wales.[17] As described there, these sources generally provided information covering all of England and Wales, with country-specific sources used where needed and available.

The national population estimates derived from the census were assessed by a team of demographic analysts. This assessment covered, among other things:

- the size and age-structure of the population
- sex ratios at each age
- population distribution among households of different sizes and different types of CE
- evaluation of implied fertility, mortality, and migration since the 2011 Census

Population estimates for all LA areas in England and Wales, and smaller areas within each LA, went through a comprehensive set of standard checks. Where these checks identified any areas of concern, further investigations were conducted to understand whether there was evidence of the census data for the area being implausible.

We also conducted further investigation of evidence provided by LAs as part of our Local Authority Insight initiative. This was a major addition to our published planned approach and enabled us to make use of the specialist expertise LAs have on the characteristics of their areas. For the first time, we invited LAs to contribute to our QA of the estimates for their area, giving all LAs and other relevant bodies, including combined authorities and the Welsh Government, the chance to see indicative census estimates before the data processing was complete. This meant that they could tell us about any aspect of those estimates where other evidence suggested we needed to look at it again within our QA process. We developed this initiative in consultation with the Office for Statistics Regulation (OSR) to make sure that providing indicative estimates for QA purposes in this way was consistent with the Code of Practice for Statistics. In total, 255 organisations accepted the invitation, and we received feedback from 174 (including feedback stating no inconsistencies were being raised).

In addition to our assurance of the population estimates, we also conducted detailed assurance of the census results for each topic included on the census questionnaire. This analysis included:

- assessments of response-rate profiles
- comparisons with available data sources on each topic
- comparisons with 2011 subnational patterns
- consideration of any potential issues raised by users or arising elsewhere in the QA process

We used QA panels, consisting of two or more ONS experts on population or social statistics who were independent of the QA team, to evaluate the evidence we collated on population estimates (nationally and for each LA) and the topic results. We ran more than 100 panels looking at population estimates, making sure that each area received individual consideration both in the initial investigation and in the evaluation of that investigation. The vast majority of panels resulted in the estimates being endorsed as of good quality and suitable for publication. Where a panel did not endorse the estimates, these were escalated for further discussion.

Where the conclusion of the panel's work was that there was a quality issue that needed to be addressed, there were a number of possible actions. These included:

- direct editing of records where a process had not worked as desired (for example if a particular response to a text write-in box had been systematically mis-coded)
- adjustment of the statistical models through which estimates are produced
- the addition of new methods
- the development of quality notes to accompany statistics alongside their release

The LA population estimate and topic QA panels reported to a high-level QA panel. This in turn made recommendations to an executive panel, which signed off the census results for publication. The executive panel consisted of the National Statistician, the Deputy National Statistician responsible for the census, and the Chief Statistician for Wales.

The Welsh Government was closely involved in the Census 2021 QA process. In addition to being part of the executive panel stage, the Welsh Government took part in the LA Insight Initiative and were involved in the QA of estimates for Wales, including Welsh language ability.

As a result of the QA process, we made a small number of adjustments. These included:

Improving estimation of full-time students

Estimating students in Census 2021 was complicated by the pandemic and lockdown restrictions and the greater likelihood of students not being at their term-time address during the census. As described earlier in this chapter, to mitigate issues identified during the data-collection operation, we made a student address adjustment (see section 6.2.5) and expanded our post-census survey of halls of residence as part of our estimation process (see section 6.5.2).

Using alternative methods to estimate undercoverage in selected areas

Though the standard methods for estimating and adjusting for undercoverage worked well in the great majority of areas, there were 19 LA areas where the QA suggested that those methods had not worked as planned. In four of those areas, where the evidence suggested the standard methods had estimated too many households, we used the Alternative Household Estimate (see section 6.4.3) to calibrate the initial estimates. In the remaining 15 areas, where the evidence suggested the standard methods had estimated too few households, we applied a simpler version of the standard undercoverage estimation model, which was designed to be less sensitive to any difficulties with the CCS in that area and which could produce more robust estimates.

Adjusting estimates for people aged under 16

Lower than expected initial estimates for 0- to 2-year-olds were identified in our QA and corroborated by LA feedback. We adjusted the estimates for this age group using evidence from births registration and NHS Personal Demographic Service data. We also adjusted our estimates for 3- to 15-year-olds in Wales and the North East. Initial estimates for this age group were assessed as being implausibly low compared to other data sources in Wales and the North East region. The initial estimates for this age group in these areas were calibrated to evidence from other data sources.

More information on these adjustments is provided in our publication Maximising the quality of Census 2021 population estimates.[18]

Endnotes

1 **Automated text coding**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/automatedtextcodingcensus2021

2 **Improving the accuracy of the Census 2021 data by resolving multiple responses (RMR)**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/improvingtheaccuracyofthecensus2021databyresolvingmultipleresponsesrmr

3 **Item editing and imputation process for Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/itemeditingandimputationprocessforcensus2021englandandwales

4 **Trout, Catfish and Roach The beginner's guide to census population estimates (pdf)**
https://webarchive.nationalarchives.gov.uk/ukgwa/20160105160709/http:/www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/census-coverage-survey/trout--catfish-and-roach---the-beginner-s-guide-to-census-population-estimates.pdf

5 **Coverage estimation for Census 2021 in England and Wales**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/coverageestimationforcensus2021inenglandandwales

6 **Linkage methods for Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/linkagemethodsforcensus2021inenglandandwales

7 **Methodology report on coverage matching for the 2021 Census (docx)**
https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2020/07/EAP107-Methodology-report-on-coverage-matching-for-the-2021-Census.docx

8 **Alternative Household Estimate 2021 (pdf)**
https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2022/05/EAP173-Alternative-Household-Estimate-2021.pdf

9 **Adjusting for the dependence bias in the coverage estimation of the 2021 Census of England & Wales (pdf)**
https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2022/08/EAP160-Adjusting-for-the-dependence-bias-in-the-Census-2021-coverage-estimation.pdf

10 **Measures showing the quality of Census 2021 estimates**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/measuresshowingthequalityofcensus2021estimates#confidence-intervals-england-and-wales

11 **Coverage adjustment for Census 2021 in England and Wales**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/coverageadjustmentforcensus2021inenglandandwales

12 **Communal establishment (CE) estimation and adjustment: Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/communalestablishmentceestimationandadjustmentcensus2021

13 **Trout, Catfish and Roach The beginner's guide to census population estimates (pdf)**
https://webarchive.nationalarchives.gov.uk/ukgwa/20160105160709/http:/www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/census-coverage-survey/trout--catfish-and-roach---the-beginner-s-guide-to-census-population-estimates.pdf

14 **Administrative data used in Census 2021, England and Wales**
https://www.ons.gov.uk/releases/administrativedatausedincensus2021englandandwales

15 **Quality assurance of Census 2021**
https://www.ons.gov.uk/census/planningforcensus2021/qualityassuranceofcensus2021

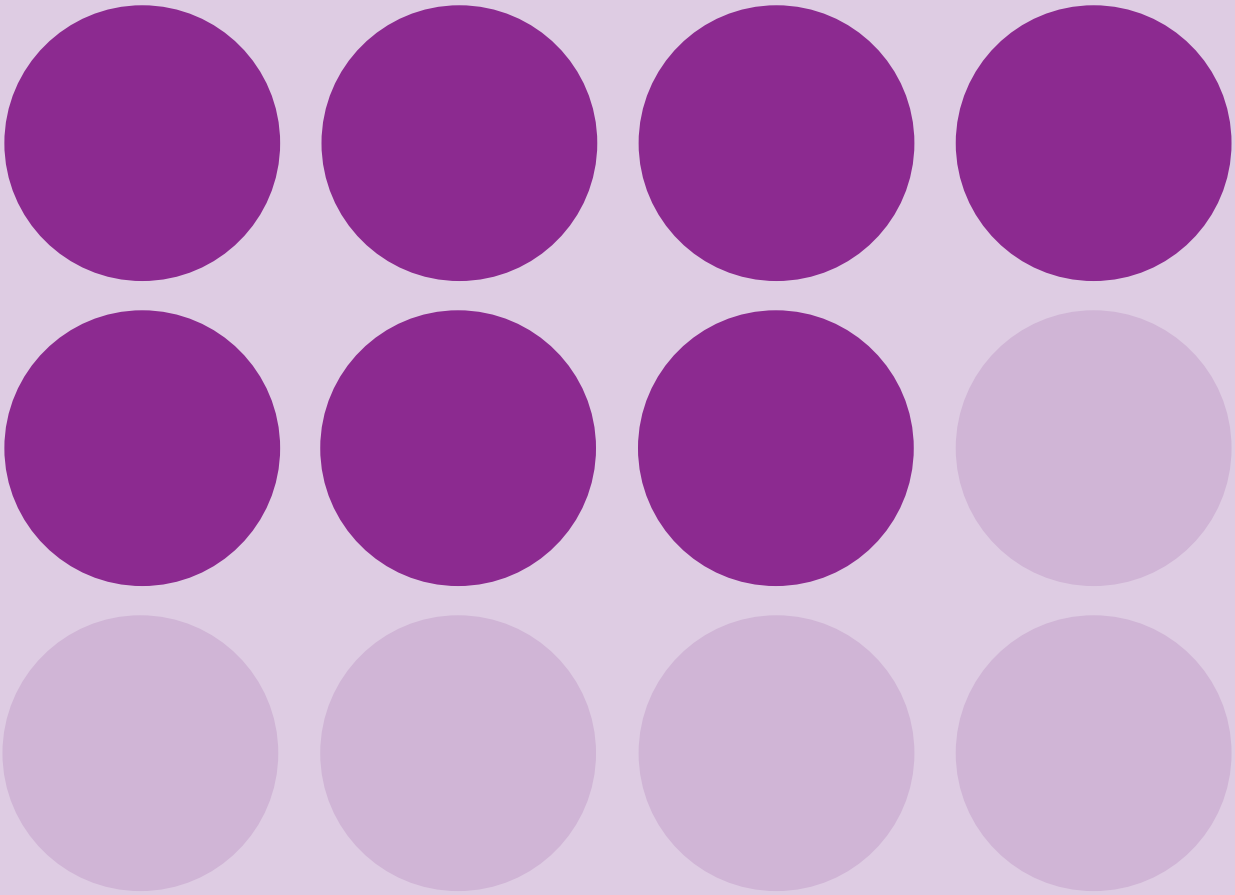
16 **How we assured the quality of Census 2021 estimates**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/howweassuredthequalityofcensus2021estimates

17 **Administrative data used in Census 2021, England and Wales**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/administrativedatausedincensus2021englandandwales

18 **Maximising the quality of Census 2021 population estimates**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/maximisingthequalityofcensus2021populationestimates

Quality of Census 2021 data

07



The quality of a census is about **producing results that are fit for purpose** and meet user requirements.

7.1 Introduction

This chapter summarises the results of ONS's assessment of the accuracy of Census 2021. Information on other aspects of statistical quality, such as relevance and timeliness, is provided elsewhere in this report and in our publication Quality and methodology information for Census 2021.[1]

Census 2021 exceeded the quality targets set out in paragraphs 1.7 and 1.8 of the December 2018 white paper and in section 1.5: Strategic aims and objectives for 2021 Census in this general report. These targets included person response rates of 94% overall and at least 80% in every local authority (LA), which we exceeded with a 97% overall person response rate and over 88% in every LA.

7.2 Accuracy of the Census population estimates

As described in chapter 6: Processing and estimation, the census population estimates represent all usual residents, including those who responded to the census and an adjustment for estimated net undercoverage to account for those who did not respond. This adjustment is largely based on data collected through the Census Coverage Survey (CCS).

Because the final census estimates incorporated evidence from the CCS sample, they were subject to sampling error. As with any sample, different people would be selected if the sample was randomly drawn again, and slightly different estimates would be produced based on this different sample. The spread of these estimates is known as the sampling variability, and confidence intervals are used to present the sampling variability. A 95% confidence interval is a range within which the true population parameter would fall for 95% of all possible samples that could have been selected.

As set out in the 2018 white paper (and in section 1.5: Strategic aims and objectives for Census 2021), our confidence interval targets for Census 2021 were for England and Wales population estimates with a confidence interval +/ 0.2%, with bias less than 0.5%, and local estimates with 95% confidence intervals for all LAs of +/-3%. Following feedback from users, we calculated asymmetrical confidence intervals for Census 2021 rather than intervals that were symmetrical around the estimate, as used for previous censuses. This meant that the target interval widths are better expressed as 0.4% for England and Wales and 6% for LAs. Table 7.1 provides the 95% confidence intervals for the household population estimates from the 2011 and 2021 censuses, showing that the 0.23% total width of the confidence interval for Census 2021 was substantially lower than the 0.4% width of the target interval, and lower than the 0.3% interval width for the 2011 Census.

Table 7.1: 95% confidence intervals for estimate of usual residents living in households for 2011 and 2021 Censuses, England and Wales

	Lower limit	Upper limit	Total width of interval
2011	0.15%	0.15%	0.30%
2021	0.16%	0.07%	0.23%

Table 7.2 shows the distribution of relative confidence intervals for the LA population estimates in the 2011 and 2021 censuses. It shows, for example, that 7% of LAs had a census population estimate in 2021 with the width of the associated confidence interval less than 1 percentage point of the estimate. As with the England and Wales population estimates, the confidence intervals for 2021 are not necessarily symmetrical: where for 2011 the intervals were described as symmetrical (for example a 2% interval width as +/-1%), for 2021 the overall width of the interval is used. The table shows that confidence intervals in 2021 are generally narrower than in 2011, meaning that the estimates were less subject to sampling variability. Nine LAs had confidence intervals wider than the target maximum width of 6% (based on a symmetrical target interval of +/-3%). Further reporting on confidence intervals for age, sex, ethnic group, activity last week and tenure, all by region or LA, is available to download from our Census Quality Measures page.[2]

Table 7.2: 95% confidence interval distribution for 2011 and 2021 Censuses for local authorities in England and Wales

Width of 95% confidence interval	Distribution of local authorities in 2011	Distribution of local authorities in 2021
Less than 1%	0%	7%
Up to 2%	28%	34%
Up to 3%	38%	33%
Up to 4%	22%	18%
Up to 5%	7%	5%
Up to 6%	3%	1%
6% or more	3%	3%
Number of local authorities	348	331

Note:

- Interval width ranges include the widths up to but not including the maximum stated width. For example, "Up to 2%" includes interval widths from exactly 1% up to but not including 2%, and "6% or more" includes widths of exactly 6% and greater.

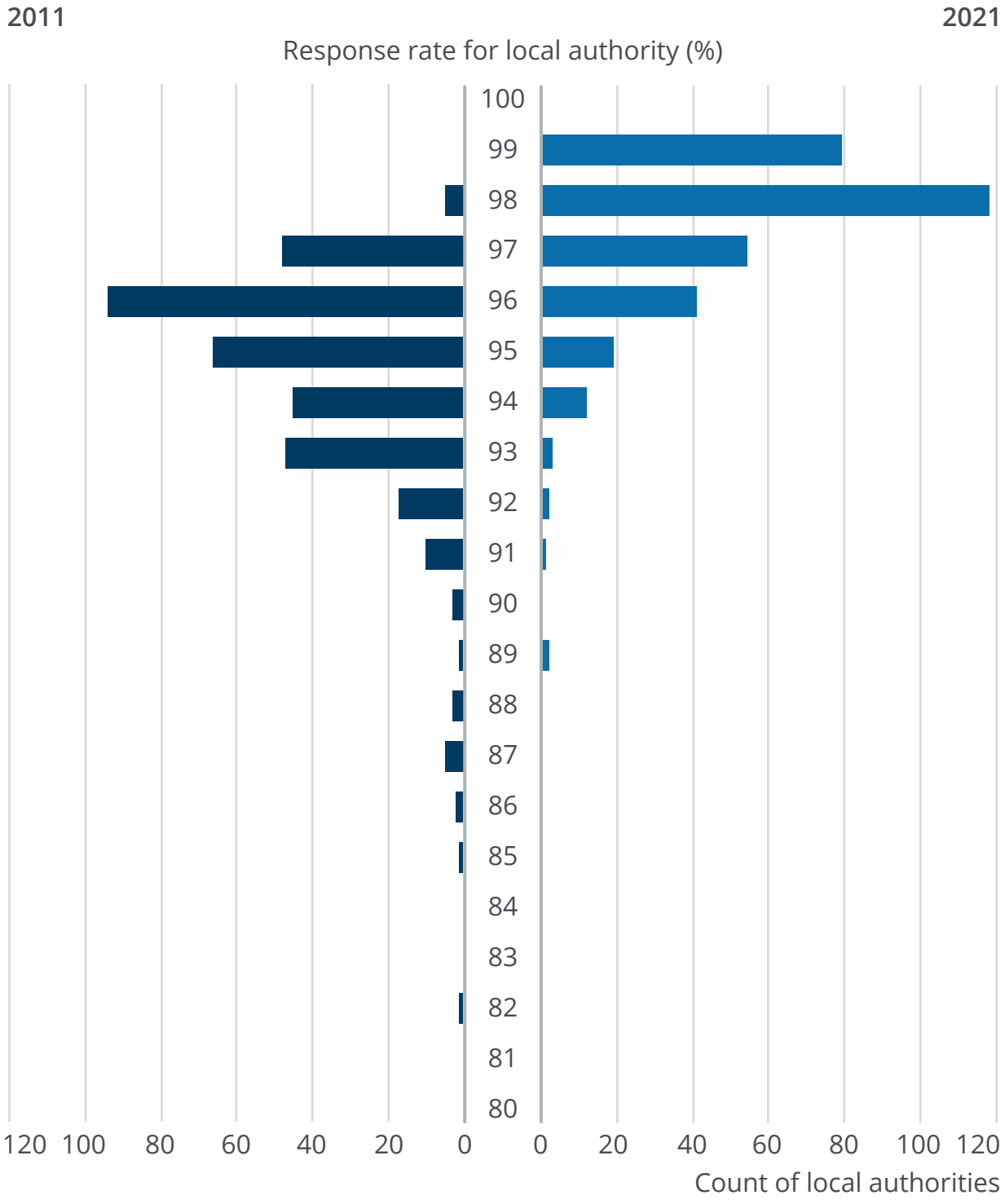
7.3 Response rates

Achieving narrow confidence intervals was not, on its own, enough to deliver the quality estimates that users required, especially for small areas and small populations. Maximising overall response rates and minimising variation in response rates across population groups were also critical to ensure that there were no particular gaps in the population estimates. Therefore, reviewing response rates and variation in response helps to understand further the coverage of the census estimates. As set out in section 4.8.3 Household return and response rates, while household return rates were our operational measure during the collection phase, response rates are our output measure for both persons and households and are the focus of this section.

7.3.1 Response rates by local authority area

The estimated overall response rate to the 2021 Census was 97%. This is materially higher than the 94% achieved in 2011. An important aspect of obtaining good quality statistics for every LA was in reducing the variation in response rates amongst these areas. Figure 7.1 illustrates the distribution of response rates from the 2011 and 2021 censuses. Not only were response rates generally higher in 2021 and well above our target of 80% in each LA area, we also reduced the variation in response rates, with no major outliers at the bottom of the distribution and more than half of all LAs having a response rate between 96.5% and 98.5%.

Figure 7.1: Person response rates for local authorities in 2011 and 2021 Censuses, England and Wales



7.3.2 Response rates by demographic characteristics

Our methods also sought to reduce variability in response rates by different demographic characteristics. Figure 7.2 shows response rates by age and sex from the 2011 and 2021 censuses. It shows that response rates for all these groups were higher in 2021 than in 2011 and variation was substantially improved in 2021.

Figure 7.2: Response rates by five-year age bands and sex, 2011 and 2021 Censuses, England and Wales

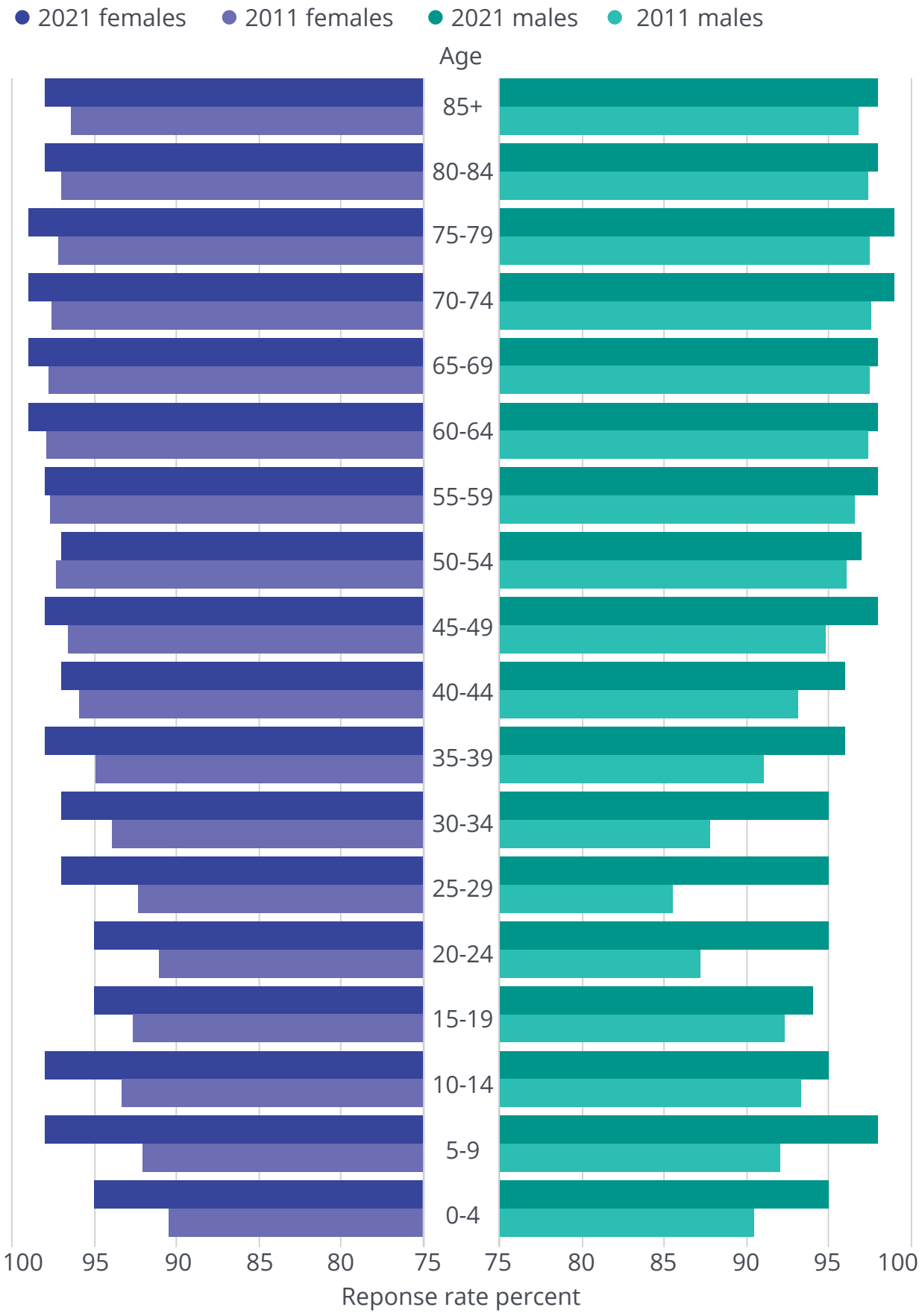


Table 7.3 shows response rates by ethnic group in 2011 and 2021. This shows both an improvement in response rates across ethnic groups and a reduction in variation between groups, none of which had a response rate of under 92%.

Table 7.3: Response rates by ethnic group, 2011 and 2021 censuses

Ethnic group	2011 Census	2021 Census	Change from 2011 (percentage point)
White: English, Welsh, Scottish, Northern Irish or British	95%	98%	3
White: Irish	94%	96%	2
White: Gypsy or Irish Traveller	90%	92%	2
White: Roma	-	92%	n/a
White: Other White	90%	94%	4
Mixed or Multiple ethnic groups: White and Black Caribbean	83%	95%	12
Mixed or Multiple ethnic groups: White and Black African	83%	95%	12
Mixed or Multiple ethnic groups: White and Asian	85%	96%	11
Mixed or Multiple ethnic groups: Other Mixed or Multiple ethnic groups	83%	95%	12
Asian, Asian British or Asian Welsh: Indian	94%	96%	2
Asian, Asian British or Asian Welsh: Pakistani	94%	94%	0
Asian, Asian British or Asian Welsh: Bangladeshi	93%	94%	1
Asian, Asian British or Asian Welsh: Chinese	85%	93%	8
Asian, Asian British or Asian Welsh: Other Asian	85%	95%	10
Black, Black British, Black Welsh, Caribbean or African: Caribbean	88%	94%	6
Black, Black British, Black Welsh, Caribbean or African: African	92%	92%	0
Black, Black British, Black Welsh, Caribbean or African: Other Black	64%	93%	29

Ethnic group	2011 Census	2021 Census	Change from 2011 (percentage point)
Other ethnic group: Arab	72%	92%	20
Other ethnic group: Any other ethnic group	74%	94%	20

7.3.3 Completeness and accuracy of characteristics data

Another key objective for the quality of data was to provide the most accurate possible information about the characteristics of the population of England and Wales. Meeting this objective mainly depended on a combination of high levels of completeness of the census questionnaires, and accurate responses to the individual questions on which information was collected. These two aims were assessed through levels of completeness and measurement error.

Levels of completeness were measured through item non-response rates (for example the rate of non-completion for a particular question, such as 'sex', on a returned questionnaire) as derived from the start of the edit and imputation process (see section 6.3).

Measurement error was measured through the Census Quality Survey (CQS), in which a sample of respondents to the census were re-asked the census questions in a follow-up interview, and their CQS answers compared with their responses in the census to derive measures of agreement. These agreement rates are the percentage of CQS responses to each question which are the same as the response given by that person on the census. Where people gave different answers, this might be because of a mistake in completing the census or a mistake answering the CQS. This means that the CQS does not give us an exact measure of 'respondent error' in the census. However, it does indicate which questions might be more subject to that error and the possible scale of such error.

Table 7.4 summarises these two measures, where available, for questions asked on the census questionnaire for 2011 and 2021. As these measures can be affected by changes in definitions and questions asked in 2011 and 2021, data users are advised to consult the detailed publications on these measures if drawing any conclusions from these statistics.

In general, the level of question completeness was higher in 2021 than in 2011. This is plausibly attributable to the extent of online completion, where users were prompted to complete any questions that had been missed before submitting the response. The questions where completeness was lower in 2021 largely related to employment. It is possible that, despite the additional guidance provided on how to answer if people's circumstances were affected by the coronavirus pandemic, some respondents were not sure how to answer these questions or less willing to do so.

Three questions asked in the 2021 census – those relating to religion, sexual orientation and gender identity – were voluntary. While all achieved reasonably high response rates (broadly comparable with the religion question in 2011) we did not impute answers to these questions if they were left blank on a response. This means that the coded data, and published statistics, include a 'Not answered' category. This must be borne in mind if using the census results for these topics.

Question agreement rates were also generally higher in 2021 than 2011 as shown in table 7.5.

Table 7.4: Item non-response rates for household and individual questions, 2021 and 2011 Censuses, England and Wales

Household questions	2021 total	2021 non-response	2021 percentage non-response	2011 total	2011 non-response	2011 percentage non-response
Accommodation type	24,816,919	227,292	0.9	22,877,116	583,330	2.5
Self-contained	24,816,919	188,278	0.8	22,877,116	638,337	2.8
Number of rooms	24,816,919	786,775	3.2	22,877,116	709,899	3.1
Number of bedrooms	24,816,919	268,249	1.1	22,877,116	599,783	2.6
Central heating	24,816,919	535,444	2.2	22,190,830	500,548	2.3
Tenure or Ownership	24,118,648	242,883	1.0	22,190,830	508,026	2.3
Landlord	9,050,536	227,019	2.5	7,717,860	215,023	2.8
Car or van availability	24,118,648	230,085	1.0	22,877,116	820,842	3.6

Individual questions	2021 total	2021 non-response	2021 percentage non-response	2011 total	2011 non-response	2011 percentage non-response
Age	58,623,712	89,311	0.2	53,483,440	319,318	0.6
Sex	58,623,712	160,026	0.3	53,483,440	224,632	0.4
Marital and civil partner status	48,464,416	398,353	0.8	53,483,440	2,051,766	3.8
Second address indicator	58,623,712	410,855	0.7	53,483,440	1,846,458	3.5
Second address type	3,700,179	29,037	0.8	3,274,116	218,661	6.7
Schoolchild or student	55,550,719	298,804	0.5	53,483,440	1,744,592	3.3
Term-time address	11,832,118	22,398	0.2	11,606,900	158,845	1.4
Activity last week	47,205,146	366,708	0.8	43,041,335	2,171,951	5.1
Relationship to person one	33,646,405	502,699	1.5	30,334,673	1,203,389	4.0
Country of birth	57,923,737	257,673	0.4	52,791,310	799,888	1.5
Arrival in the UK	9,584,583	287,205	3.0	6,858,268	325,526	4.8
Intention to stay	617,948	19,660	3.2	593,837	86,289	14.5
National identity	57,923,737	553,557	1.0	52,791,310	1,022,572	1.9
Ethnic group	57,923,737	757,388	1.3	52,791,310	1,594,934	3.0

Individual questions	2021 total	2021 non-response	2021 percentage non-response	2011 total	2011 non-response	2011 percentage non-response
Main language	56,157,359	521,342	0.9	52,791,310	1,328,103	2.5
Welsh language	2,915,527	41,572	1.4	2,861,188	96,232	3.4
Proficiency in English	4,903,350	49,740	1.0	3,929,255	142,258	3.6
Religion	57,923,737	3,455,589	6.0	53,068,054	3,759,421	7.1
Address one year ago	57,370,277	796,109	1.4	52,150,252	2,004,386	3.8
Passports held	57,923,737	736,229	1.3	56,753,939	1,315,071	2.3
General health	57,923,737	486,592	0.8	52,791,310	852,962	1.6
Provision of unpaid care	54,850,744	639,169	1.2	52,791,310	1,855,021	3.5
Long-term health problem or disability	57,923,737	750,537	1.3	52,791,310	1,675,266	3.2
Qualifications	47,205,146	1,259,483	2.7	43,041,341	2,433,278	5.7
Ever worked	20,101,052	400,537	2.0	17,786,664	316,241	1.8
Employment status	42,145,734	686,040	1.6	39,687,495	1,582,350	4.0
Occupation - working	27,104,094	822,354	3.0	25,254,678	578,001	2.3
Supervisor status	42,145,734	1,004,404	2.4	39,687,495	1,711,054	4.3

Individual questions	2021 total	2021 non-response	2021 percentage non-response	2011 total	2011 non-response	2011 percentage non-response
Industry - working	27,104,094	2,704,363	10.0	25,254,678	1,813,175	7.2
Workplace postcode	14,726,336	2,517,890	17.1	20,371,182	2,548,343	12.5
Method of travel to work	27,104,094	307,188	1.1	25,254,678	796,043	3.2
Hours worked	27,104,094	365,395	1.3	25,254,678	854,256	3.4
Gender identity	47,205,146	2,786,269	5.9	-	-	-
Sexual orientation	47,205,146	3,481,800	7.4	-	-	-
UK armed forces veterans	47,205,146	1,056,218	2.2	-	-	-
Position in communal establishment	858,659	157,494	18.3	957,937	106,028	11.1

Notes:

- 'Total' columns refer to all enumerated households and persons who were observed or imputed to require a response to the item. Includes short term-resident households or persons; excludes households and persons added by coverage adjustment.
- For number of Rooms: Census 2021 used data from the Valuation Office Agency (VOA)
- For national identity, the Census 2021 non-response figure here combines the categories of 'UK' and 'rest of world' in the published item non-response table. The 'total' figure is just under 90,000 higher than the previously published 'UK'

figure, as a small subset of responses had been omitted (where respondents writing in a national identity on paper had not also ticked 'other'). This error did not affect the census data and makes no material difference to the non-response rate.

- The voluntary questions asking about respondents' sexual orientation, gender identity and religion were not edited or imputed.

Table 7.5: Agreement rates between 2021 Census and Census Quality Survey

Household questions	2021 CQS agreement rate (%)	2021 Confidence interval (+/- %)	2011 CQS agreement rate (%)	2011 Confidence interval (+/- %)
Accommodation type	90.4	0.6	91.6	0.8
Self-contained	98.5	0.3	98.6	0.3
Number of bedrooms	93.0	0.5	91.4	0.8
Central heating	79.9	0.9	90.2	0.8
Tenure or Ownership	95.1	0.5	95.0	0.6
Landlord	88.0	1.5	87.6	1.8
Car or van availability	90.2	0.6	-	-

Individual questions	2021 CQS agreement rate (%)	2021 Confidence interval (+/- %)	2011 CQS agreement rate (%)	2011 Confidence interval (+/- %)
Age	99.2	0.2	98.4	0.3
Sex	99.3	0.2	99.7	0.1
Marital and civil partner status	96.6	0.3	98.1	0.3
Second address indicator	97.1	0.3	97.1	0.4

Individual questions	2021 CQS agreement rate (%)	2021 Confidence interval (+/- %)	2011 CQS agreement rate (%)	2011 Confidence interval (+/- %)
Schoolchild or student	99.1	0.2	97.6	0.3
Term-time address	-	-	98.9	0.5
Country of birth	98.9	0.2	99.1	0.3
National identity	59.2	0.9	60.4	1.4
Ethnic group	94.1	0.4	94.7	0.8
Main language	95.5	0.4	96.3	0.7
Welsh language	76.6	1.7	-	-
Religion	90.0	0.6	90.4	0.9
Address one year ago	97.0	0.3	95.5	0.6
Passports held	91.5	0.5	91.8	0.7
General health	66.6	0.8	68.2	1.2
Provision of unpaid care	90.1	0.5	90.9	0.7
Long-term health problem or disability	78.8	0.7	88.9	0.7
Qualifications	73.1	0.8	67.6	1.0
Ever worked	80.4	0.9	94.4	0.7
Employment status	95.1	0.4	94.7	0.5
Supervisor status	85.4	0.7	86.2	0.7
Workplace postcode	77.3	2.8	82.2	1.1

Individual questions	2021 CQS agreement rate (%)	2021 Confidence interval (+/- %)	2011 CQS agreement rate (%)	2011 Confidence interval (+/- %)
Method of travel to work	80.7	1.3	85.5	0.9
Hours worked	80.9	1.3	83.9	0.9
Gender identity	99.5	0.3	-	-
Sexual orientation	98.3	0.2	-	-
UK armed forces veterans	98.5	0.2	-	-

Notes:

- Welsh language: This question is asked only in Wales, meaning the CQS sample is smaller than for other questions
- Gender identity: The CQS sample included a boost of people who responded "no" to this question, indicating that they were trans, to allow for detailed analysis. To account for this when calculating the overall agreement rate for this question, custom weights were used. For more information, see the accompanying report.
- Workplace address: This question was only asked to people whose usual routine involved travelling to a workplace at the time of the census.
- Further information, including sample sizes can be found in Census Quality Survey agreement rates, England and Wales: Census 2021[3]

7.4 Issues specific to Census 2021

7.4.1 Impact of the coronavirus (COVID-19) pandemic on census data

The coronavirus pandemic and the restrictions in place at the time of Census 2021 (see section 1.11.3) had some specific impacts on the data collected in the census.

Place of usual residence

Census results relate to where people considered themselves to be 'usually resident' on Census Day (see section 2.4: population bases). For most people, the pandemic would not have affected where they considered themselves resident. However, for some students, and in some urban areas, there is evidence that the coronavirus pandemic did result in changes to where people lived. These changes might have been temporary for some and permanent for others.

Other chapters in this report describe the additional efforts taken to ensure that students were enumerated at their term-time addresses if they had them (in line with our updated definition – described in section 2.4).

While we are confident that the census population estimates are a reliable measure of the usual resident population as at Census Day, it is likely that some population groups will show relatively high rates of change in usual residence after the restrictions were removed. Our publication Quality and methodology information for Census 2021[4] includes more information about students and urban areas.

Labour market and travel to work statistics

Restrictions related to the pandemic affected the labour market data collected in the census. With many people working from home or on furlough as a result of the pandemic, these restrictions will have had an impact on estimates on economic activity and on travel to work patterns.

We published extra guidance to help people on furlough to answer the census questions about work. This guidance said that they should identify themselves as "temporarily away from work"; this would ensure they were still included in the economically active population. We are unable to determine whether furloughed people followed guidance. However, our research suggests that there are inconsistencies between the number of people answering "Temporarily away from work" in Census 2021 and other administrative data sources. More information on these issues is provided on our publication Labour market quality information for Census 2021.[5]

Similarly, it is unclear as to how representative the census statistics are of travel to work patterns as at Census Day. While census data always provide a snapshot in time, the impact of lockdown and furlough may mean that the Census 2021 results have limited utility in measuring pre- or post-pandemic travel patterns. More information can be found in our publication Travel to work quality information for Census 2021.[6]

7.4.2 New questions

Three questions were asked for the first time in Census 2021: those relating to previous service in the Armed Forces, sexual orientation, and gender identity.

Armed forces

We have identified no material quality issues around the census estimates related to previous service in the Armed Forces.

Sexual Orientation

Census estimates for sexual orientation reflect additional uncertainty due to being based on a voluntary question. In addition, some responses to the sexual orientation question that should have been coded to "All other sexual

orientations" in the detailed classification were incorrectly coded to "Pansexual". This error did not affect estimates using the standard census outputs classification based on the 'tick-box' responses options, which were used in most published tables, but did affect some tables using a more detailed nine-category classification (which used information from write-in responses). Corrected figures for these tables were published in November 2023.

Gender identity

Following user feedback on unexpected patterns in the census data on gender identity, further detailed investigation was conducted after the first release of estimates for this topic in early 2023, with a report on the findings published in November 2023.[7] Like sexual orientation, this was a voluntary question, bringing some additional uncertainty. There are good reasons to expect higher levels of uncertainty in the estimates relating to the trans population (those whose gender is different to their sex registered at birth) than for other census topics. We estimated the trans population to be 0.5%, or 1 in 200, a small proportion of the overall England and Wales population. This means that the census estimates could be substantially affected by the characteristics of census respondents who decided not to answer this voluntary question (more than 10 times the number of people who recorded that they were trans).

Furthermore, gender identity is a sensitive topic and one which relies on self-identification of a concept which people may interpret differently. Additionally, those completing the census on behalf of others might not report, or even know, how a person identifies.

The November 2023 report identified that the gender identity estimates from Census 2021 were broadly consistent with the best available comparator of the GP Patient Survey and international comparators. Data and analysis from the trans status and history question Scotland's Census[8], published in June 2024, provided additional comparable data to our gender identity estimates for England and Wales. The trans population estimate for Scotland (0.44%) was broadly comparable to England (0.55%) and Wales (0.40%). Some differences in estimates were to be expected, reflecting different questions, asked of different populations, at different points in time. However, these sources provide broadly consistent estimates at a national level.

Our focus has therefore been making sure limitations are clear for users of sub-national or other smaller group breakdowns of the data. Reflecting issues raised by others, our November 2023 report noted that some respondents may not have interpreted the question as intended, notably people with lower English language skills in some communities. The new evidence from Scotland's Census added greater weight to this statement. While we cannot quantify all the uncertainty surrounding responses to the Census 2021 question on gender identity, the available evidence did show there was potential for bias in how the question was answered by those who responded that they did not speak English well.

In September 2024, the ONS's Deputy National Statistician, Health, Population and Methods Group, wrote to the Head of the Office for Statistics Regulation (OSR) to request that the gender identity estimates from Census 2021 were no longer 'accredited official statistics' (previously known as National Statistics) and were instead classified as 'official statistics in development'. This would better reflect their innovative nature and the evolving understanding of measuring gender identity. Changing the designation of the statistics helps to signal the limitations arising from this issue, while also better signalling the fact that our knowledge and understanding of the best approach to collecting data on gender identity continues to evolve. The OSR confirmed its support for the proposed change in designation in the final report of its Review of statistics on gender identity based on data collected as part of the 2021 England and Wales Census.[9]

In December 2024, the Government Statistical Service harmonisation team, based in the ONS, updated its ongoing workplan with details of planned work to develop new harmonised standards for sex and gender identity data collection. In line with the OSR's September 2024 report's recommendations, we also confirmed that new analysis was being undertaken to provide more detailed information on the uncertainty associated with the Census 2021 gender identity estimates, and guidance on their appropriate use.[10] The findings from this analysis were published in March 2025.[11]

7.4.3 Welsh language ability

The Census 2021 estimate that 17.8% of people aged three years or older living in Wales were able to speak Welsh was a decrease of 1.2 percentage points since the 2011 Census. In contrast, estimates on Welsh speakers aged three years and older in Wales produced from the Annual Population Survey (APS) for the year ending 31 March 2021 were 3.4 percentage points higher than in the year ending 31 March 2011. The APS also estimated a much larger proportion of the population aged three years and older in Wales were able to speak Welsh (29.2% in the year ending 31 March 2021).

Differences in the estimates of Welsh language ability between the census and household surveys such as the APS are longstanding, and both the ONS and the Welsh Government have explored possible reasons for some of these differences in the past. While household surveys typically provide us with higher estimates of Welsh-speaking ability, this is the first time that the census has estimated declining numbers of Welsh speakers and the APS has estimated increasing numbers of Welsh speakers.

The Welsh Government considers the census to be the authoritative source for information about the Welsh language ability of the population in Wales. It uses census data to monitor progress against its aim of a million Welsh speakers by 2050, and wanted to understand more about these longstanding differences between the census and other data sources. In April 2023, the Welsh Government and the ONS published a joint workplan on coherence of Welsh language

statistics[12] outlining a programme of research to analyse these differences and potentially make recommendations on the future production of statistics on the Welsh language. This workplan involves several work projects, including quantitative and qualitative research.

The first findings from the workplan were published in October 2023[13], and considered linked, de-identified responses of individuals who had completed the Labour Force Survey (LFS) around the time of Census 2021. This research project was the first to be carried out entirely in the Integrated Data Service (see section 8.6.1). Work on the outstanding research projects from the joint workplan has continued in 2024 and 2025, alongside joint research on the provision of Welsh language statistics as part of our work on the future of population and migration statistics (see chapter 11).

Endnotes

1 **Quality and methodology information (QMI) for Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/qualityandmethodologyinformationqmiforcensus2021

2 **Measures showing the quality of Census 2021 estimates**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/measuresshowingthequalityofcensus2021estimates

3 **Census Quality Survey agreement rates, England and Wales: Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/censusqualitysurveyagreementratesenglandandwalescensus2021

4 **Quality and methodology information (QMI) for Census 2021**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/qualityandmethodologyinformationqmiforcensus2021

5 **Labour market quality information for Census 2021**
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/methodologies/labourmarketqualityinformationforcensus2021

6 **Travel to work quality information for Census 2021**
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/traveltoworkqualityinformationforcensus2021

7 **Quality of Census 2021 gender identity data**
https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/genderidentity/articles/qualityofcensus2021genderidentitydata/2023-11-13

8 **Quality Assurance report - Sexual orientation and trans status or history**
https://www.scotlandscensus.gov.uk/2022-results/scotlands-census-2022-quality-assurance-reports/quality-assurance-report-sexual-orientation-and-trans-status-or-history/

9 **Review of statistics on gender identity based on data collected as part of the 2021 England and Wales Census: Final report**
https://osr.statisticsauthority.gov.uk/publication/review-of-statistics-on-gender-identity-based-on-data-collected-as-part-of-the-2021-england-and-wales-census-final-report/

10 **ONS Letter to the OSR on the GSS workplan towards new harmonised standards for sex and gender identity**
https://www.ons.gov.uk/news/statementsandletters/onslettertotheosronthegssworkplantowardsnewharmonisedstandardsforsexandgenderidentity

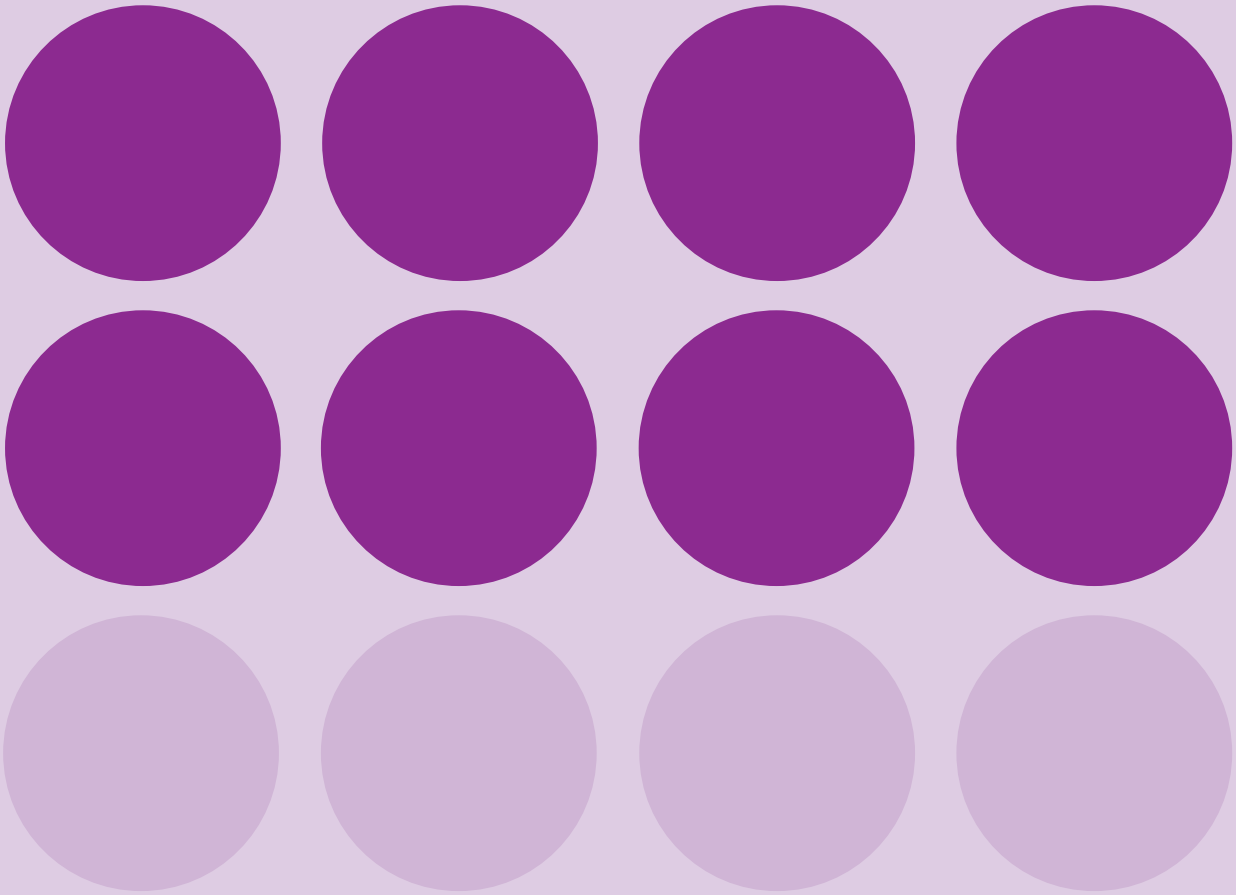
11 **Census 2021 gender identity estimates for England and Wales, additional guidance on uncertainty and appropriate use**
https://www.ons.gov.uk/releases/census2021genderidentityestimatesforenglandandwalesadditionalguidanceonuncertaintyandappropriateuse

12 **Office for National Statistics (ONS) and Welsh Government joint work plan on coherence of Welsh language statistics**
https://www.gov.wales/office-national-statistics-ons-and-welsh-government-joint-work-plan-coherence-welsh-language-statistics

13 **Differences between estimates of Welsh language ability in Census 2021 and household surveys**
https://www.gov.wales/differences-between-estimates-welsh-language-ability-census-2021-and-household-surveys-html

Confidentiality, security and privacy

08



8.1 Introduction

The safety of census respondents' personal data is a top priority at the ONS. This chapter sets out how that priority was reflected in the operation of Census 2021 from initial contact to the publication of data, and access to census data for research, including steps taken in preparation for the census and the preparation of a Data Protection Impact Assessment. It also outlines how we protected personal data in the census outputs through statistical disclosure control.

Once submitted through the online questionnaire or scanned from a paper questionnaire, personal census information was held securely by the ONS. Our business processes, technical systems and services used for the collection, processing and storage of census data conform to government and international security standards. This includes the Government Cyber Security Standard, the international Information Security Management Standard (ISO27001) and security industry best practice from the Information Security Forum. We made extensive use of detailed technical security guidance from the National Cyber Security Centre (part of GCHQ) and other government specialists. All personal data from census questionnaires remained and will remain in the UK and every person's identity is protected through secure handling, storage and decommissioning. No identified information about any individual will be released for 100 years.

All our systems, staff and suppliers must protect the confidentiality of personal data by law, including both personal information provided in census responses and data from other sources such as operational data, correspondence or administrative data.

Laws in place that cover protection of data include the Data Protection Act 2018, the UK General Data Protection Regulation (UK GDPR), the Census Act 1920, and the Statistics and Registration Service Act 2007.

8.2 Legislation

8.2.1 Statistics and Registration Service Act 2007

The Statistics and Registration Service Act 2007 makes it a criminal offence for a member or employee of the UK Statistics Authority (referred to in the Act as the Statistics Board, of which the ONS is the executive arm) to disclose personal information held by the Authority in relation to any of its functions. The maximum penalty is 24 months' imprisonment, a fine or both. Section 39 deals with the duties of the UK Statistics Authority concerning the confidentiality of all personal information held by it. It is a criminal offence to disclose personal information, except in a small number of circumstances where it may be possible.

8.2.2 Census Act 1920 & census secondary legislation

As set out in section 2.9 Legislation and parliamentary engagement, each England and Wales census is provided for by the Census Act 1920 and secondary legislation under it that is laid before the UK Parliament and the Senedd. The census regulations for Census 2021 made provision for the security of personal census information. These were similar to the provisions in regulations for the 2011 Census, updated to reflect the increased use of electronic devices and online responses.

In the Census 2021 regulations for England and for Wales (see section 2.9.2 Secondary legislation) these provisions had the same regulation numbers. Regulation 17 prohibits census staff to whom personal information has been provided from making use of that information or publishing or communicating it without lawful authority. Regulation 19 requires census electronic devices to be used and stored in such a way as to keep personal information secure, and to be returned when and how requested by the Authority. Regulation 20 requires people who have access to personal information from census questionnaires to make a statutory declaration or complete a form of undertaking, the wording for which is included in Schedules 3 and 4 to the Regulations respectively.

Regulation 18 requires:

- anyone holding personal information relating to the census (whether relating to themselves or others) to keep any such records secure and prevent unauthorised access
- any census staff holding records and documents (including on electronic devices) to surrender those to the Authority (i.e. ONS acting on behalf of the Authority) when directed to do so
- the Authority to store securely any completed questionnaires, any other paper or electronic records and documents containing personal information relating to the census, and census electronic devices on which such personal information remains accessible

8.2.3 Data protection legislation

Data protection legislation defines how, when and why any organisation can process personal data. Personal data are any information that can identify a living individual. Data protection laws exist to make sure data are managed safely and used responsibly.

For Census 2021, we had a data protection by design approach for its activities relating to the processing of personal data. Data protection by design[1] is an approach that ensures organisations consider privacy and data protection issues at the design phase of any system, service, product or process and then throughout the lifecycle.

8.3 How security and confidentiality were built into Census 2021

8.3.1 Data Protection Impact Assessment

Projects that involve the processing of personal data will usually have some associated risks to the privacy of individuals, which must be identified and mitigated. The census is no exception. A Data Protection Impact Assessment (DPIA)[2] is a process used to identify and minimise data protection risks and to ensure that the privacy of personal data is built into relevant projects.

We published the Census 2021 DPIA[3] on the ONS website in March 2021. It underlines our commitment to safeguard confidentiality, protect privacy and uphold government security and data handling standards. The assessment demonstrated that full account had been taken of the need to protect all the personal data that will be collected and processed as part of Census 2021. We engaged with the Information Commissioner's Office during the drafting of the DPIA to enable them to advise on the content.

The DPIA describes how data protection was considered and built into the census operation from preparation, through data collection operation and the storage and processing of data, to the publication of census outputs. It describes how the processing of personal data collected in Census 2021 complies with the principles relating to the processing of personal data.

The DPIA lists the various risks associated with processing personal data in the census and describes how those risks were mitigated to reduce the overall risk. The following section sets out many of the ways that data protection was built into the planning for and delivery of Census 2021.

8.3.2 Staff at the ONS and in the census field force

All ONS staff have a Baseline Personnel Security Standard (BPSS) check when they join the ONS. UK GDPR training has been mandatory for all ONS employees since 2018 and it is a requirement for all ONS staff to complete mandatory security awareness training each year. Employees working with personal data on a regular basis are required to undertake a higher level of security scrutiny[4], depending on the regularity of their contact with personal data and the sensitivity of the data. All staff working on the census, including temporary and field staff, were required to sign the undertaking set out in the census regulations to ensure that they are aware of the confidentiality requirements and the penalties for non-compliance with the requirements. The training for our field staff depended on the requirements of their role but for all roles it included a specific UK GDPR module.

8.3.3 Suppliers

The outsourcing of services for the 2021 Census was conducted in accordance with government procurement standards and requirements (as described in section 3.7: External suppliers), designed and managed to safeguard the confidentiality of personal data and to deliver value for money. Contractual and operational measures were implemented to ensure security and privacy standards. We ensured that there were rigorous testing and assurance processes (including rigorous security requirements), to ensure conformity with government guidelines, internal standards, and the law. Data protection legislation requires controllers to use processors (suppliers) that provide adequate guarantees to implement technical and organisational measures that meet the requirements of the legislation and ensure the protection of data subjects' rights. We only used suppliers that provided sufficient guarantees that these measures were undertaken.

8.3.4 Initial contact and completing the census

All residential addresses in England and Wales were sent either an initial contact letter or a paper questionnaire (see section 4.3 Delivery of census materials to households). Having a comprehensive, high-quality address register covering all households, communal establishments and special population groups in England and Wales was important both for the quality of the census and the data protection principle of ensuring that data held are accurate and, where necessary, kept up to date. Section 2.6: Address frame describes how we delivered an effective address frame.

The letters and paper questionnaires (PQs) included a unique access code (UAC), which was a unique 16-character numeric code for accessing the questionnaire online. The length of the code reduced the risk of the code being guessed or hacked. Each UAC was specific to a particular address, which respondents were asked to confirm at the start of the electronic questionnaire (eQ) to reduce the risk of using a code delivered incorrectly to their address. We made clear in our communication with the public that UACs should be protected and kept secure.

Once online questionnaires were submitted, answers were no longer visible using the UAC. Replacement UACs provided to households or individuals were different to the original UACs for their addresses to reduce security risks of wrongful access to questionnaires. Completed PQs were posted back via Royal Mail who have safeguards in place to prevent malicious use of any mail item. Opening mail is an offence for Royal Mail employees. We advised the public to post back PQs as soon as they were complete. Once returned, we were able to track the locations of questionnaires as their receipt was scanned and logged by Royal Mail and Leidos.

For both paper and online household responses, personal data were visible to other members of the household. If there was personal data that a respondent wished to record but did not want to reveal to other household members, they could complete a separate individual questionnaire without other members of the household being aware, by requesting a UAC by text or a PQ sent by post in an unmarked envelope. In addition, there were three voluntary questions on sensitive topics (religion, sexual orientation, and gender identity) and the questionnaire made it clear that these did not have to be completed.


census
2021

<Title><Forename><Surname>
<Address_Line1>
<Address_Line2>
<Address_Line3>
<Town_Name>
<Postcode>

If you need help, go to www.census.gov.uk or phone us free on 0800 141 2021
Reference number: 1234 1234 12

Dear <Title><Forename><Surname>
Here's your individual access code for completing a separate census online.

How to complete your census

1 Read this letter containing your individual access code.
2 Go to www.census.gov.uk, select "Start census" and enter your individual access code:
1A2B C3D4 E5F6 G7H9
3 Answer the questions and submit when complete.
Your answers are protected by law and will be kept confidential.

What you need to know

- It should take around 10 minutes to fill in.
- Help is available for everyone to complete the census. Visit www.census.gov.uk or call 0800 141 2021 to find out more, or to request a paper form.

Thank you

Professor Sir Ian Diamond – National Statistician

Office for National Statistics
www.census.gov.uk
U42P1

8.3.5 Supporting completion

Section 4.11 describes the range of support offered for those who needed assistance to complete the census, including a freephone contact centre, online and in-person assistance.

Public contact centre advisers were given security training and required security clearances to work in their role. They processed names and addresses, and requests for help, via telephone, email, webchat, short message service (SMS) and social media. Personal data was not routinely held by the contact centre as its main purpose was to provide advice to the public. Interpretation services were provided via a three-way conversation with a contact centre adviser, interpreter and respondent.

The telephone capture service provided via the contact centre was used for over 184,000 responses to the census and CCS. Staff delivering this service only had access to the personal data of the respondent while completing the online questionnaire on their behalf. Once the questionnaire was submitted, they no longer had access to the personal data. Names and telephone numbers were held temporarily to arrange telephone capture appointments; once the appointment had taken place, these personal data were no longer accessible in the system.

The assisted digital service provided by the Good Things Foundation through census support centres supported individuals in completing their online census questionnaire. The supplier provided venues, devices and staff to assist people wishing to complete their census online but unable or would struggle to do so without help. They were responsible for providing general security training, as well as role-specific training to their staff.

8.3.6 Providing a secure Census 2021 digital service

As a digital-first census, the security of our digital service – the website, electronic questionnaire and data 'pipelines' – was of particular importance. Government Digital Service design, National Cyber Security Centre (NCSC) guidance, and industry standard security requirements were used to build the online platform securely by design. This included extensive interaction with NCSC, the Centre for the Protection of National Infrastructure (CPNI, now the National Protective Security Authority) and the Government Digital Service (GDS), as well as cyber security consultancies. Audits and penetration testing of online systems were undertaken, including an independent security review (see section 8.4).

We secured the Census 2021 online collection and support sites against two main kinds of attacks. The first was data-exfiltration attacks, including attempted hacking of the website infrastructure or data pipelines in the ONS, or spoofing of our brand to redirect responses. The second was service disruption attacks and events, such as distributed denial of service (DDOS) attacks or targeted resource attacks, or greater than expected legitimate usage damaging the site performance. Our 2021 publication Delivering the Census 2021 digital service[5] describes how we secured the census against these attack types.

8.3.7 Receipt, storage and processing of census data

Paper questionnaires (PQs) were returned via Royal Mail, while data from the electronic questionnaire (eQ) came through directly to our systems. Personal data from census questionnaires were processed and held in the UK. Robust physical security controls were in place to ensure the personal data were held securely while PQs were being scanned by our suppliers. Once the data were scanned, the PQs themselves were securely destroyed in line with government guidelines. Access to information from questionnaires, whether submitted online or scanned from PQs, was and is limited to ONS staff with the necessary level of security clearance and business need.

Census data are held in a secure environment operated by ONS, access to which is strictly controlled in accordance with the relevant legislation. All ONS sites require security checks before entering the premises. Access is granted via a security pass containing the employee's name and photograph. Contractors are required the appropriate level of security clearance for their role, like ONS staff. All other non-ONS visitors to the site are required to be escorted by an employee.

A dataset of responses from both the scanned PQs and from online completions will be kept for permanent preservation for future deposit with The National Archives. Personal data from the census will be held securely and controlled under the policy of keeping England and Wales census returns closed for 100 years. This policy minimises the risk of disclosing information about people who are still living and protects an individual's living descendants. While census records remain in the custody of the ONS as the executive arm of the UK Statistics Authority, they are permanently closed until being passed to The National Archives to be released as historical public records after the end of the hundredth year after the census, just as the 1921 census returns were released in January 2022.

8.3.8 Operational data

The census operation required some personal data to be recorded for operational reasons. Operational personal data was held only for as long as it was required to achieve the necessary purpose. Recording of some personal data was necessary for the purposes of safeguarding individuals. In these instances, again, the minimum amount of personal data was held to achieve the purposes and it was held for as long as it is required.

Field staff could use codes to record information about properties or households where they felt it beneficial, allowing us to make decisions about future contact with an address during the census operation. For example, a code could be used to indicate that an address cannot be found. The codes were only processed where there was a clear benefit to statistical production or to protect the wellbeing of the interviewer or respondent. The data were held only for the duration of the census operation, unless there was an overriding need to hold the data for longer, such as a legal requirement.

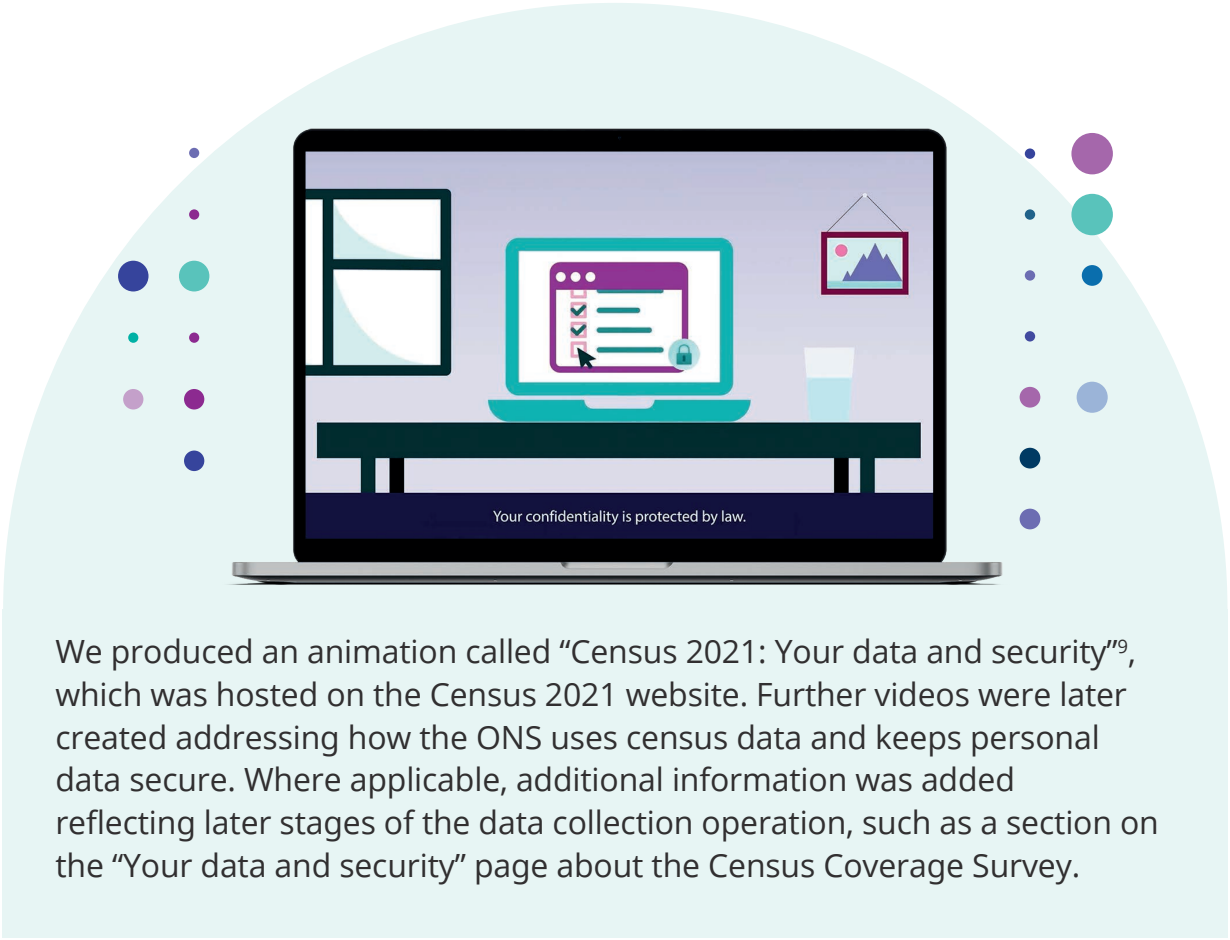
Personal data were recorded in relation to incidents during the census operation, where necessary for the resolution of the incident. Processes were put in place to ensure that the minimum amount of personal data was recorded, without impacting the usefulness of the information. Access to details of an incident was restricted to those who needed to view the data for business purposes. Incident records were reviewed at the end of the census operation and personal data deleted where there were no further legal requirements to hold them.

8.3.9 Informing the public about data protection and data privacy

As well as taking steps to ensure that the personal data would be secure, we also needed to assure members of the public of the safety of their data and inform them about how it would be used. Privacy information, explaining how personal data we collected during the census were processed, was published on the ONS website and sent to households receiving a PQ prior to census day. Households or communal establishments receiving an initial contact letter were provided with a link to the same privacy information on the Census 2021 website.

A series of pages on the Census 2021 website presented information on privacy, confidentiality and data protection, including:

- Your data and security[6], accessed from the top bar of the Census 2021 website, with sections on 'Keeping your data safe', 'What we do with your information', 'Answering separately from your household', 'How we will contact or visit you' and other ONS surveys taking place alongside the census.
- Protecting your information[7] setting out that census personal data is used only for statistical purposes, flagging the optional questions and linking to the 'Your data and security' page.
- Privacy and data protection[8], the page whose URL was provided to digital-first households to find more information, which provided a more detailed summary of how personal data are used by the ONS, including legislation, data subjects' rights and details of the ONS's data controller.



We produced an animation called "Census 2021: Your data and security"[9], which was hosted on the Census 2021 website. Further videos were later created addressing how the ONS uses census data and keeps personal data secure. Where applicable, additional information was added reflecting later stages of the data collection operation, such as a section on the "Your data and security" page about the Census Coverage Survey.

Several pages on the ONS website also reflected our commitment and steps taken to protect people's data, including a page on how census data are kept secure.[10] The UK Statistics Authority's Data Protection Policy is available on its website.[11]

8.4 Independent Information Assurance Review

To ensure that citizens could be confident that we would protect the information collected during Census 2021, we commissioned an independent review of the security arrangements, performed by a specialist security company. The assessment covered preparations by the ONS and the Northern Ireland Statistics and Research Agency (NISRA), for their respective 2021 censuses.

Overall, the assessment concluded that both the ONS and NISRA had comprehensive security programmes in place designed to reduce the risk of compromise to the delivery of the census and citizens' data. The assessment[12] found that strong controls were also in place to detect and respond to threats that may have impacted the census when it was in live operation.

8.5 Protecting personal data in census outputs

The protection of respondents' confidentiality was a primary consideration throughout Census 2021, including in our outputs. While the creation of statistics about small areas and population groups is one of the benefits of a census, this must be balanced against the risk of the published statistics revealing the identity or private information about an individual – the data must be 'non-disclosive'.

We protected the confidentiality of individuals' data in statistical outputs in three ways: swapping records between areas, applying a cell key method to each table, and applying disclosure rules in deciding which tables could be published. These disclosure control measures were carefully designed to protect confidentiality without distorting the statistics unduly. This section provides an overview of them. More detail can be found in our publication Protecting personal data in Census 2021 results.[13]

8.5.1 Our approach to statistical disclosure control for Census 2021

Statistical disclosure control covers a range of methods to protect individuals, households, businesses and their attributes, or characteristics, from identification in published datasets and microdata. Methods may be applied to the record-level census database or the output tables before release.

In the 2011 Census, we used the pre-tabular method of targeted record swapping to protect the confidentiality of individual responses and released a set of static tables. Generally, users were positive about the releases in the 2011 Census. However, concerns were raised around three aspects of dissemination: accessibility, flexibility, and timeliness. Looking to build on what worked in 2011 and address what worked less well, we had to balance user concerns against the legal obligations to protect against disclosure risk. This balance of risk versus utility is the classic problem for statistical disclosure control.

The resulting approach for Census 2021 was a combination of targeted record swapping along with a post-tabular cell key method. The latter helped to facilitate creating an online table builder, allowing a user to find the tables that they

required with the 'Create a custom dataset' tool (described in section 9.5.2: Phase Two: Multivariate outputs). The level of detail that a user could be allowed would be subject to the assessment of disclosure risk that the combination of variables, classifications and geography would generate.

In previous censuses, the policy has always been to assess each dataset based on whether the release of datasets is acceptable (non-disclosive) for all areas, meaning that datasets that might have been acceptable for some areas were not released because the corresponding dataset was not acceptable for other areas. This was particularly the case for some datasets with ethnic group or country of birth, where minority population groups might be geographically clustered. Our aim for 2021 was to make datasets available for those areas where the disclosure risk would be sufficiently low, rather than reject for all areas because some might incur higher risk.

8.5.2 Methods used to protect personal data

Three methods were used to protect personal data: targeted record swapping, cell key perturbation, and disclosure checks. Each offers a complementary form of protection.

To protect individuals and households with unique or unusual characteristics, we used targeted record swapping. This prevents easy spontaneous recognition of individuals and households within datasets. Similar households that match on some basic characteristics are sought from other areas to be used as "swaps", to preserve data quality (for example those with the same household size, to maintain the numbers of individuals and households in each area). Households are swapped within local authority districts or, in rare cases of households with very unusual characteristics, with matches in nearby authorities. The geographies were changed for between 7% and 10% of households. Between 2% and 5% of individuals were swapped between communal establishments. Fewer than 1 in every 100 swaps were between different districts. These were within our tolerances; more than these levels would have damaged utility of the data unduly.

Cell key perturbation offers protection against "disclosure by differencing", where two or more slightly different datasets could be compared to expose an individual respondent, and in instances where a few datasets can be constructed and could otherwise be linked together to reconstruct records from the microdata. It adds "noise" to datasets to allow individual record confidentiality. This technique allows users to find summary information about the data while reducing the risk of a security breach. A typical dataset would have around 14% of cell counts perturbed by a small amount. Small counts were more likely to have been perturbed so datasets with large counts receive less noise than those with many small counts.

Disclosure checks are the rules by which decisions can be made as to whether to allow the release of outputs containing specific combinations of variables. Previously all datasets were assessed to ensure there were no disclosure issues. For our standard ready-made tables, this process was again carried out. The

facility to ‘Create a custom dataset’ meant that users could produce an extremely large bank of datasets. The combination of a number of datasets might allow identification of individuals and disclosure of information, notwithstanding the application of record swapping and cell key perturbation. Hence, some automated disclosure rules checks were run to limit the detail provided in custom datasets. The rules allowed release for those areas where the risk is sufficiently low, while stopping release in areas where the risk was higher.

For example, the disclosure rules for ‘Create a custom dataset’ included the ‘marginal minimum’, where a row or column has a small total, meaning the dataset can be susceptible to an attribute disclosure, or to help an intruder build up an individual record, if that total appears in other datasets. Other rules apply to ‘marginal dominance’ (the proportion of a dataset that is in or outside the most common category), the numbers of ones and zeroes, and limits on the numbers of variables for smaller output geographies.

8.5.3 Impact of these measures on census outputs

Because we matched wherever possible on household size, the number of individuals and households in each area will be unaffected by record swapping, except for a very few cases where there was a large household that had no possible match on household size. In those instances, as close a match as possible on household size was taken.

Perturbation creates some “noise” in cell counts. The cell key method is intended as a “light touch” to reduce the impact of differences between totals. Where a cell containing the same records appears in the same or another dataset elsewhere, the perturbation is consistent. The noise can be positive or negative and, across a dataset, should approximately balance out. However, the randomness may mean small changes to totals. Where two or more different datasets are constructed, the totals of all cells may in turn be different, for example between an estimate for a region and the sum of the estimates for smaller geographical areas within it (such as Output Areas). This is because the datasets are constructed from different cells that could be perturbed in different ways. We therefore advised users to use or create tables containing the geography they require, or if necessary to combine the smallest number of cells to minimise the effect of perturbation. Overall, the differences should be small and so should not change the conclusions of any analysis or research.

If disclosure rules meant that datasets were unavailable through ‘Create a custom dataset’ tool, we recommended that users consider either reducing the detail for one or more of the variables or using a higher geographic level. The rules in that tool were necessarily more cautious since they are automated, and some datasets (areas) could potentially be made available in ready-made datasets. We therefore published a number of separate ready-made datasets alongside the tool; the commissioned table service also provided a route to access datasets that cannot be produced through ‘Create a custom dataset’.

8.6 Secure access to census data for research purposes

Chapter 9: Outputs describes how samples of census data are made available for research and educational purposes while ensuring that personal data are kept secure, including through microdata samples and the longstanding Longitudinal Study. We also make de-identified record-level census data available to accredited or approved researchers through the UK and Welsh Governments' preferred secure data-linking facilities, both of which are accredited under the Digital Economy Act 2017 (DEA).

The UK Government's preferred facility is the Integrated Data Service (IDS), which is described in more detail below. The SAIL (Secure Anonymised Information Linkage) Databank is a research resource focused on improving health, well-being and services funded by the Welsh Government's Health and Care Research Wales. Both are accredited under the DEA and allow access only to accredited researchers.

The ONS's Secure Research Service[14] (SRS) currently operates in parallel to the IDS. The SRS gives accredited or approved researchers secure access to de-identified, unpublished data to work on research projects for the public good. The SRS is accredited as a DEA processor by the UK Statistics Authority for the provision of data for research purposes. The SRS has been providing secure access to de-identified data for accredited researchers for over 15 years. It is one of the largest trusted research environments in the UK, around 6,000 accredited researchers having potential access. Of these, around 1,500 are actively working on research projects at any given time. For Census 2021, only a limited number of bespoke linked datasets for approved projects were included in the SRS, while the secure microdata and origin-destination datasets were deposited in the IDS (see section 9.5.3: Phase Three: Specialist products and additional geographies).

8.6.1 The Integrated Data Service

Building on the success of the SRS, the Integrated Data Service (IDS)[15] is a new cross-government initiative with ONS acting as the lead delivery partner. The IDS marks a step change in the way data about our society and economy are made available for vital research and decision making in the UK. The IDS intends to create a central hub of high-quality accessible data, critical for driving efficiency and improving public service.

The aim of the IDS is to bring together ready-to-use data to enable faster and wider collaborative analysis for the public good. The service was developed as a key enabler of the Government's 2020 National Data Strategy and modernisation agenda and will provide access to datasets from a range of sources, across UK Government departments and devolved governments, presented alongside analytical and visualisation tools in a secure multi-cloud infrastructure.

The service is designed for use by government analysts, devolved governments, and external accredited researchers, and is optimised for government use.

The IDS achieved DEA Accreditation in September 2023. This milestone was a key strategic step forward in achieving the programme's vision of bringing together ready-to-use data for the public good and is a significant sign of confidence from the UK Statistics Authority and wider stakeholders across both government and research organisations in the capacities and securities of the platform.

In 2023, de-identified Census 2021 data were ingested into the IDS for the purposes of exploratory use by key UK Government departments and devolved governments, such as HM Revenue and Customs, the Department for Health and Social Care (DHSC) and the Welsh Government.

The exploratory use of these data provided accredited analysts with high levels of security clearance controlled access for the purposes of deriving full projects. Since achieving DEA Accreditation, outputs from these data have included a DHSC project exploring the link between deprivation and excess deaths, an Ofsted truancy analysis project and the joint work between the ONS and Welsh Government on Welsh language ability described in section 7.4.3.

Endnotes

1 **Data protection by design and default**
https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/accountability-and-governance/guide-to-accountability-and-governance/data-protection-by-design-and-default/

2 **Data Protection Impact Assessments (DPIAs)**
https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/accountability-and-governance/data-protection-impact-assessments-dpias/

3 **Data Protection Impact Assessment for the 2021 Census**
https://www.ons.gov.uk/file?uri=/census/aboutcensus/legislationandpolicy/2021censusdpiafinalapprovedversionforpublication.pdf

4 **National security vetting: clearance levels**
https://www.gov.uk/government/publications/united-kingdom-security-vetting-clearance-levels/national-security-vetting-clearance-levels

5 **Delivering the Census 2021 digital service**
https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/deliveringthecensus2021digitalservice/2021-10-04

6 **Your data and security**
https://webarchive.nationalarchives.gov.uk/ukgwa/20210409192817/https://census.gov.uk/your-data-and-security

7 **Protecting your information**
https://webarchive.nationalarchives.gov.uk/ukgwa/20210410105500/https://census.gov.uk/protecting-your-information

8 **Privacy and data protection**
https://webarchive.nationalarchives.gov.uk/ukgwa/20210409180303/https://census.gov.uk/privacy-and-data-protection

9 **Census 2021: Your data and security**
https://www.youtube.com/watch?v=2FiUHWMQOw4

10 **Your confidentiality**
https://www.ons.gov.uk/census/aboutcensus/yourconfidentiality

11 **Data Protection Policy**
https://uksa.statisticsauthority.gov.uk/our-policies/data-protection-policy/

12 **Census 2021 Independent Information Assurance Review**
https://www.ons.gov.uk/census/censustransformationprogramme/keepingyourinformationsecure/census2021independentinformationassurancereview

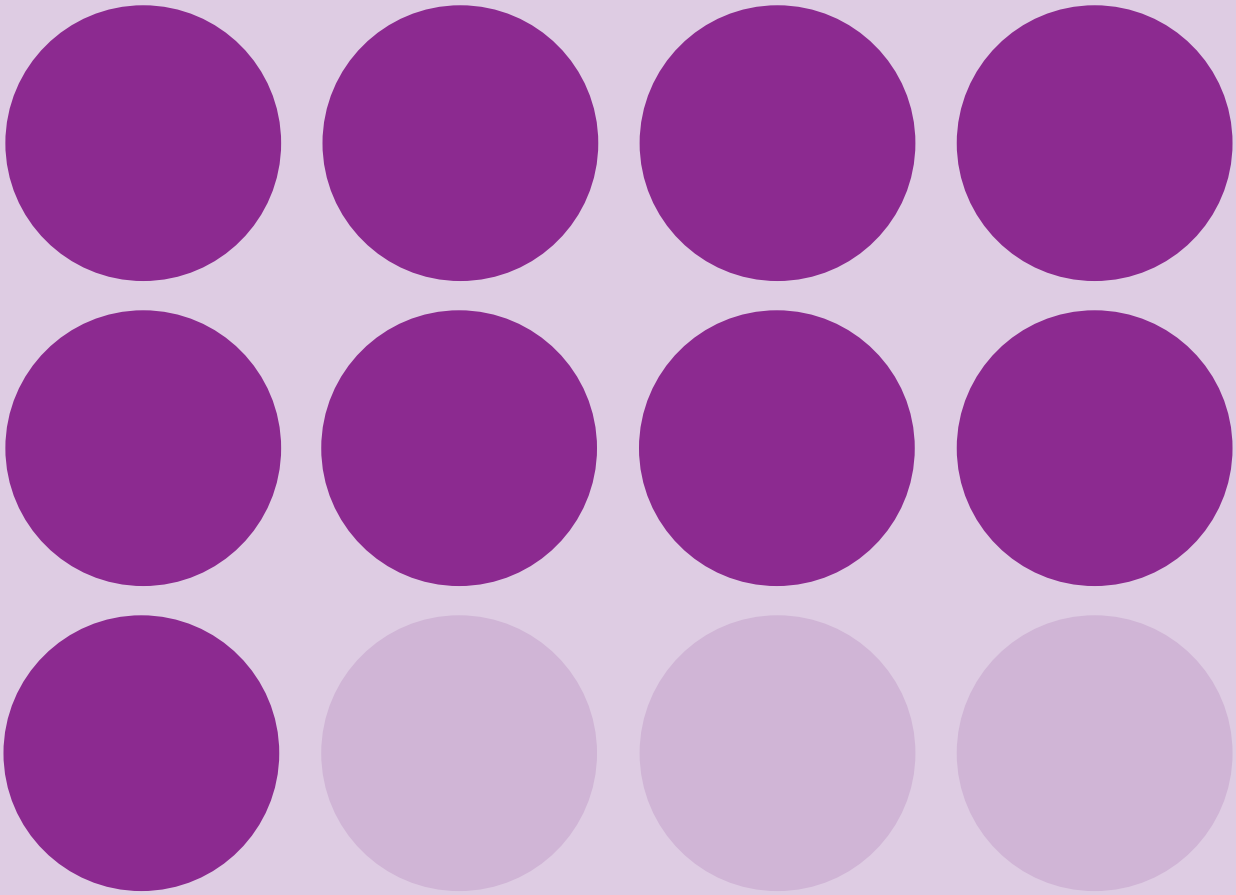
13 **Protecting personal data in Census 2021 results**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/protectingpersonaldataincensus2021results

14 **Secure Research Service**
https://www.ons.gov.uk/aboutus/whatwedo/statistics/requestingstatistics/secureresearchservice

15 **Integrated Data Service**
https://integrateddataservice.gov.uk/

Outputs and dissemination

09



9.1 Introduction

Our vision for Census 2021 was for flexible, timely, accessible and relevant census outputs. We aimed to make as much data available at the lowest geographic levels and as easily as possible, so users could access the data they needed in the way that suited them, while protecting confidentiality. We understood that the main benefits of the census would only be realised by users having access to high-quality statistics, released free at the point of use and as speedily as possible.

The sections in this chapter set out how we developed and delivered our programme of census statistical releases in 2022 and 2023. This included a phased release of univariate and multivariate datasets, followed by more specialist products. Analysis, data-visualisation and a range of interactive products also greatly expanded the accessibility of data from the census for different users. These were accompanied by a greater range of supporting and quality information.

By the end of 2023, we had published outputs meeting all the commitments set out in the 2018 white paper and following our 2021 outputs consultation.

Working with partners, we also produced an article entitled Voices of our ageing population: Living longer lives,[1] which explored issues relating to ageing and why census data are particularly useful.

The efforts made to meet a wide range of user needs through high-quality products that were accessible to different audiences was recognised when the work of Census 2021 Outputs and Dissemination team and the ONS Digital Publishing teams were Highly Commended for the Royal Statistical Society's (RSS) 2023 Campion Award for Excellence in Official Statistics.[2] The 'Create a custom dataset' tool was featured as a case study in "transparent and open communication alongside care and respect" in the UK Committee on Research Integrity's 2023 Annual Statement.[3] The Census 2021 outputs have been well received by users more broadly and have received interest from our colleagues in other census-taking organisations around the world.

9.2 Strategic aims for Census 2021 outputs

The 2011 Census outputs formed the most complex and comprehensive set of information about the population produced to date. Feedback from users identified a need for a greater flexibility in outputs and a need for more timely release of data. We disseminated high-quality outputs complying with the Code of Practice for Statistics, with Census 2021 data published via the ONS website in a combination of ready-made tables and a web-based interactive dissemination system where users can specify the data required.

Central to this was Census 2021 data being:

- flexible – including allowing users to build their own tables selecting the geography, population base and variables they require
- timely – we aimed to disseminate national and local authority (LA) level estimates for England and Wales within 12 months of Census Day and all other main data within 24 months
- accessible – hosting the majority of census data would be available from one location (the ONS website) and following Government Digital Service guidelines on accessibility[4]
- relevant – developing enhanced or integrated census outputs where census data and administrative data are linked at the record level to enable the production of multivariate, small area outputs

9.3 Consultation and engagement

9.3.1 Consultation and engagement 2018-21

Our strategic aims for census outputs were included in the 2018 consultation on our Initial View on Census 2021 Output Content Design.[5] The consultation was accompanied by roadshows in April and May 2018, in Cardiff, Newcastle, Manchester, Birmingham and London, which included a hands-on session for attendees to try out an early prototype flexible dissemination system that was later developed into the 'Create a custom dataset' tool.

We received 196 responses to the consultation, more than half from LAs. Overall, users agreed with our proposed output content and approach for disseminating 2021 Census data. There was strong support for our strategy to deliver census data via a flexible dissemination system, with 88% agreeing or strongly agreeing that they would prefer to access data via a flexible dissemination system rather than to wait for tables to be produced by the ONS like previous censuses. Many expressed a need to obtain census data via a single website and have an option for accessing large volumes of data via an API (Application Programming Interface). A lot of respondents were supportive of our aim to enhance the census data with administrative data to enable analysis on topics not covered by census. There was also an expressed need for timely and accessible origin-destination data. Further engagement after the consultation focussed on the flexible dissemination system, origin-destination data, and UK data.

9.3.2 Outputs consultation, Summer 2021

Our main outputs consultation in Summer 2021 covered all phases of the release schedule.[6] The consultation ran from July to October 2021 and was promoted through a range of engagement activity described later in this section. We published our two responses in December 2021 and March 2022.

We received a total of 312 responses to the consultation. Of these, 240 were submitted by people in their professional capacity, including 211 on behalf of an organisation, of which 126 were from the local government sector. In general, respondents said they supported our proposals. However, users did request some specific changes and additions. We reviewed each request to assess if a minimum strength of need was provided for us to consider making the requested change. We then grouped respondents' requests under one of three categories:

- not enough user need to consider changing the published proposal
- sufficient user need, leading to an assessment of the feasibility of a change
- sufficient user need, leading to a commitment to a change

Where we needed to consider the feasibility of a request, this included factors such as statistical disclosure, data quality and cost, as well as considerations included in the consultation response reports.

We published two consultation response reports. The first, covering phase 1 included changes to the ordering of the topic response publications, information about the classifications we were planning to use or exploring the feasibility of the new questions (sexual orientation, gender identity and previous service in the UK armed forces), and that we were exploring the feasibility of new classifications within other topics including age, ethnic group and country of birth. The second report focussed on the later phases, covering both the 'Create a custom dataset' tool and ready-made tables in phase 2; setting out work being undertaken on derived variables in education and employment and across health and living arrangements; providing details of the "small populations" we were investigating producing data on; and committing to five alternative population bases.

Outputs consultation engagement

To encourage participation in the 2021 outputs consultation, we promoted the consultation through a multi-faceted campaign that aimed to engage both existing and new census users. In the months preceding its launch, we signposted the consultation in external meetings and newsletters, and on the ONS website and social media channels.

We hosted three public consultation launch webinars over June and August 2021. These proved popular, with over 490 attendees. When requested, we repeated

these webinars with content tailored to specific user groups. For example, we ran a session for members of community groups who were newer users of census data and for the House of Commons Library.

We invited users to take part in the consultation within blogs written for the National Statistical in July 2021, and for the Social Research Association and UK Data Service in September 2021. We also presented on aspects of the consultation and encouraged participation as part of ONS-led sessions at the RSS and British Society for Population Studies conferences. These events were focussed on data users in academia. We also ran a series of topic-specific consultation meetings with different user groups interested in data and analysis for that topic.

We considered feedback received in these meetings alongside the evaluation of formal consultation responses.

9.4 Output geographies

9.4.1 Approach

The Output Geography policy for Census 2021 was to retain a high degree of stability in our census statistical geographies. This aimed to support comparability between census information from 2001, 2011 and 2021, and also from other national and official statistics collected using the same hierarchy. For geographies whose boundaries change over time, our policy was to use the boundaries in use at the time of the publication of the census outputs in 2022 (although as noted later, some changes since 2022 have been included in census releases).

We invited views on our proposed Census 2021 Output Geography Policy and our plans for geography products and services from 5 November to 18 December 2020 and published our response on 12 March 2021.[7]

9.4.2 Summary of Census 2021 geographies

Census statistical geographies

Following the creation of statistical geographies after the 2001 England and Wales Census, comprising Output Areas (OAs), Lower layer Super Output Areas (LSOAs), and Middle layer Super Output Areas (MSOAs), these statistical geographies were updated following the 2011 Census. For 2021, each OA, LSOA or MSOA was only changed if it fell outside the established population or household thresholds, or where improvements to census outputs for wards (and parishes in some cases) could be achieved through targeted OA boundary realignment. When the 2021 statistical geographies were finalised, this resulted in 3.3% of the 2011 OAs changing, with changes of 3.2% and 1.7% respectively for LSOAs and MSOAs.

Output Areas

OAs have between 40 and 250 households and a usually resident population between 100 and 625 persons. Exceptionally, some OAs may have more than 625 people, for example, where there is a large communal establishment such

as a prison. In Census 2021, there were 188,880 OAs (178,605 in England, 10,275 in Wales), an increase of 7,472 (4.1%) in the number of OAs from 2011. Around 200 OA boundaries, all in England, were selectively realigned to ward boundaries.

Lower layer Super Output Areas

LSOAs are made up of groups of OAs, usually around five. They comprise between 400 and 1,200 households and a usually resident population between 1,000 and 3,000 persons. There were 35,672 LSOAs (33,755 in England, 1,917 in Wales) in Census 2021, an increase of 919 (2.6%) in the number of LSOAs from 2011.

Middle layer Super Output Areas

MSOAs are made up of groups of LSOAs, usually four or five, and fit within LA boundaries. They comprise between 2,000 and 6,000 households and have a usually resident population between 5,000 and 15,000 persons. There were 7,264 MSOAs (6,856 in England, 408 in Wales), an increase of 63 (0.9%) in the number of MSOAs from 2011.

Other geographies

We also published census data for other geographies that users needed, including electoral, administrative and health geographies. For the majority of these, the estimates were produced on a best-fit basis built up of OAs. OAs are used as the best-fit building block as, being the smallest statistical geography, they will generally produce better results when aggregated to higher geographies.

As noted in section 9.4.1, the geographies were those current in 2022. Census 2021 outputs were additionally made available reflecting the 2023 changes to some LAs in England, and the revised UK parliamentary constituencies that took effect when the July 2024 general election was called.

Countries and regions

Data are available for England and Wales combined, by country (i.e. separately for England and for Wales), and by region, which includes Wales as a whole and the nine regions in England.

Local authority areas

The LA geography reflects the different structures of local government in England and Wales. In some areas of England, responsibility for services is split between county councils (upper-tier) and district councils (lower-tier), while in other areas a single authority is responsible for all of those services (including unitary authorities, metropolitan districts and London Boroughs). Census data were published for the 152 upper-tier LAs and 309 lower-tier LAs in England in 2022, with the 59 unitary authorities, 36 metropolitan districts, and 33 London boroughs (including City of London) included at both levels. In Wales there were 22 unitary authorities (for

which data were also provided if users look for lower or upper-tier authorities). Wards are areas used to elect local authority councillors. Reflecting wards as of May 2022, our outputs included 6,904 wards in England and 762 in Wales.

Parliamentary geographies

There were 533 Westminster (UK Parliament) constituencies in England and 40 in Wales in 2022. There were also 40 constituencies for the Senedd (the Welsh Parliament), the other 20 members of which represented regions made up of constituencies.

Health geographies

In England there were seven NHS regions and 42 integrated care board areas, and in Wales seven local health board areas (reflecting healthcare geographies in July 2022).

Local enterprise partnerships

Local enterprise partnerships (LEPs) are voluntary partnerships between LAs in England and local private sector businesses to help determine local economic priorities, drive economic growth and job creation. Census 2021 data were provided for the 35 LEP areas in England that do not overlap (out of 38 in total). There are no LEPs in Wales.

Parishes, communities, national parks and postcode

Civil parishes are the smallest unit of local government in England, and communities are similar units in Wales. There were 10,480 parishes in England, mainly found in rural areas as parishes do not cover many urban areas; the 878 communities in Wales covered the whole country. National parks are areas of land which, for reasons of environmental and cultural significance, are protected by the National Parks and Access to the Countryside Act 1949. There are 10 national parks in England and three in Wales, which collectively cover over 16,000 square kilometres, or 10.97% of the land in England and Wales. Additionally, population and household counts were published at postcode level.

Parishes (and communities), national parks and postcode areas were the exception to the general best-fit approach. For these geographies, aggregating OAs does not always result in a good match with the target geography (parishes, national parks and postcodes); instead census outputs reflect the actual addresses within these geographies, rather than a best-fit of OAs.

In addition to these geographies, we have also produced estimates for 7,723 Built-up areas (BUAs): 7,091 in England, 622 in Wales, and 10 spanning parts of both England and Wales.[8] BUAs are a geography based on the physical built environment, using satellite imagery to recognise developed land, such as cities, towns, and villages. This allows economic and social statistics to be investigated based on actual settlements where most people live. BUAs are classified by population size ranging from minor (less than 5,000 usual residents) to major (200,000 or more usual residents).

Using data from the 2011 Census, we developed Workplace zones, reflecting where people work (each containing between 200 and 625 workers), and Travel to Work Areas, which are areas where a large proportion of workers both live and work. We are working to check what impact the coronavirus (COVID-19) pandemic had on how respondents answered questions related to their workplace, including exploring alternative methodologies and data sources. This will inform a decision on whether to update the 2011 Workplace zones and Travel to Work Areas using Census 2021 data.

As part of the more flexible approach to census outputs for Census 2021, users are able to access data for a greater range of geographies through our releases and tools.

Most of the geographies listed above are included as options in the 'Create a custom dataset' tool (see below) and ready-made tables, allowing users to filter for different types of geography and particular areas (for example all the lower-tier LA areas within a region of England). The 'Build a custom area profile' tool[9] allows users to explore data for a variety of pre-set geographies or to create their own by adding or removing OAs. To complement census outputs, and to assist users to undertake their own analysis, a number of geography products are available through the Open Geography Portal.[10] This includes lookup files (for example, allowing some 2011 Census geographies to be matched to Census 2021 geographies), and digital boundaries for mapping purposes.

9.5 Main Census 2021 statistical outputs

The main England and Wales census outputs were published from June 2022 to late 2023 in a series of phases. This represented a considerable increase in the timeliness of the releases compared with the 2011 Census, particularly for the more detailed releases in 2014 and 2015. A significant part of the improvement in the timing and flexibility of the outputs was the 'Create a custom dataset' flexible dissemination tool, which was published in March 2023.

Ahead of the publication of the first results in June 2022, the Office for Statistics Regulation published their confirmation of National Statistics designation for Census 2021 in England and Wales, following the accreditation process described section 1.8. This accreditation validates the quality and trustworthiness of the data and statistics produced from Census 2021. As noted in section 7.4.2, the census gender identity estimates were subsequently redesignated as 'official statistics in development'.

9.5.1 Phase One: Univariate outputs, June 2022-January 2023

First results, June 2022

The first release of census data contained rounded population estimates for England and Wales and for Wales, published on 28 June 2022.[11] Coming within a year of the census data-collection operation concluding, this was earlier than the equivalent publication from the 2011 census (which was published on 16 July 2012, itself earlier than for 2001). The data in the release were available at LA level, by sex and age.

As for previous censuses, the first results for England and Wales were laid before Parliament on the day of publication, accompanied by a Written Ministerial Statement,[12] and the results for Wales were laid before the Senedd with a Written Statement.[13] The public announcement was made at the winning and second-place schools in the Census 2021 Let's Count! primary schools competition, with pupils from schools in Havant, Hampshire, and Tonyrefail, near Porth, announcing the population estimates for England and Wales and for Wales respectively (see section 5.2.5 Primary and secondary schools campaigns).

The first release was accompanied by information on the quality of Census 2021 data, including quality and methodology information (QMI), an article on Maximising the quality of census data, and an LA comparison tool,[14] which included data on estimates, components of the estimation and adjustment process (see chapter 6: Processing and estimation) and response rates. The bulletin and datasets for Wales were published in English and Welsh, as was the QMI for England and Wales. Accessible versions in English and Welsh were also published through the Census 2021 website.[15]

We also published our first census interactives with the first release: the Census 2021 population map game and How the population changed where you live (comparing 2011 and 2021 data). For more on our interactive census content, see section 9.7.

Topic summaries, November 2022 to January 2023

The first unrounded population estimates and characteristics data from Census 2021 were published in topic summaries. A topic summary is a set of data supported by statistical bulletins, interactive products, and quality information, grouped by a similar theme.

Alongside the first topic summary release, we also published measures and interactive tools showing the quality and quality assurance of the census data, including an updated LA comparison tool.[16] The majority of the datasets released as part of each topic summary contained data about just one variable. The standard lowest level geography level for topic summary datasets was OA level (see section 9.4: Output geographies), where the risk to confidentiality was sufficiently low.

The first topic summary (demography and migration), published on 2 November 2022, included the unrounded population estimates. These estimated that the size of the usual resident population in England and Wales was 59,597,542 (56,490,048 in England and 3,107,494 in Wales). This was the largest population ever recorded through a census in England and Wales, more than 3.5 million (6.3%) larger than the population in 2011.

In publication order, the topic summaries and related datasets were:[17]

- demography and migration, 2 November 2022, including unrounded population estimates by sex and age, household and resident characteristics, and international migration
- UK armed forces veterans, 10 November 2022
- ethnic group, national identity, language and religion, 29 November 2022
- Welsh language (data on Wales only), 6 December 2022, with a short headline-only release, as the main bulletin was published on the same day by the Welsh Government
- labour market and travel to work, 8 December 2022
- housing, 5 January 2023, including second addresses and communal establishments
- sexual orientation and gender identity, 6 January 2023
- education, 10 January 2023
- health, disability, and unpaid care, 19 January 2023

In addition to publishing the main bulletin on Welsh language, the Welsh Government published statistical bulletins on their Census of Population webpage [18] summarising the key points for Wales alongside our releases. Following the release of the Welsh Language data, the ONS and Welsh Government published a joint workplan of coherence of Welsh language statistics (see section 7.4.3).

Pageview metrics for our Census 2021 statistical bulletins show 69,000 recorded views of the first release bulletin by November 2023, as well as 60,000 for the unrounded population estimates. Of the other topic summary bulletins, the most viewed were ethnic group (87,400) and religion (76,300), followed by the new topics of gender identity (42,700) and sexual orientation (35,500). As for census website pageview figures used in chapter 4, these are likely to understate the real numbers of users, as they reflect cookies and not all users accepted cookies.

Quality information relevant to each topic area was published alongside the topic summaries and datasets. An area profiles page[19] was published on nomis with the first topic summaries and updated with further releases of topic data; this allowed users to view statistics from across different topics for a particular area.

9.5.2 Phase Two: Multivariate outputs, March to April 2023

A major innovation for Census 2021 was the 'Create a custom dataset' tool, which opened up census data for users to explore and find the data they want. This was part of a blended offer that also included ready-made multivariate tables. These products, along with the interactive tools and analysis described below, provided users with access to a vast array of census data. Census 2021 data were also made available through the commissioned table service, through which users could request data that were not available through the other products.

Create a custom dataset

The 'Create a custom dataset' tool[20] is a flexible table builder, which empowers users to find and download multiple combinations of data they are most interested in. Users can cross-tabulate data using up to five different variables (for MSOA and above; for OA and LSOA the limit is four). A major innovation for official statistics, it allowed us to release billions of statistics more quickly than ever before. The software for the tool was developed by the Sensible Code Company and it was hosted on the ONS website, with a user interface designed in-house and a common layout to our other census data pages. It went live on 28 March 2023, immediately making a vast amount of census data available to users to explore as they wanted. By November 2023, the 'Create a custom dataset' homepage had over 201,600 recorded visitors.

Users were able to choose the population base (such as all usual residents, those residents in households or in communal establishments) and level of geography they wanted to explore, including whether they wanted to see all areas at that level or filter for particular areas. They could then choose from a large selection of Census 2021 variables and select the level of detail they wanted

to see for each. For example, the country of birth variable can be shown split into only UK and non-UK or with up to 60 categories. The tool automatically set a recommended level of detail, which the user could adjust from a range of options for most variables.

Where for previous censuses each dataset required bespoke assessment for disclosure risk and could not be published if data for any geographic areas had to suppressed, the new flexible functionality for Census 2021 was enabled through dynamic statistical disclosure control (SDC) methodology that protects data confidentiality (see section 8.5 Protecting personal data in census outputs). By applying these checks, the tool informed users how many geographic areas would be suppressed and provided dynamic suggestions on how to edit the data request to maximise the returned data, for example by increasing the size of the geographies requested or reducing the level of detail. Once the user selected the data they want, it was available to download both as an xls spreadsheet and as a machine-readable csv file. The datasets themselves were formatted to be machine-readable, and could be downloaded using an API, enabling users to use HTTP programming to extract the data they needed automatically, whether whole datasets or parts of them.

Ready-made tables

For certain population bases, we recognised that statistical disclosure rules would often lead data to be suppressed through the 'Create a custom dataset' tool. Where it was more appropriate to do so, we developed ready-made multivariate tables to provide detailed data for users while still protecting confidentiality. This included multivariate data relating to sexual orientation and gender identity, short-term residents, students, families, dependent children, and Houses of Multiple Occupancy. These datasets had already passed disclosure checks and included data for the lowest possible, non-disclosive geographies.

The first set of ready-made tables was released at the same time as the 'Create a custom dataset' tool, with others published over the following weeks:

- Data combining multiple variables, 28 March 2023
- Sexual orientation and gender identity data combining multiple variables, 4 April 2023
- Person-level data combining multiple variables, 18 April 2023
- Data about households and families combining multiple variables, 25 April 2023

As with 'Create a custom dataset', users could specify the geographies and number of classifications they want within the variables, and the data could be downloaded in xls and csv formats and via an API.

9.5.3 Phase Three: Specialist products and additional geographies

The final phase of England and Wales census releases, as after the 2011 census, were products and additional geographies to meet more specialist and expert user needs. This section outlines the main releases in this phase, which were published in the second half of 2023.

Other products in phase three included data for geographies listed in section 9.4 that were not included in earlier releases. In addition to datasets for parishes, postcodes and National Parks, this meant that geographies including LEPs, Senedd constituencies and regions, and new LA boundaries became available in 'Create a custom dataset' and ready-made tables published in phase two.

Small populations

Our "small populations" data were produced for populations defined by characteristics such as ethnic group, religion, national identity, main language, country of birth, or a combination of religion and ethnic group. Most were based on "write-in" responses to the census questions for these characteristics. Due to the relatively small population size in certain groups, confidentiality constraints limited the release of data about these groups in our standard multivariate census outputs (which were largely based on tick-box response options). Instead, we created bespoke datasets for those populations about which specific users needs were identified through engagement and consultations. The datasets were only provided for those geographic areas where the population of that group exceeded a given threshold.

The Census 2021 "small populations" release[21] included data on 43 groups in total, accompanied by a statistical bulletin. Different datasets were produced for different populations, depending on user need and confidentiality constraints. For most groups, we produced a breakdown by five-year age group and sex. This included seven additional groups compared with the 2011 release, based on identified user need: Caribbean ethnic group, Eritrean ethnic group, Romanian ethnic group, Hispanic or Latin American ethnic group, Alevi religion, British Sign

Language, and Valmiki ethnic group or religion. Data on specific characteristics, such as disability, unpaid care, economic activity, employment, qualifications, and socio-economic classification, were published for eight groups. For some population groups that can be defined as either an ethnic group or a religion (including Jain, Jewish, Ravidassia, and Sikh), we provided breakdowns for the number of people identifying with the group as their ethnic group only, their religion only, or as both their ethnic group and religion.

Microdata samples

Microdata samples (often referred to as Samples of Anonymised Records – SARs) have been produced from each census since 1991. These datasets comprise files containing a sample of individual record-level persons drawn from the census database that have been anonymised. They contain a range of individual and household characteristics that can be used to carry out analysis not possible from standard census outputs. Microdata samples range in size from 10% to 1% of households or individuals.

Microdata samples are designed to protect the confidentiality of individuals and households. We do this by applying access controls and removing information that might identify a person, such as names, addresses and date of birth. Like all census outputs, we applied SDC methods to the microdata samples, for example, record swapping, collapsing variables and restricting detail.

Census 2021 microdata samples for England and Wales were classified in three ways:

Public microdata teaching sample

This was a random sample of 1% of individuals, provided down to a regional level of geography. This contained 19 variables and a low level of detail. The sample was non-disclosive and made available through the ONS website for educational purposes.

Safeguarded microdata samples

These were three random samples, containing data 5% of individuals at regional and grouped LA level, and 1% of households (and individuals within them) provided down to regional level. These contained between 50 and 90 variables at different levels of detail and are hosted by the UK Data Service.

Secure microdata samples

These were two random samples, containing 10% of individuals and 10% of households (and individuals within them), provided down to LA level. These contained around 190 variables and a high level of detail and are hosted in the Integrated Data Service (IDS, see section 8.6)

More information can be found on the Microdata Samples page[22] on the ONS website, which also hosts the public-access sample.

Origin-destination data

Origin-destination data show the movement of people from one location to another. It is also known as flow data. We released four types of origin-destination data; these were:

- migration flow data, showing the national and international migration of residents with a different address one year before Census Day
- workplace flow data, showing the location of workplaces in relation to an individual's usual residence (for those in aged 16 and over who were in work in the week before the census)
- second address flow data, showing the location of people's second addresses and how far they are from their usual residence or workplace.
- student flow data, showing migration patterns of individuals living at student term-time or boarding school addresses in the UK one year before Census Day (whether or not they were students at the time of Census 2021).

As with microdata samples, the data are classified as public, safeguarded or secure, with increasing levels of detail and security around access to them. The public datasets were published on nomis on 26 October 2023. The safeguarded datasets are hosted by the UK Data Service and secure datasets are hosted in the IDS.

The difference in census dates across the UK meant we could not combine these data to produce a single reliable set of UK origin-destination datasets. However, the origin-destination datasets for England and Wales included Scottish and Northern Ireland flows where residents in England and Wales worked, had a second address, or lived one year before Census Day in one of those nations.

More information can be found on the Origin-destination flow data[23] page on the ONS website.

Alternative populations

Alternative population bases are different geographical locations, other than their usual residence recorded in the census. For Census 2021 these populations were:

Workplace

This was an estimate of the usually resident population aged 16 years and over, working in an area. It included people who work mainly at or from home, or did not have a fixed place of work, in their area of usual residence.

Workday

This was an estimate of the population during the working day. It included everybody who worked in an area, wherever they usually lived, and all respondents who lived in the area but did not work.

Out-of-term

This was the usually resident population, redistributed to their out of term-time address if they had one. As a result the difference related to the location of some students and schoolchildren.

Second address

This looked at the characteristics of the population with a second address counting them at the location of their second address rather than at the address where they were usually resident.

The fifth alternative population base was short-term residents, defined as those who were not born in the UK and who intended to stay in the UK for between 3 and 12 months (people who stayed or intended to stay for less than 3 months were not asked to answer Census 2021). Following user feedback, we moved the release of this alternative population dataset into phase two as part of the release of Person-level data combining multiple variables.

Approximated Social Grade

Social Grade is a socio-economic classification; this is a way of grouping people by type, which is mainly based on their social and financial situation. Approximated Social Grade (ASG) is a model created by the Market Research Society for census data to estimate Social Grade. The ASG model for Census 2021 is based on characteristics of the Household Reference Person (HRP), which when combined give a good measure of Social Grade. The HRP is the person in a household who serves as the reference point to characterise a whole household, mainly based on economic activity. All usual residents in households were allocated the grade of their HRP if the HRP was aged 16 to 64 years. The data on ASG[24] included ethnic group, country of birth, and housing tenure, among others, and was accompanied by a statistical bulletin.

Detailed migration data

Detailed migration statistics[25] provided the characteristics of people or households who moved within England and Wales, or from another country into England and Wales, during the year before Census 2021. The data included family status, ethnic group, disability, economic activity and socioeconomic status for person-level migration. For household migration it included tenure, household family composition, dependent children, and HRP's economic activity and socioeconomic status.

We had combined UK internal migration data in 2011 for England, Northern Ireland, Scotland and Wales, but we did not have these data in 2021. When publishing detailed migration data in September 2023, we did not have data for Northern Ireland (because of differences in data processing schedules) or Scotland (where the census was held in March 2022). This means outflow counts excluded people who lived in England and Wales the year before Census 2021 but had moved to Northern Ireland or Scotland before 21 March 2021.

9.6 Census analysis publications

The census analysis programme produced a comprehensive set of research based on Census 2021 data for England and Wales. Following the successful addition of narrative analysis publications in the 2011 Census, we aimed to deliver more analysis publications sooner for Census 2021. Alongside the production of facts and figures about the population, the analysis publications shone a light on public-policy topics. These publications were based on multivariate data, ranging from breakdowns of populations covered by the topic summaries by age and sex to a profile of centenarians in England and Wales, and variables calculated from census data, such as overcrowding and underoccupancy.

As part of the outputs consultation in 2021 (see section 9.3), we set out our plans to publish analysis alongside phase two and beyond, so that they would accompany the multivariate and specialist publications. That consultation included our analysis programme proposals and found that the vast majority of users felt their needs were fully (70%) or partially met (25%) by the proposals. Following the consultation, we updated our list of proposed analysis articles.[26]

This wider range of analysis included articles on specific communities. After 2011 we published analysis on the Gypsy and Irish Traveller population. Analysis from Census 2021 also included articles on Sikh, Jewish, Somali, Roma, and Cornish populations, to accompany the data published as 'small populations' datasets in phase three.

Our first analysis piece, published in December 2022, compared Census 2021 and Labour Force Survey estimates of the labour market. The main run of analysis publications based on Census 2021 data began in late January 2023 with articles on ethnic group, religion, sexual orientation, gender identity, and international migration. By the end of 2023, we had published over 50 analysis articles.

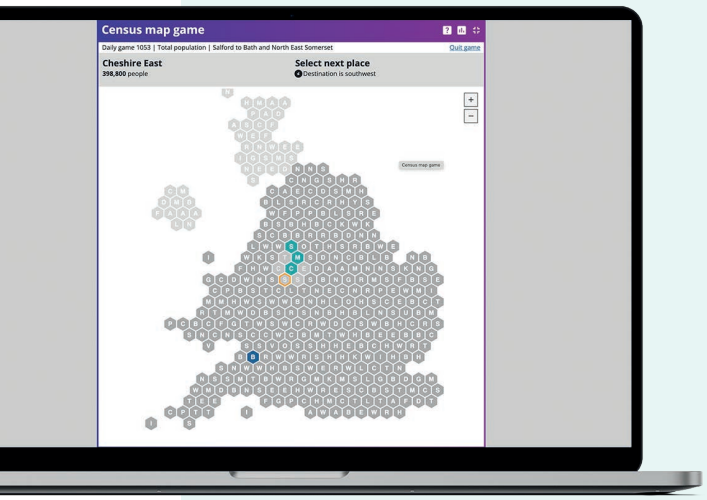
Following their production of the main bulletin accompanying the first Welsh language data, the Welsh Government also produced analysis publications, working closely with the ONS. Published on the Welsh Government's Census of Population webpage,[27] these included: Welsh language by population characteristics (including ethnic group, national identity, labour marked and health); Welsh language composition of households in Wales; analysis of outcomes in health, housing, education and economic status across ethnic groups and for disabled people; and analysis of second addresses used as holiday homes and characteristics of the population by area deprivation.

9.7 Interactive products and data-visualisation

A major part of the release of Census 2021 data was the inclusion of interactive products and data-visualisation. Much greater use was made of data-visualisation in the topic summary statistical bulletins and analysis articles than in 2011, including interactive maps, charts, population pyramids and heatmaps.
We also published a range of stand-alone interactive products, ranging from games and semi-automated bulletins to enabling users to find census data for bespoke areas. These products included:

How the population changed where you live

An interactive article[28] was published alongside the first release in June 2022 and received widespread engagement. On selecting an LA, users were provided with a visual and dynamic explanation of population changes in their chosen area since the last census. Language and styling made this as accessible as possible to non-technical users, such as, explaining population density using football pitch illustrations. Nearly a quarter of a million pageviews were recorded for this content by November 2023.



Census population map game

Also released alongside the first release was our Census population map game.[29] This was a 'hex game' where users could move across a map of England and Wales by correctly guessing whether the number of people living in a local authority area in 2021 was higher or lower than its neighbours. It included a daily game that pre-selected the start and end points and allowed users to share their score.

Census maps

Launched in November 2022, Census maps[30] was one of the most used products on the ONS website, with over 30 million interactions. The maps allowed people to navigate census data at various levels of geography and are particularly powerful for showing patterns at neighbourhood level. Functionality was later added to allow views for change over time and density. Media sites widely reused the embeddable frames and views of the maps. Sir Chris Whitty, Chief Medical Officer for England, praised it as "a remarkable resource, exceptionally well presented." Over 419,000 user sessions were recorded for Census Maps by December 2023 (pageviews for this content recorded each time a different

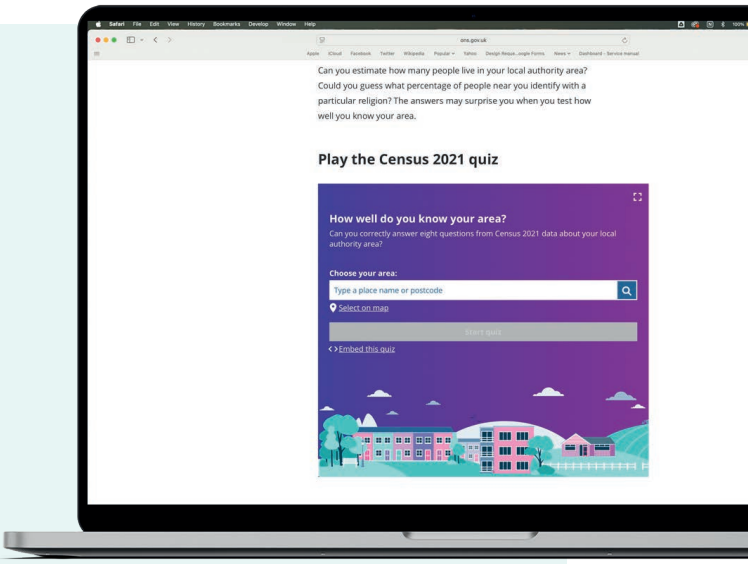
option was chosen by users, totalling over 9 million).

How your area has changed in 10 years

These localised articles[31] demonstrated further technological innovation in our outputs. Articles for 347 LA areas were generated using rules pre-programmed by our team, writing themselves from source data according to a sophisticated template. They had over 8 million impressions in Google search (the number of times it appeared for a search there) for queries about local areas and was embedded on many local news sites, driving even more views of the content.

Census quiz

A 'How well do you know your area?' quiz[32] was published in December 2022, allowing users to guesstimate the values of census indicators for their chosen LA area in various ways (including true or false, higher or lower, and rankings). It was embedded on a number of local news websites, as well as being widely used on the ONS website and shared on social media. Over 8,300 pageviews were recorded for the quiz by December 2023.



Build a custom area profile

The Build a custom area profile tool[33] allowed users to draw a bespoke area on a map and then view or export summary charts of census data for that selected area, depending on the indicators they wanted. It was well received among academics, researchers and journalists, who often face hurdles accessing data for non-standard geographies (such as a 5km radius of a certain place). We were able to add new layers into the tool, including the early addition of the new parliamentary constituency boundaries, which proved to be in high demand. Over 257,000 pageviews were recorded for this tool by December 2023.

Create a population profile

The Create a population profile tool[34] allowed users to select one or more characteristics (for example, age, country of birth and level of English proficiency) to see census data for the populations sharing particular characteristics – including health, educational level, and marital and civil partnership status. This multivariate product complemented the 'Create a custom dataset' tool, auto visualising outcomes and data for selected populations.

Origin-destination data visualisation

This visualisation[35] used travel to work and migration data to show flows and population shifts, with context and information on how to read the data included.

9.8 Hosting of census data

In line with the strategic aims for Census 2021 outputs, most of the datasets we published were hosted on the ONS website, including the 'Create a custom dataset' tool. Hosting them on our website meant that they could be presented alongside our topic summaries and the interactive products, making census data accessible to a wide range of users from general users interested in how their local area had changed to expert users wanting to interrogate the data through custom datasets.

Many technical users also told us that they were used to the nomis website,[36] which hosts data from 2001 and 2011 as well as some from earlier censuses (and other data related to population, society and the labour market), so all ready-made tables were also hosted there. Most of the phase three data with a more technical audience were hosted on nomis rather than the ONS website.

9.9 Commissioned tables

Our commissioned table service also provides a route for users to access data that are not included in our published outputs or through 'Create a custom dataset'. These ad-hoc tables are created in response to customer requests; we charge the person or organisation who requests an ad-hoc table for the service and, once we have created the tables, we publish them for all to use under Open Government Licence. What can be produced is constrained by several factors, including SDC, see section 8.5). The service currently covers data from the 2001, 2011 and 2021 censuses. More information and current prices can be found on our commissioned tables webpage.[37]

9.10 Exceptional early publication of data for urgent operational planning needs

Throughout the coronavirus (COVID-19) pandemic, the ONS was committed to providing the public, businesses, and policymakers with the best possible information to inform the ongoing response. Meeting the need for rapid and real-time data, we introduced new surveys, used new data sources, and published new cross-cutting analysis in response to demands for trustworthy and up-to-date statistics. Our Public Health Data Asset (PHDA) was a unique linked dataset combining the 2011 Census, the General Practice Extraction Service data for pandemic planning and research, and the Hospital Episode Statistics. This was used to update data on ethnic contrasts in deaths involving coronavirus, vaccination rates by sociodemographic characteristic and occupation and deaths involving COVID-19 by vaccination status.

In exceptional circumstances and under the strictest terms, the National Statistician can consider early internal use of preliminary information collected in the census by ONS statisticians where there is an essential need to understand a topic and a high impact for the public good. To help with understanding of the coronavirus pandemic, the National Statistician approved a request to help update important estimates of vaccination rates by occupation in England by using a preliminary and limited subset of information collected in Census 2021 to update information on occupation the PHDA. This significantly increased the range of the population that could be included in the PHDA and reduced the uncertainty that using ten-year-old 2011 Census data brought.

Working in line with important principles around proportionality, ethical oversight, security, and in line with guidance from the Office for Statistics Regulation,[38] we produced this analysis and shared it with policymakers. In line with our commitment to make it available as soon as possible afterwards for the benefit of all our users, the data were also published on the ONS website.[39]

Following Russia's invasion of Ukraine in February 2022, we also provided preliminary counts of country of birth by LA for Ukraine and neighbouring or relevant countries[40] to help local and national emergency response planning.

Unlike the pandemic-related data, which used linked individual-level data, this release contained figures by LA area based on census returns. These were counts of census responses that had not been adjusted for estimated under-coverage (see chapter 6: Processing and estimation), and therefore differed from the published census estimates of country of birth.

Alongside the publication of phase one of the census outputs, we also published data to support and inform the response to rising energy costs. In November 2022 we published preliminary univariate and multivariate estimates of selected population groups by a selection of personal and household characteristics in England, to support response planning by the Department of Health and Social Care. In December 2022, we published preliminary estimates of the number of households by type of central heating at OA level and above[41], to support the response by the Department for Business, Energy and Industrial Strategy to rising energy costs.

9.11 Use of administrative data in Census 2021 releases

For the first time, we were able to produce integrated outputs, which combined census and administrative data. As noted in section 2.3: Topic and question development, we were able to drop the 'number of rooms' census question, as we could use administrative data from the Valuation Office Agency (VOA). The census housing data published in January 2023 included estimates based on VOA data, which were also available in multivariate releases. The variable was marked as being based on VOA data when users selected it in the 'Create a custom dataset' tool, and information about how the definition differed from that used in the 2011 Census is included in that tool. The difference is similarly noted in other locations where the data are accessed (such as nomis, census maps) and in the Census 2021 dictionary.

Administrative data were also used for housing analysis, notably our October 2023 publication on vacant properties and second homes.[42] Properties were classed as second homes or truly vacant based on information from census data, such as responses identifying a property as a second home or responses by housing associations for empty properties, and administrative data sources, such as council tax exemptions and energy use data. More information is available in the Measuring the data section of the publication.

Following our commitment in the December 2018 white paper (paragraph 3.174), we have been working with tax and benefits data from the Department for Work and Pensions and HM Revenue and Customs to develop small-area income data that can be linked with the data collected in Census 2021. These additional components depend on having timely access to underlying data sources and overcoming the complexity in combining data from different sources. We have

published research outputs, Admin-based income statistics,[43] to demonstrate the potential of this approach and are continuing to develop these research outputs. Our latest update[44] was published in June 2023.

9.12 Publishing supporting information

We provided a greater range of quality information and other supporting information alongside the releases for Census 2021 than previous censuses.

9.12.1 Quality and methodology

A census quality measures page provided links to standard measures of return and response rates, confidence intervals around population estimates, question response and imputation rates and the results of the Census Quality Survey.[45] Quality and methodology information (QMI) for Census 2021,[46] includes information on the quality characteristics of the census data and the methods used to create the data and outputs. This was published with the first release and updated with subsequent releases, as was our publication setting out how we maximised the quality of the census population estimates[47] during the processing and quality assurance of the final statistics.

The main release page for each of the nine topic summaries published from November 2022 to January 2023 included a link to a quality information page for the topics covered (two pages in the case of labour market and travel to work). The most important quality information also appeared on dataset landing pages and in the metadata for datasets, as well as being shown in other census products, such as the census maps. The QMI and Maximising quality publications are also linked from many other pages for census outputs.

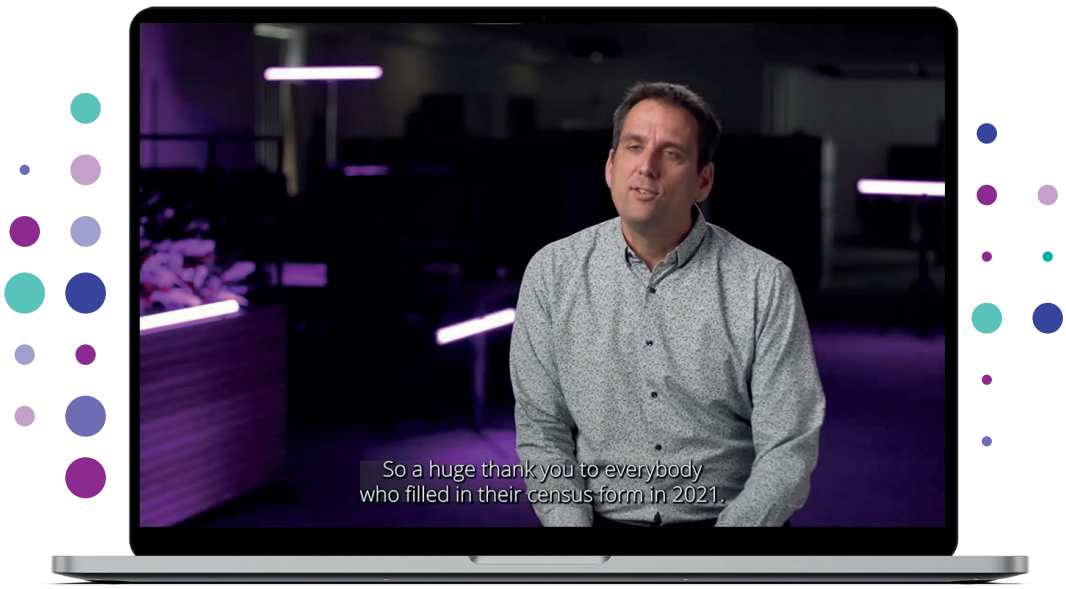
9.12.2 Other supporting information

The Census 2021 dictionary[48] provides definitions, variables and classifications to help users of Census 2021 data. It includes definitions of the area types used in census data and measurements used, such as usual resident, household, family and communal establishment. For each topic it provides definitions of each variable, classifications for that variable, background information, information on comparability with 2011 Census data and with census data from Scotland and Northern Ireland, and which Census 2021 data use the variable. For example, the “Ethnic group variable” page provided a definition, along with the 20 categories used for this variable, a link to other ethnic group classifications with fewer categories (for example where only the high-level response options are included), and links to the main dataset, the data visualised through census maps, ‘Create a custom dataset’, and a range of other datasets that used this variable.

We also published an outline of how we carried out SDC on Census 2021 data, in our article Protecting personal data in Census 2021 results.[49] This is summarised in section 8.5 Protecting personal data in census outputs. Similarly, chapter 6: Processing and estimation summarises several of the publications providing information about the processing stages.

9.13 Promoting census releases

We produced downloadable general information leaflets for the initial release periods, letting stakeholders know what was being released and when. PowerPoint presentation slides were provided based on the leaflets, for stakeholders to present information about Census 2021 outputs to their audiences.



Accompanying the releases themselves we ran a variety of webinars and produced videos to communicate and explain the Census 2021 results. The webinars included general sessions on the outputs and sessions that focussed on using the 'Create a custom dataset' tool and a quality assurance workshop. The 17 'explainer' videos included 'The making of Census 2021 from collection to results', a general video on the census results, and videos on the topic summaries. These were available in English and Welsh on the Census 2021 website and YouTube. All were also available in British Sign Language (BSL).[50]

Stakeholders were kept informed of Census 2021 outputs before and during the publication phases. We also produced a communications toolkit to help local authority and community stakeholders to raise awareness and explain the results. These were updated through the period, and included links to leaflets and videos.

For the first results in June 2022, we had over two thousand items of print and broadcast media coverage. The release was covered by national and local media across England and Wales, with senior ONS staff interviewed on BBC, ITV and Sky News, including for BBC Wales and ITV Wales. In total, 29 interviews were carried out across multiple platforms, including three in Welsh. Visits to the website, and impressions on Twitter and Instagram increased significantly, with a positive response to the interactive article and 'hex' game.

For the topic summary releases from November 2022 to January 2023, we again alerted over 20,000 stakeholders for each release.

These releases achieved over 5,100 items of media coverage. The demography and migration topic summary also gained attention in both mainstream media and community or sector media, including G-Scene, Asian Image, and Polish News. Attention particularly focussed on migration and the census maps. In line with the popularity of data downloads, the ethnic group, national identity, language and religion topic release and the sexual orientation and gender identity release generated the most interest in media and social media. This included both mainstream and wider media audiences, with a particular interest in the religion data and the first official estimates for sexual orientation and gender identity. Similarly, the new topic of previous UK armed forces service attracted mainstream, regional and sectorial media attention (including Forces Net and the British Forces Broadcasting Service).

9.14 Linking census data for research

In addition to the wide range of statistics, commentary, analysis and other materials that the ONS published for Census 2021, census data provide a very valuable source for researchers, for whom controlled access is provided to ensure that data are kept secure. Census 2021 marks a major step forward in the capacity for the secure use by accredited researchers of census data linked with other sources, including through the Integrated Data Service (DS) and the Secure Anonymised Information Linkage (SAIL) Databank, described in section 8.6 Secure access to census data for research purposes, as well as longitudinal analysis.

9.14.1 Longitudinal Analysis

Census 2021 marks 50 years of the ONS Longitudinal Study (LS).[51] The LS is the largest longitudinal data resource in England and Wales, containing linked census and life events data for a 1% sample of the population. It contains records on over 500,000 people usually resident in England and Wales at each point in time and it is largely representative of the whole population. We are adding data from Census 2021 to the data from the five previous censuses (since 1971). All information collected on the census forms is included in the LS, for example, age, sex, marital status and many other socio-demographic topics. With a very large sample size and low levels of attrition, the LS allows for extensive research into subgroups of the population of England and Wales. It has supported research

across multiple themes, including ageing, care-giving, deprivation, ethnicity, health inequality, migration and social mobility. We expect Census 2021 to be linked with the other data in the LS and available for research in summer 2025.

We are also developing a major new longitudinal project: the Longitudinal Population Dataset (LPD).[52] The LPD would enable longitudinal study of the whole resident population of England and Wales. Beginning with core data from Census 2021, the LPD would be updated to account for births, deaths and migration. The LPD would support the creation of satellite studies, either of the population or of population sub-groups, with the potential to include additional variables of interest from administrative sources. The value of a large-scale longitudinal dataset was illustrated during the coronavirus pandemic when this approach allowed an understanding of differences in COVID-19 mortality for people with different characteristics or occupations (see section 9.10: Exceptional early publication of data for urgent operational planning needs).

To demonstrate the feasibility of maintaining the LPD to deliver a range of benefits, the ONS, in collaboration with the Home Office and the Department for Levelling Up, Housing and Communities (now the Ministry of Housing, Communities and Local Government), created the Refugee Integration Outcomes Cohort Study (RIO).[53] The RIO study explores integration outcomes for refugees resettled via the Vulnerable Persons and Vulnerable Children's Resettlement Schemes, Afghan Resettlement scheme, UK resettlement scheme and refugees granted asylum in England and Wales between 2015 and 2023, using administrative data and Census 2021 data.

9.15 Reconciling the Census 2021 and the mid-year estimates

A key purpose of taking a census is to provide a 'stock take' of the population by age, sex, and geography. In non-census years the ONS makes mid-year estimates (MYEs) of the population using the cohort component method. This method ages on the previous year's population by one year, adding births, subtracting deaths, and accounting for internal and international migration flows and cross-border flows between England and Wales and the other UK countries. While births and deaths are well measured through a long-standing registration system, migration estimates are based on various sources. International migration has historically been measured using a sample survey (the International Passenger Survey) with administrative data providing geographic distributions. Internal and cross-border migration numbers are derived from administrative data. During the last decade improved migration methods utilising administrative data[54] have been developed (see chapter 11).

MYEs are produced using standardised high-quality methodology and the best quality data available at the time of publication. The complexity of internal and international migration data means that MYEs tend to drift from the census-based population estimates over the course of the decade, both at national and local level. After each census, we seek to understand the differences and provide an updated (rebased) set of MYEs for the decade.

The first stage is to calculate and understand the differences between the MYE for 2021 based on data rolled forward from the 2011 Census and that based on Census 2021 (and therefore rolled forward only from March to June). Our initial Census 2021-based MYEs found around 268,500 fewer people than the MYEs rolled forward from 2011.[55] This was revised down to 249,800 in our November 2023 rebasing publication[56] because of updated migration data for the period between Census Day and mid-2021. Table 9.1 shows the differences between the rolled-forward and census-based estimates. This was lower than the difference in the equivalent figure in 2011, which was 476,000 (or 464,000 excluding migration improvements).

Table 9.1: Comparison of the 2021 rolled-forward mid-year estimate (MYE) and the Census 2021-based MYE

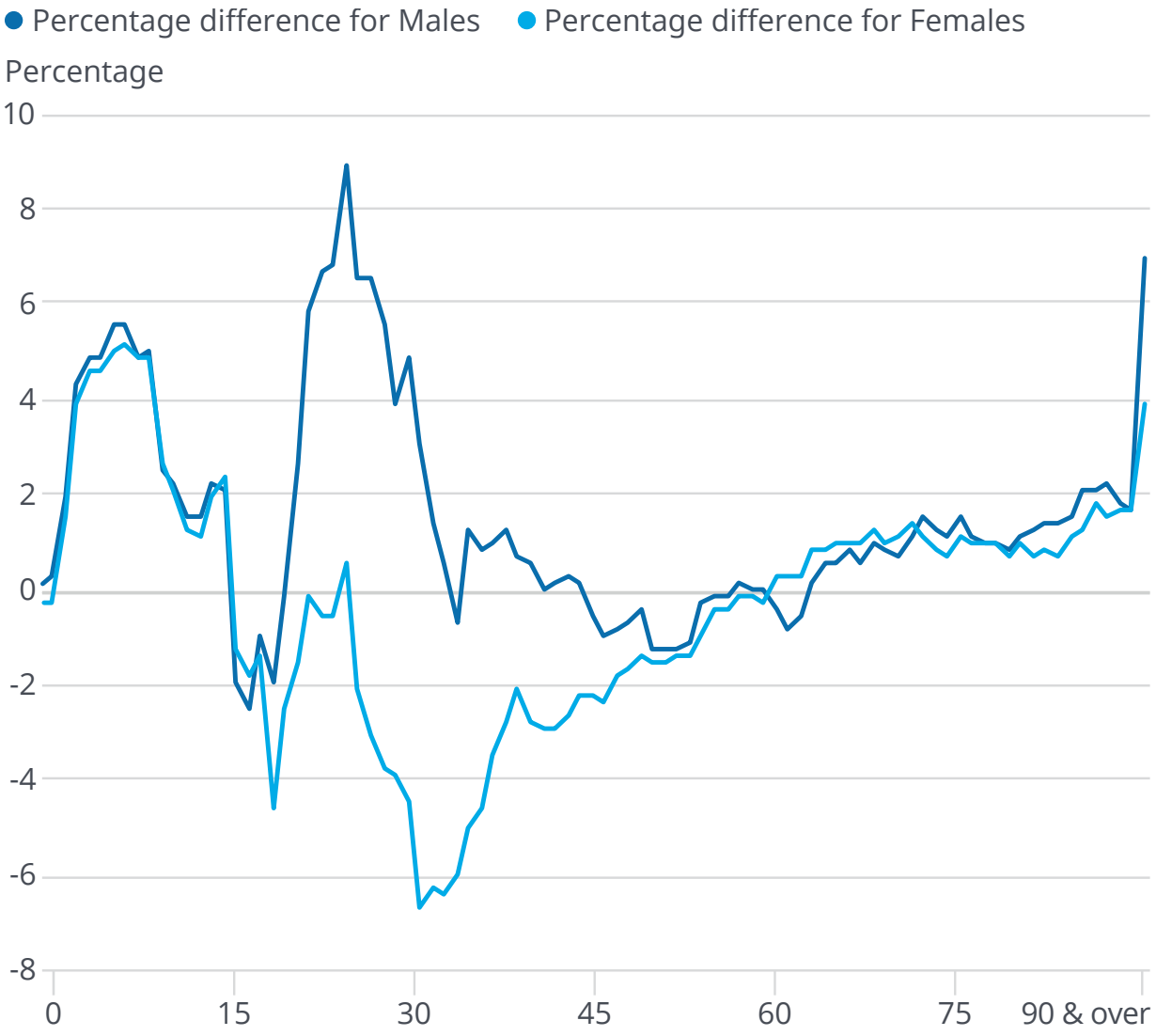
	2021 rolled-forward mid-year estimates	2021 census-based mid-year estimates	Difference to explain
Total	59,910,300	59,660,500	249,800
Female	30,260,700	30,457,200	-196,500
Male	29,649,600	29,203,400	446,200

Note:

- The numbers in this table relate to the mid-year estimates published in November 2023, so differ from the version of this table published with our initial reconciliation in February 2023
- Figures have been rounded to the nearest 100
- Totals may not sum due to rounding.

The difference between the rolled-forward and census-based MYEs is likely to reflect missed or overestimated international migration flows, but may also partially reflect uncertainty in the 2011 and 2021 census estimates (see section 7.2 Accuracy of the Census population estimates). The differences are not evenly distributed by age and sex. As figure 9.1 shows, the figures for male and female children (aged 3 to 15 years) were higher in the 2021 rolled-forward estimates than in the Census 2021-based estimates; meanwhile males aged 22 to 32 years and 90 years and over were higher in the rolled-forward estimates, and females aged 17 to 21 years and 26 to 53 years were lower.

Figure 9.1 Difference between 2021 rolled-forward mid-year estimates and 2021 Census based estimates by age and sex, England and Wales



Notes:

- Positive value means the rolled-forward estimate is higher, negative value means the rolled-forward value is lower
- Differences are expressed as percentage difference from the rolled-forward 2021 value.

Our 2023 rebasing and reconciliation publications contain more details, including the distribution of these differences across LA areas.

As well as rolling forwards from the new census base for MYEs after Census Day, after each census we have rebased MYEs dating back from that census to an appropriate point. After Census 2021, we rebased back to the 2012 MYE, following a similar pattern to rebasing after the 2011 Census, which went back to 2002. (After the 2001 Census we rebased the estimates back to 1982).

Table 9.2 shows which of the components of MYEs (births, deaths or migration) the differences were attributed to in order to reconcile the 249,800 difference between the two mid-2021 estimates. Having allocated these quantifiable components over the period, the remaining 40,400 unattributable population change was spread back over the years by cohort based on migration churn, as most uncertainty is derived from migration estimates. Further information, including how each component of the MYEs was reconciled and lessons learned from this process, can be found in our publication Rebasing of mid-year population estimates following Census 2021.[57] In April 2024, we published further analysis of the rebased MYEs.[58]

Table 9.2: Factors impacting on reconciliation differences, England and Wales 2021 estimates (net differences)

Factor	Impact this has on the mid-year estimates back series (2012-2021)
Difference between rolled-forward and census-based MYEs for 2021	249,800
Revision to net international migration flows due to improved methods and data	-177,000
Revision to deaths component to incorporate very late death registrations	-30,200
Removal of a foreign armed forces adjustment previously made, which is superseded by improved international migration estimates.	-3,300
Revision to 2020 births due to COVID derived registration delays.	+1,100
Other (assigned as Unattributable Population Change)	-40,400

Notes

- This table differs from that published in our November 2023 rebasing article as the revised census-based mid-2021 estimate is used; the miscellaneous adjustments of less than 50 have been removed.
- Figures have been rounded to the nearest 100.
- Totals may not sum due to rounding.

Our census-based MYEs have provided the best snapshot of the population at a moment in time for many years. The accuracy and reliability of the MYEs is high immediately after each census before declining over the course of the decade until they are rebased after the following census. The ONS's research indicates that it can produce reliable admin-based population and migration estimates that have a more consistent level of quality over the ten-year period than current MYEs (see chapter 11).

9.16 UK census statistics

While the production of statistics and the delivery of censuses is devolved across the UK, with the ONS responsible for England and Wales, there is a need for coherent UK-wide statistics. We work closely with Northern Ireland Statistics and Research Agency (NISRA) and National Records of Scotland (NRS) on these, which have two main aspects: the harmonisation of census outputs, and the production of census estimates for the whole of the UK, for which the ONS has ultimate responsibility.

UK harmonisation was the subject of close working with the other census offices, reflected in the statements of agreement published in 2015 and 2021. This included a UK Outputs and Dissemination Harmonisation Working Group, made up of ONS, NISRA, NRS, and the Welsh Government (see section 1.6 UK and international harmonisation). Through this collaboration, the questions and definitions used in the census have been harmonised where possible, as have outputs-related decisions such as alignment of approach to derived variable specifications and output classifications. As noted above, the Census 2021 dictionary includes information on the comparability of variables across the UK.

Historically, census-taking has occurred on the same day across the UK. The census in Scotland being delayed to March 2022 meant that for the first time since the Second World War, the censuses have different reference dates: 21 March 2021 in England, Wales and Northern Ireland, and 20 March 2022 in Scotland.

As a result, census population estimates for Scotland were available later than those for the rest of the UK. Census population estimates for England, Wales and Northern Ireland were incorporated into our UK-level MYEs for mid-2021[59]

published in December 2022, which used population estimates for Scotland rolled forward from mid-2020. Mid-2022 estimates for England, Wales and Northern Ireland were published in 2023 and, in March 2024, we published UK-level MYEs for mid-2022[60] that incorporated data from Scotland's 2022 Census.

We have also been working with colleagues across the UK on the production of UK-level characteristics statistics based on the 2021 and 2022 censuses. March 2021 UK estimates for a range of census topics, with guidance on the use of these data, are due to be published in summer 2025

9.17 Sharing and collaborating with UK and international colleagues

Our collaboration with NRS and NISRA also includes sharing how each organisation has approached their own census outputs and dissemination. For example, we collaborated with NISRA to co-develop and host systems for their flexible dissemination that built on our core capabilities and learning. With the census in Scotland taking place a year after that for England and Wales we were able to share lessons and examples from Census 2021 through meetings, discussions and the loan of staff to NRS.

In addition, our novel approach to census outputs has attracted international interest and we have shared lessons with Statistics Canada, Stats NZ, and the Australian Bureau of Statistics. We presented to the International Monetary Fund and to the UN Economic Commission for Europe to showcase our innovation in dissemination and ran the International Census Forum Community of Practice group on Content and Outputs for several years. We have also shared information on our dissemination approach as part of the revision of the United Nations Statistics Division's Principles and Recommendations for Population and Housing Censuses for the 2030 round. For more on our UK and international co-operation, see section 1.6 UK and international harmonisation.

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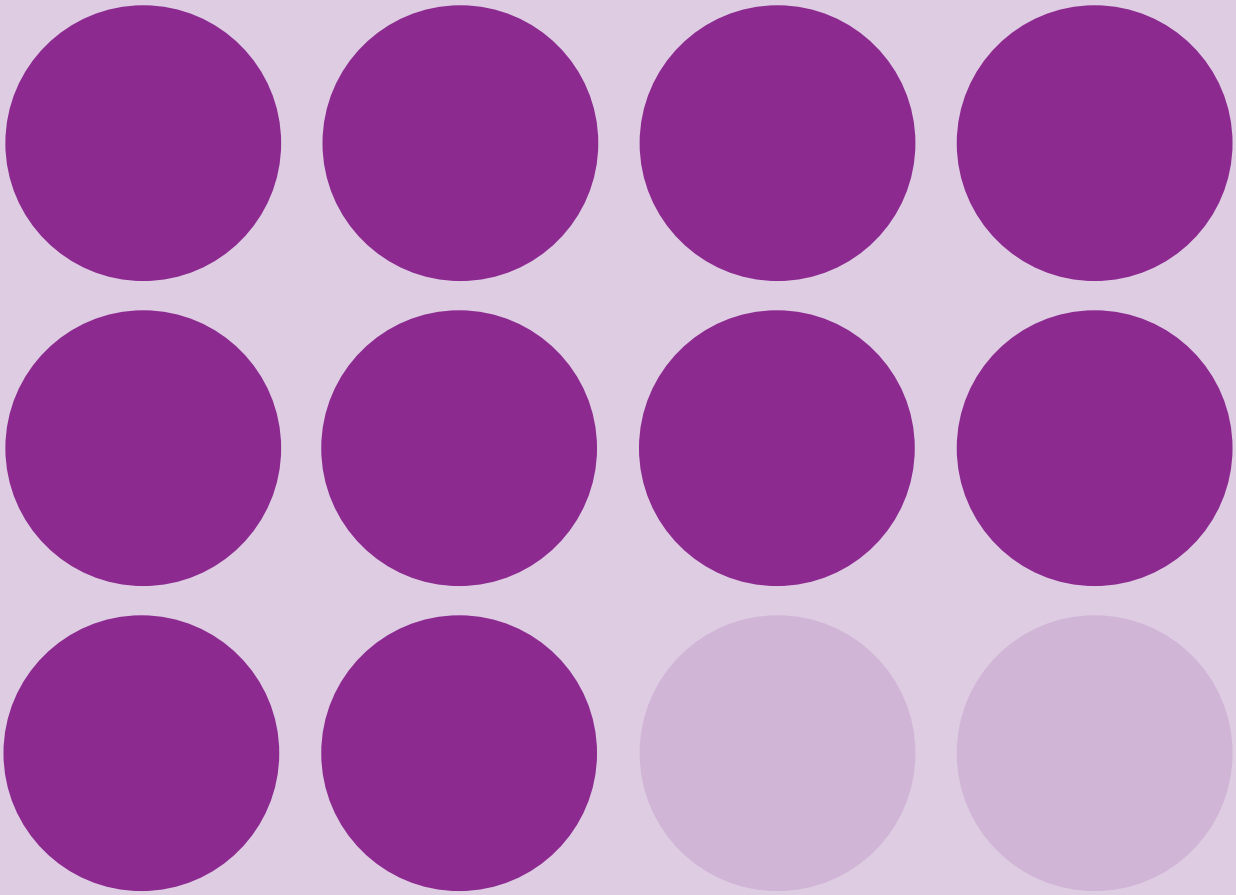
Evaluation and lessons learned

10



10.1 Introduction

It is important to reflect on what went well and what could have been improved in the delivery of a census. Census 2021 in England and Wales achieved a very high response rate with minimal variation between local areas and exceeded most of our strategic aims.

Census data were released more quickly than in previous decades, including a new flexible dissemination tool enabling users to explore up to five variables together.

There are many positive lessons to be taken from the planning and delivery of the census, but there are also areas where it could have been improved or where there were risks.

This chapter provides a retrospective review of Census 2021. The evaluation and lessons included here are not meant to be comprehensive, but to reflect on what helped to make it successful, areas of risk, and what might have improved the delivery of the census. These reflections may be of benefit to countries planning to deliver a census or large-scale data-collection in the future, considered alongside the potential benefits that might come from greater use of administrative data or Artificial Intelligence than was possible in 2021.

10.2 Highlights of Census 2021

This chapter outlines a number of positive aspects of the planning and delivery of Census 2021. There were a number of factors that were important in the success of the census.

These factors included having a good statistical design for the census and a strong but flexible operational design to deliver it. This included an effective strategy to deliver a digital-first and genuinely mixed-mode census.

The very high response rates before and over the census weekend were an important factor. This can be attributed largely to the communications campaign, community engagement and media relations that, combined with initial contact materials and well-designed routes to completion, encouraged

and enabled participation. The quality, ease of use and security of the electronic questionnaire (eQ) used by nearly nine in ten households was a notable success. It is likely that the coronavirus (COVID-19) pandemic and the lockdown conditions in place≈in March 2021 contributed to these initial response rates.

We exceeded our household response and local variability targets due to the high initial response and the effectiveness of follow-up activity by the field force and reminder letters, targeted communications, and local, national and community engagement that was more extensive than ever before. Focussing much of our engagement and communication on addressing barriers to taking part faced by some population groups was particularly effective.

Flexibility in our operational plans was essential. It meant that we were able to adapt to the circumstances of the coronavirus pandemic, and to change the household field force doorstep routine, engagement plans, communications campaign, and student messaging to cater for the situation in spring 2021. Flexibility in the field operation also enabled us to make best use of a smaller field force than we had planned for to support completion and minimise local variability, and to adapt to events and patterns in responses.

The processing stages were assisted by early access to live census data, while our Local Authority Insight Initiative brought local authorities into our quality assurance process, improving our estimates and user confidence. During the processing stages, we were also able to provide early data for the first time to support urgent policy-making of national importance (including the pandemic and rising energy costs).

Most importantly, we were able to produce a range of high-quality outputs that were more timely and more flexible than ever before, providing data and resources to meet a wide range of user needs. The centrepiece of this was the ‘Create a custom dataset’ flexible dissemination tool, which allows users to explore multivariate data in the ways they want to. Alongside this

and our flexible pre-built datasets, our statistical bulletins, analysis, interactive products and data-visualisation, semi-automated articles on local changes, and games provided information for people with a range of needs and expertise, accompanied by more quality information and other supporting information than for previous censuses.

In addition to these factors in the success of the census, there has also been a practical legacy with many of the technologies, methods and lessons from Census 2021 used across the wider work of the ONS, particularly in the transformation of population and migration statistics. Examples are noted in this chapter and at relevant points in the report.

10.3 Planning for Census 2021

The statistical design for Census 2021 built on the lessons from 2011 and guided the design of this census. This meant that decisions on operational matters were geared towards delivering the best statistical outcome. While the field operation and data collection are key to a successful census, end-to-end planning for the whole of the census guided by the statistical design is needed to deliver high-quality estimates from the information collected. Our quality targets were an important part of our planning, with their emphasis on minimising local variability as well as achieving high overall response rates.

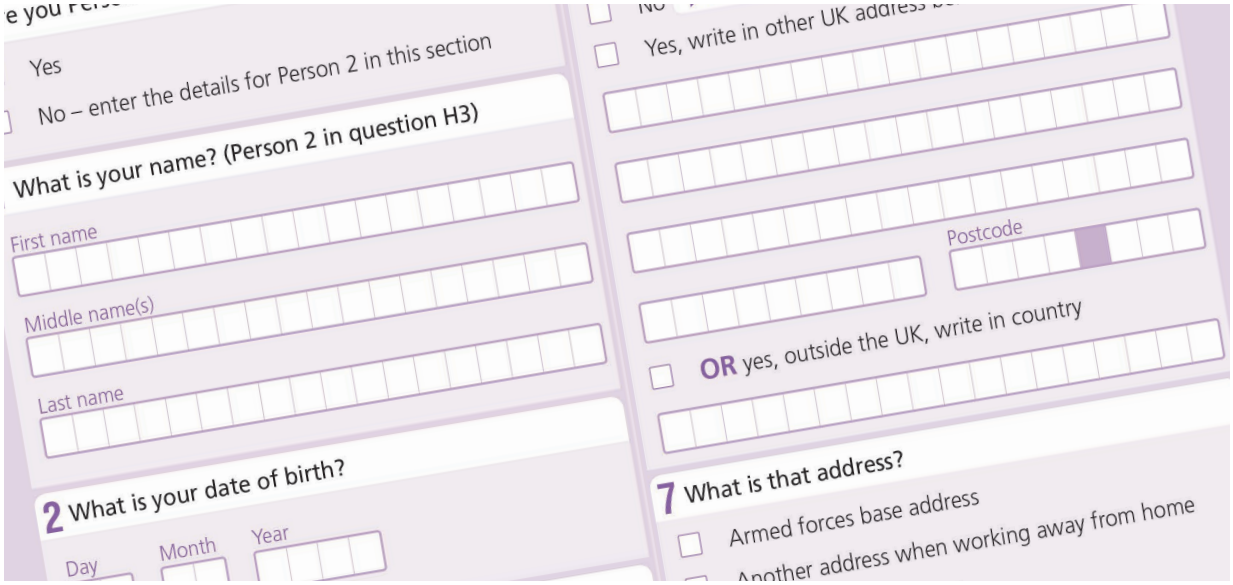
The 2011 General Report recommended that tests and rehearsals should cover the whole process, including processing and outputs. The 2019 Rehearsal was focussed on data-collection and was followed by a processing rehearsal, but the latter was less useful than it might have been due to the implementation of improvements identified in the collection rehearsal, while outputs production was not rehearsed. Preparation for the production and dissemination of outputs could have been improved by greater inclusion in the general statistical design and a thorough rehearsal. Considering how and when it is best to rehearse processing and outputs could allow more successful end-to-end testing and improve preparations for the latter stages of a census.

Rehearsing the live data-collection operation in 2019 was very valuable preparation. It helped to expose the planned operation to real-world delivery and allowed us to develop responses to issues and complexities that might only emerge in live delivery.

It is notable that some of the more difficult aspects of delivery in 2021 were in parts of the operation that were not rehearsed. The clearest example is communal establishments (CEs) and special population groups (SPGs), only the more straightforward parts of which were rehearsed in 2019, as the rehearsal mainly focussed on the larger population residing in households. Rehearsing as much as possible of what will be included in the live operation should be the aim. Including more of the contact and response routes for CEs and SPGs, or focussing on the more difficult routes, might have helped to identify and resolve issues that were not encountered until the live operation. It is worth noting that being smaller-scale and voluntary means that not all problems that surface in a full census will be encountered in a rehearsal.

Another important part of our planning was 'war-gaming', scenario planning, and working through issues that might arise. This applies for the data-collection phase but also for processing. While we could not have specific plans for each possible issue and incident, we had an established process for responding, whatever the specific issue that arose.

With our aim for Census 2021 to be as inclusive as possible, mapping the journeys through the census for people facing different barriers to taking part (described in section 2.10 Accessibility) was valuable in delivering an inclusive and accessible census. However, reviewing our plans in this way could have been built in earlier in their development.



10.3.1 Question and questionnaire development

Question and questionnaire development was undertaken from 2015 through to the finalisation of the questions in the census secondary legislation in 2020, as described in section 2.3 Topic and question development. While this question development process was generally successful, the gap between the main topic consultation and engagement period and the census itself was around five years. The constraints of preparation for processing and legislation impose some of this gap, but it is worth considering whether any flexibility could be built into the timeline to adapt to changing user needs. Similarly, it is worth considering whether the legislation can allow greater flexibility to adapt to major developments, as in 2021 with the coronavirus pandemic.

Publishing our question development reports, both general and topic-specific, has been helpful both for transparency of our processes and to demonstrate why certain questions, wording choices or response options were, or were not, used. While the household and individual questionnaires were fully researched and developed in this way, more work could have been done to understand user need for the information collected through the CE manager's form.

The biggest change for census respondents in 2021 was the default mode of response being online. This was a great success, with 88.9% of households responding online. The eQ remained live and secure throughout the data-collection period, and respondents were able to complete it quickly and easily. Enabling people to complete when and how they wanted was important and the high level of response via mobile phone (over 56%) suggest we achieved that.

Making the census fully multi-mode meant that the development of questions had to take into account both paper and online use. Early engagement between question development and eQ development teams is important to understand the needs and constraints of each response mode. While it is important to align questions between the modes, there is a balance to be struck between alignment

and optimising the response received from each mode. Related to this is the need to consider the impact of decisions on the data collected, for example the move to a five-person paper questionnaire (PQ) reducing the information gathered on relationships in larger households completing a paper return. More broadly, it is worth considering whether we could accept more variation between completion modes (paper and online) if less alignment between them means that we can take greater advantage of the possibilities created by online question design.

Section 7.4: Issues specific to Census 2021 describes work we have done relating to some topics following the publication of census data. In April 2023, the ONS and Welsh Government published a joint workplan of coherence of Welsh language statistics. We also conducted further investigation of census gender identity estimates, which were subsequently redesignated as 'official statistics in development'. An additional report on the quality of Census 2021 gender identity estimates was published in March 2025, providing more detailed information on the uncertainty associated with the Census 2021 gender identity estimates, and guidance on their appropriate use.

10.3.2 External engagement and assurance

The external engagement in developing the census topics and questions, data-collection operation and outputs was extremely valuable. A particularly helpful addition to our external assurance for Census 2021 was the National Statistician's Methodological Assurance Review Panel (described in section 1.10 Census legacy), which has continued to have a role in the transformation of population and migration statistics.

10.3.3 UK and international census collaboration

Across the preparation for and delivery of Census 2021, collaboration and co-operation with other national statistics institutes has been extremely valuable. The arrangements with our colleagues in National Records of Scotland, the Northern Ireland Statistics and Research Agency and the Welsh Government, described in section 1.6: UK and international harmonisation have been very important in both harmonising approaches across the UK and sharing lessons and best practice through each stage of the census. More generally, sharing experiences and lessons with census-taking bodies around the world helped us in our preparations for Census 2021, and we hope that our experiences have similarly assisted others. Engagement with international partners has also been valuable, for example the International Census Forum and UN Economic Commission for Europe (UN-ECE) through which we have been able to share lessons learned and learn from others' experiences.

10.4 Data collection

10.4.1 Overview

The main data-collection phase of Census 2021 (described in chapter 4) exceeded our targets; however, an operation of its scale and nature will naturally involve risks. Our targets were framed to reflect both the need for high response rates nationally and low levels of variability between local authority areas, both of which are needed to produce high-quality census estimates.

The coronavirus pandemic presented a significant risk and had a mixed impact on the data-collection operation, potentially providing a more receptive audience for the census among those most likely to respond, but increasing the difficulty of reaching those who were less likely to. The national lockdown and the start of the vaccination campaign in the winter of 2020-21 may have made it easier for our messaging to reach parts of the population, particularly those more inclined to respond. The extent to which the operation benefited in this way cannot accurately be estimated. The pandemic created a challenge for the rest of the operation, however, affecting the doorstep routine for census officers and engagement with communities. The shortfall in recruiting for the field force was another risk, with only 70% of household field force roles filled; the proportion of roles filled was lower in Wales, particularly in Welsh-speaking roles. While the high initial response rates (and reduced volume of follow-up required) mitigated the impact to some extent in the main census data-collection operation, not having the numbers of census officers we had planned for made the follow-up activity more difficult. Pushing those high initial rates to national and local rates that surpassed our targets depended on effective engagement, support, ongoing communications, and making the best use of the field force.

Enumerating CEs was a known challenge from previous censuses. This was made more difficult by both the pandemic and the field force being smaller than planned for. For example, lockdown restrictions reduced the scope for in person follow up visits.

Following the main campaign, response rates for the Census Coverage Survey (CCS) were below our target (see section 10.4.4). The high census response rates meant that we were able to produce high-quality statistics even with the lower CCS response rates, and did not need to use our contingency plans for lower-than-expected response rates across the two surveys, but the CCS response rate was a major risk.

Flexibility was vital in the work required to exceed our response rates targets, particularly in the deployment of the field force, but also in responding to developments in the campaign (such as the focus on students and reacting to problems with PQ receipting) and external incidents (such as the death of the Duke of Edinburgh). Incident management and pre-campaign ‘war gaming’ were important parts of our preparations, as was establishing an effective operational management forum supplied with up-to-date management information.

10.4.2 Initial contact and digital-first strategy

A central feature of Census 2021 was that it would be digital-first but support people completing the census on paper if they preferred. Striking the right balance between paper-first and digital-first initial contact was important and predicting the online take up was not easy, as the way people engaged online changed considerably from 2011, with the coronavirus pandemic potentially providing an additional catalyst for change.

There are alternatives to a mixed-mode initial contact, the pros and cons of which could be considered. For example, the potential benefits of only sending out letters (and no PQs) as initial contact would need to be weighed against the additional logistical effort and potential delay to responses caused by potentially larger numbers of requests for PQs or other completion routes (such as telephone capture or assisted digital). Similarly, a digital-only census without a paper response route would remove the need for post-back and scanning, but would need to accommodate those unable or unwilling to complete online. The right balance of online, paper and other routes for a particular census is an important consideration and will change over time. The balance of around 90% digital-first to 10% paper-first contact worked well for 2021, reflected in the similar proportion of online and paper responses, but for any future mixed-mode census operation, a different approach to the proportion and targeting of paper-first contact might be appropriate.

The Census 2021 eQ was successful in terms of both its front-end design and ease of use for respondents and its technical performance, with the service maintained and operated securely throughout the data-collection period. It is also a good example of lasting and wider benefits, as the eQ was developed for both Census 2021 and for business surveys, and developed further for other surveys.

The initial contact letters worked well to promote and facilitate completion, in combination with the communications campaign and the eQ. Testing and the 2019 Rehearsal helped to refine the initial contact letter to perform its function well. Some elements of the design and timing of the reminder letter could be reconsidered, however, following the negative responses received via the public contact centre and correspondence. For example, a slightly later first reminder letter or not referring directly to the fine for non-completion in the first letter might have delivered a similar benefit without prompting queries and complaints from people who had received a reminder letter after completing the census, particularly on paper.

10.4.3 The main census field operation

The shortfall in recruitment for the field force created a risk in the data-collection operation. The high early levels of response and the flexibility built into the design of the field force meant that we were able to deliver what was needed with the field force we had, but the shortfall (including among Welsh speaking roles) meant that this work was harder and the risk was greater than if the full planned-for field force had been in place. While most of the unfilled posts were among household census officers and CE officers, the difficulties were particularly acute where team leaders were not appointed. Problems with the candidate experience of the recruitment process, particularly around communication with candidates, also created negative media and social media coverage of the ONS and the census.

The mobile field force was a very useful resource, which could be deployed to areas where additional resource was needed to improve local return rates. We were able to increase the mobile resource by converting some household census officers in areas with high return rates into mobile officers, again demonstrating the importance of flexibility. We were also able to build flexibility into our response to high return rates, providing new mechanisms to stop follow-up activity in those areas.

In any future census, there may be scope to increase the flexibility of the operation to cater for differences between different areas and regions by incorporating local insights from existing teams and staff across ONS at an earlier stage. It may also be worth considering greater operational independence in planning and delivering the field operation in Wales, to take account of specific factors affecting the operation and variations across Wales.

The use of technology to support the field operation was a major feature of the day-to-day running of Census 2021. Field officers carried mobile devices that included a Fieldwork management tool (FWMT), through which they received daily workloads of cases to follow-up based on the Response Management (RM) system. In turn RM kept track of all activity relating to each case, from initial contact, through to reminder letters, visits and completion, an improvement

on 2011's Questionnaire Tracker. Data from RM also fed into operational management decisions that in turn directed how the field force and other interventions were used (see section 10.4.6). Field officers' devices also assisted their personal safety through the Lone Worker Solution (see section 4.7.4).

There remained challenges, as in previous censuses, around enumerating second homes. These were exacerbated by the coronavirus pandemic, which meant that some people did not visit their second homes so did not receive the letter or questionnaire we sent to that address. Meanwhile others had relocated from what would have been their usual address before the pandemic to their second home. This made it more important than previously to explain clearly to users that the census was a snapshot of March 2021, and to ensure that post-pandemic population moves were identified and included in subsequent estimates. There may be ways that we could have collected data on second addresses more flexibly, such as collecting information on them at the same time as for the usual address, or allowing PQs for second addresses to be sent to the respondent's usual address.

While the much larger household population was naturally the main focus in planning, the design of the more complex CEs and special population groups (SPGs) enumeration also needs attention from an early stage. CEs and SPGs were segmented into 28 categories, ranging from student halls of residence, prisons and hospitals, to caravan sites, people living on boats and rough sleepers. This reflected the complexity of the enumeration but also potentially created additional operational complexity, with a range of different types of site or population requiring different methods of contact and delivery of census materials. Less segmentation might have improved that, and a simpler design for delivery and completion across the different categories might have been possible, while some SPG categories could potentially be covered by the household operation. As noted earlier in this section, more extensive testing of the CE and SPG operation, particularly through the 2019 Rehearsal, would have been beneficial.

The interaction between CE and household operations more generally could be considered. There were uncertainties in the definitions of CEs that made it unclear whether some properties were CEs or households, requiring field staff to make a judgement on the definitions. Potentially having a single questionnaire for residents of both CEs and households would simplify things in this area. Meanwhile, there could have been more integration between the CE and household operations, and with local engagement. Integration with support services could have been improved, for example to ensure that consistent messaging is used for groups for whom the usual routes for completion were less applicable (such as people living on boats).

Student halls of residence were known to be a particularly difficult CE type to enumerate, as well as being the CE type with the most usual residents. Engagement with universities was particularly important in getting messages to students. Challenges around CE addresses was particularly acute for halls

of residence, with more complex arrangements, differences between common names for buildings and those in the address frame, and changes of ownership of properties since 2011. The coronavirus pandemic created a significant additional challenge due to the absence of many students (including international students no longer being in the UK). It also meant that some properties were closed and inaccessible to field staff. Including unit-level addressing (such as rooms in student halls of residence) in the address frame was challenging and did not deliver the benefits expected, in part due to most students being absent from halls and therefore not receiving the initial contact letter (ICL) intended for their room address.

10.4.4 Census Coverage Survey

The response rate for the Census Coverage Survey (CCS) was lower than our target. While the high response rate for the main census meant that the CCS response was sufficient to provide high quality estimates, it was a risk and could have created problems if the census response rate had been lower. Section 4.10 outlines several factors that potentially affected CCS response rates, including potential census fatigue, the shortfall in recruitment, and needing to make respondents aware that it was voluntary. More mentoring by experienced interviewers (with more mentors and without the pandemic restrictions that affected the 2021 operation) might have helped to reduce the refusal rate. As recommended following the 2011 Census, greater prominence could have been given to the CCS in general materials and information provided to the public about the census, raising its profile as an important part of the census process.

10.4.5 Addresses

The address frame is an essential part of the delivery of the census, both in the data-collection and the processing stages. The address frame for Census 2021 was very high-quality, providing a comprehensive list of addresses through which to contact the public to complete the census. This was particularly the case for household addresses, while the CE address frame was more complex

and challenging. Being able to update the address frame right up to Census Day was beneficial: additional information from AddressBase Premium was added after the initial extract and further refinements made by census staff. Planned field-based checks were cancelled due to the pandemic, so we increased desk-based clerical checking. This resulted in the address checking processes becoming more efficient and effective. Information received from field staff via the public contact centre further refined the address frame during the follow-up period, providing information not available or up-to-date in the administrative data used for clerical checks. The balance of administrative and field-based evidence for the address frame is something that may have a wider application, particularly as we produce more administrative-data based statistics. The requirement for greater use of clerical checks was an unexpected benefit of the pandemic restrictions.

The address frame for CEs and SPGs was particularly challenging, with mismatches between common names for buildings and those in the address frame, properties missing or misclassified between being CEs and households (see section 10.4.3). In part this reflects the greater complexity of some CEs compared with households, for example some large establishments (such as halls of residents) may be made up of buildings with separate addresses. Creating the address frame for the CCS was also challenging. By design, this was created separately from the main census address frame, giving independence to the frame used for the CCS but requiring additional work to develop separately.

While the ability for people to order new access codes and PQs through the website was useful and well-used, this facility used a larger address index than the address frame itself. This meant that for some establishments there were multiple valid addresses listed that users could choose, complicating the tracking and follow-up of their cases. This occurred particularly in student halls of residence where students were often not present to receive their room-specific access code so relied on this service.

Addressing was one part of the bilingual delivery of Census 2021 in Wales that we were not able to deliver to the standard we would wish. While the materials sent to households and CE residents themselves were bilingual (a bilingual ICL or both English and Welsh language PQs), we were not able to use Welsh-language addresses. Although a requirement for Welsh-language addresses was identified during the planning process, it was not incorporated into our plans early enough to implement a change for printed materials or the eQ. This provides a reminder of the need to identify and incorporate such requirements from the initial design phase to explore, test and implement them in good time.

10.4.6 Operational management and use of management information

Operational management of the Census 2021 data-collection operation worked well. Different elements of the operation worked well together, with good connections and oversight. Central to the day-to-day operation were the daily

Optimising Response Group (ORG) and the management information (MI) that the ORG was able to access from Response Management (RM). An important forum bringing together the field operation and statistical design, the ORG was planned as part of the design but over time developed in importance and improved in its communications and alignment to operational teams. The daily rhythm of ORG and other meetings was useful for teams, providing a predictable routine.

Pivotal to the success of operational management and the ORG was the provision of high-quality daily MI from the RM system, which was also a critical resource for delivering workloads to field staff and information to respond to public inquiries. Use of these data allowed decisions to be made based on the latest data, from national decisions (such as the timing of reminder letters) to local deployment of the field force. The MI enabled us to spot trends in responses and to detect issues that particularly affected one area of the country, such as the receipting of PQs.

Given the importance of MI and the ORG, there are some changes that would have improved the arrangements further. For example, earlier development of MI systems and better alignment of ORG meetings with the deployment timings for mobile teams. The transitions between different phases could also have been improved, for example from census to CCS, and into the post-collection period.

In addition, there could have been a better shared understanding between teams that the role of ORG in optimising responses meant that decisions taken at this central level (for example, to minimise variability of response between areas and populations across the country) might have appeared to run counter to the regional and local teams' attempts to maximise return rates in their locations.

Incident management during the operation also worked very well, and the work that went into preparing it was vital. This included 'war gaming' and running through various scenarios and how the operation would respond to them. These pre-operations preparations were vital to enabling us to respond to specific incidents and ensured that we had processes to deal with whatever might arise.

10.5 Communications, media and engagement for data collection

The communications campaign, media relations and engagement were a major part of the success of Census 2021 and were evaluated using the Government Communication Service Evaluation Framework. As noted above, the high response rates up to and over census weekend demonstrated the public's awareness of the census. High-profile media, such as a Gogglebox partnership had a demonstrable impact on visits to the census website, while others such as the 'community heroes' and the purple 'light-up' of prominent buildings provided good local press coverage. The partnership marketing campaign resulted in 37 commercial partners amplifying communications which reached 37 million and over 11,000 primary and secondary schools participated in the census education programme.

As well as delivering high-quality, accessible campaign materials, an important factor was flexibility. This allowed us to adapt to the pandemic and to the evolving needs of the campaign, as demonstrated in the students' campaign, which worked in conjunction with dedicated advice on the Census 2021 website and engagement. Media choices were adapted to reflect people spending more time at home and the campaign was constantly adjusted to target lower responding areas and groups.

Between the 2019 Rehearsal and Census 2021, we changed our communications campaign supplier. This was a move taken at risk, with such a high-profile operation being planned, but it paid off, with the new supplier able to provide the quality and flexibility needed to support the Census 2021 campaign.

A major feature of the media coverage of the census was the effective use of census champions, with ONS staff and stakeholders appearing in national, local, sectoral and community media. Our community staff (Census Engagement Managers (CEMs) and Community Advisers (CAs)) did an excellent job of promoting the census in their locations or communities. Where CEMs or CAs had media experience, this showed in the impact they were able to have, while those without experience were greatly assisted by media training we provided. Having regional media leads, preferably with media experience, could have improved the co-ordination of the use of CAs and CEMs as media spokespeople.

Engagement to support census data collection was very effective across its different components: national and local, which included local authority and community engagement. The focus on communities and population groups that faced barriers to taking part helped to focus engagement work and make the most effective use of resources. The community partnerships that we developed with key charities, networks and community leaders across England and Wales were very effective. For example, community leaders were able to influence members of their communities and support participation. Again, the pandemic restrictions had a mixed impact, as the move to online engagement allowed us to have more meetings with larger numbers attending, but not all people or communities were able to engage online.

We had a high level of support from local authorities both for our engagement and through their own activities. The model of having Census Liaison Managers and Assistant Census Liaison Managers in local authorities worked well to support this relationship. The community engagement roles (CEM and CA) were very effective at a local level, justifying the increase in these roles since 2011. The greater emphasis on online engagement in place of in-person meetings due to the pandemic increased the geographical flexibility of CAs' work in 2021. Building such flexibility to support engagement outside their specific geographical area of operation could be a successful model should CA roles be needed in future.

10.6 Support for data collection

The public contact centre provided valuable support for respondents and benefitted from the flexibility to update the messages and options provided by the pre-recorded messages in the Interactive Voice Response (IVR). This flexibility allowed us to meet evolving user needs during the campaign, including the addition of a direct number for PQ requests. The pattern of calls was different from what was anticipated, with much higher numbers of calls early in the campaign and peaks prompted by reminder letters. The planned capacity for the contact centre could have been better aligned with the timings of initial contact and reminder letters, while the provision of the direct PQ request line from the start would have eased pressure on the service in the early weeks. Similarly, there could have been a smoother transition from the contact centre to Census Customer Services. The contact centre service might have been improved by access to an adviser's view of the system during development, to help identify unexpected behaviours and refine the design. We could also have made more use of automation, for example using "bots" for webchat, managed by the contact centre provider. The provision of a census correspondence address on ICLs and planning for a larger volume of letters could have improved communications with respondents contacting us that way.

The support aspects of the website were very useful as the main information source for our other support services as well as for respondents accessing it directly. This meant that there was a consistent set of messages across the website, contact centre (including webchat), social media and assisted digital. As section 4.4.4 Online help sets out, the most used pages related to who needed to complete or be included in the census, which helped to align people's responses to our definitions. Having a full set of guidance for all census questions as well as supporting access and completion required a disproportionate amount of effort. However, it was important to provide support for those who needed it, directly through the website or indirectly through the other support services. Users might have benefitted from a search facility on the website, to help them find the guidance they wanted. Hosting resources for stakeholders to access was also a useful function of the website prior to the launch of the main campaign.

As noted in section 4.9: Communal establishments and special population groups, the provision of consistent and accurate information for populations with no fixed address to access the census was a challenge. We updated the contact centre IVR with messages for this population group, but a bespoke user journey, perhaps including self-service access via the website, might have been beneficial.

Telephone capture and our census support centres provided valuable direct assistance to respondents completing the census online who might not otherwise have been able to. We could have made more use of telephone capture as an alternative route for people to respond, and it would be worth considering whether a bespoke telephone completion questionnaire would have improved

the service. The coronavirus pandemic severely affected the provision of assisted digital services through census support centres, but these were still able to provide assistance in person, or by phone where in-person contact was not possible. This was a valuable service that could have played a much greater role but for the pandemic restrictions. Its impact could also be increased through greater alignment with local field operations and community engagement.

10.7 Processing and QA

10.7.1 Processing and estimation

To deliver the large-scale and complex processing needed for Census 2021, it was important to bring together a wide range of skill sets and experience from across teams in the ONS including statisticians, digital services and data engineers. These teams worked well together, working across boundaries to deliver what was needed.

A major benefit for processing and estimation came with the provision of live response data early in the data-collection period, and that these data were available at a national level (rather than divided into geographical areas). This enabled us to use these data early to identify any issues arising from processing and to develop reactive strategies, such as the adjustments made for students' addresses. As it is not possible to predict exactly what the processing systems will need to deal with in advance. They were designed to be flexible to integrated additional processes and methodologies in response to features and issues in the live data.

Early access to data for processing and quality assurance also meant that we were able to be responsive and make preliminary data available where there were urgent policy and planning needs in response to the coronavirus pandemic, the Russian invasion of Ukraine, and rising energy costs. The data-linking needed for the pandemic impact releases and the Refugee Integration Outcomes are also examples of how census data is being used in innovative ways alongside other data sources.

We used the Canadian Census Edit and Imputation System (CANCEIS) for editing and imputation for a second time in Census 2021. This meant that we were able to benefit from lessons learned from the 2011 Census. Knowledge gained in using the system and methodology in these censuses could, in turn, provide a benefit should a similar approach be required for large scale imputation approaches an the administrative-data based statistics system (see chapter 11). Matching of the census and the CCS was done using bespoke, internally developed processes that worked well and more quickly than expected, and more quickly than in 2011. Like the edit and imputation system, our coverage estimation and coverage adjustment methodology have potential uses in an administrative-data based system.

More detailed assessments of the different stages of processing can be found in the publications referred to in chapter 6: Processing and estimation. There are a number of elements of the census processing and estimation from which

we have already derived benefits in ONS's wider work, and others where we have the scope to, including the development of coding tools both for occupation and industry and for socio-cultural questions.

While flexibility through the stages of the census brought many benefits, changes being made late in the development of the collection system made it harder to plan the processing stages. There is a tension that needs to be carefully managed between flexibility and the need for stability for effective preparations.

10.7.2 Quality Assurance

An early decision was made to have teams dedicated to each of the two main strands of the work – quality assuring processes and the validation of the estimates. The latter work also drew on expertise from other teams in ONS, including a demography team, researchers specialising on each topic covered on the census, and the teams carrying out the processing of the data. The teams worked closely together to maximise efficiency and the findings of the work all went through the same governance process, ensuring that any identified quality issues had been investigated and addressed appropriately. The governance process allowed issues to be addressed quickly and the hierarchy of quality assurance (QA) panels provided independent scrutiny of the work.

Early availability of census response data meant that initial QA could be conducted in parallel with processing rather than waiting for the final estimates to be available. This minimised any delay in the release of the estimates to complete the assurance.

Involving users and other external experts in the QA was invaluable. Local authority involvement was particularly important, including through the Local Authority Insight initiative, which built confidence in the estimates when they were released. Likewise, the involvement of the Welsh Government in the initiative and the wider QA of estimates was valuable. However, with such a large number of authorities involved in the Local Authority Insight initiative, it was impractical to discuss with each local authority the details of the investigations resulting from their feedback. The process could have been improved by providing more reassurance to users that their feedback was being considered and that any issues identified were being investigated.

The validation of the estimates made great use of a range of administrative and survey data sources. Substantial time was spent in arranging access to, and understanding, these sources. With hindsight, it may have been more efficient to have focussed on a smaller number of comparator sources. Understanding the complexities of each of these sources was vital when comparing them with the census data and this took time when using sources that were newly acquired by ONS. The experience of conducting the census QA has increased ONS's understanding of these data sources and increased the value of these sources to our future work.

Results of the Census Quality Survey were published much sooner after the census than was possible after the 2011 census. This work could potentially have been scheduled even earlier to allow results to feed into the QA of the topic results before these were released, rather than being published as a reference for users following that release.

10.8 Outputs and dissemination

10.8.1 Census 2021 output products

The outputs from Census 2021 allowed more flexibility for users in how they accessed the data than ever before, as well as being accompanied by more analysis and supporting information. They were also more timely, with the first results published in June 2022, the 'Create a custom dataset' tool and other multivariate data published in March and April 2023, and the main England and Wales outputs by the end of 2023. This was significantly more timely than after the 2011 Census, after which many outputs were not published until 2014 and 2015. We also provided a much greater range of interactive products and data-visualisation to accompany these outputs. The quality and range of the Census 2021 outputs is shown by their commendation in the Royal Statistics Society Campion awards, which noted that the outputs met a wide range of user needs with products that were accessible to different audiences.

Central to this was understanding user needs and ensuring that we were able, as far as possible, to meet them. The comprehensive consultation in 2021 outlining our phased outputs plan, and the high level of engagement with it by users, helped us to understand and meet those needs. Likewise, consulting and engaging on geographies enabled us to meet users' needs with a wide range of geographies and alternative population bases.

The sequence of topic summary releases was adjusted to reflect user needs following the consultation, creating a more logical release order than after 2011.

Publishing as a series, rather than a smaller number of publications covering multiple topics, was challenging but maximised the opportunity for publicity and public awareness of data across a wider range of topics. We also produced a wider range of analysis, on a more timely schedule, than after previous censuses.

The blended offer for multivariate data, and particularly the 'Create a custom dataset' flexible dissemination tool, meant that a far greater range of data were made available to users than ever before, and this was done sooner than the full

range of multivariate data after 2011. The tool allowed users to cross-tabulate data using up to five different variables. The 2021 outputs enabled users to access the combinations of data and geographies that they wanted, within the limits of statistical disclosure. The provision of datasets in a machine-readable format (csv) and layout, and through an API (Application Programming Interface), further improved the offer to expert users, although offering more traditional table formats may have suited other users better.

The unique approach to statistical disclosure control (SDC) described in chapter 8: Confidentiality, security and privacy, was a major advance on the approach for the 2011 Census and made the 'Create a custom dataset' tool possible. While we made information about our SDC approach available to users, in retrospect we could have communicated better how this might affect the datasets themselves, as many users did not appreciate the impact (which meant that aggregated totals from tables with many cells might not be the same as the overall totals given elsewhere).

More data and information were provided in Welsh than in previous censuses, but there were some areas where improvements could have been made. Collaboration with Welsh Government officials on Welsh language topic releases, for which they published the main statistical bulletins, was a positive development. They were able to provide topic and policy expertise on the subject, as well as publishing the bulletins bilingually. Welsh Government also produced bilingual bulletins focussing on Wales alongside our other topic releases. Our topic summary statistical bulletins were available in both English and Welsh; the production of the Welsh versions was aided by the development of a dedicated Welsh-language resource between the first results and topic summary releases. The successes and challenges of Welsh-language provision for the census data collection and outputs, have contributed to a more general prioritisation of Welsh language provision, including updating the UK Statistics Authority's Welsh Language Scheme. For example, where the Welsh language versions of our statistical bulletins were published initially as pdfs alongside the English web pages, the new Scheme sets out that when publishing English and Welsh the versions should be of equal quality and format, available at the same time and equally accessible.

10.8.2 Supporting information and metadata

We provided more information on quality and methods alongside the outputs from Census 2021 than ever before. These included a quality and methods information page for the census as a whole and quality information pages for each topic summary, information on how we maximised the quality of the census data, and a local authority comparison tool. We also included

a Census 2021 dictionary to help users to understand the data. In response to user feedback that it was important to provide supporting information in Welsh, the quality and methodology information (QMI) for Census 2021 webpage and our Census 2021 dictionary are both bilingual, with users able to toggle between English and Welsh.

In addition to the SDC approach, another area that could have been communicated better was uncertainty, recognising that although the census data are of high quality they remain estimates and it is important for users to understand the uncertainty around the data. As previously, we published confidence intervals, but we could have done more to help users to use that information when interpreting the census estimates. The communication of uncertainty was identified in the Office for Statistics Regulation's report on the census data on gender identity as something that could have been done better. This could be applied more generally and is something the ONS should consider beyond census data. This would apply particularly for voluntary questions and estimates for small population groups, as non-response bias and respondent error may have a greater impact, resulting in a higher level of uncertainty in the estimates.

10.8.3 Engagement and promotion of outputs

We were able to achieve good media coverage and stakeholder engagement around the census results, operating with a much smaller budget than for the data collection period. The first results in June 2022 received widespread media coverage, while the later phased data releases and interactives received varying levels of coverage across national, local and sectoral media depending on the topic with many media outlets making use of our visualisations and interactive content. We were able to make use of clear and consistent messaging around these releases that echoed messages used earlier in the census. Similarly, the extensive stakeholder engagement for data collection was utilised, with proactive engagement around each release to ensure that all relevant stakeholders were sent communications about them. Regular evaluation of our communications output helped to us to check that we were achieving the reach we wanted and that the outputs were well understood by their audiences. One area that might have improved the reach of the communications campaign for census outputs was the continuation of the successful schools campaigns.

10.8.4 Production of outputs

As noted in section 10.3: Planning for Census 2021, it is important that outputs are planned as part of the overall census design. While they were part of the overall planning for Census 2021, they received less attention than earlier stages until late in the process and were not included in the 2019 Rehearsal at which stage the processes were not yet fully planned out. Better testing and rehearsing when the processes have been developed would have been beneficial, for example having early access to representative test data (including the complex variations of household composition).

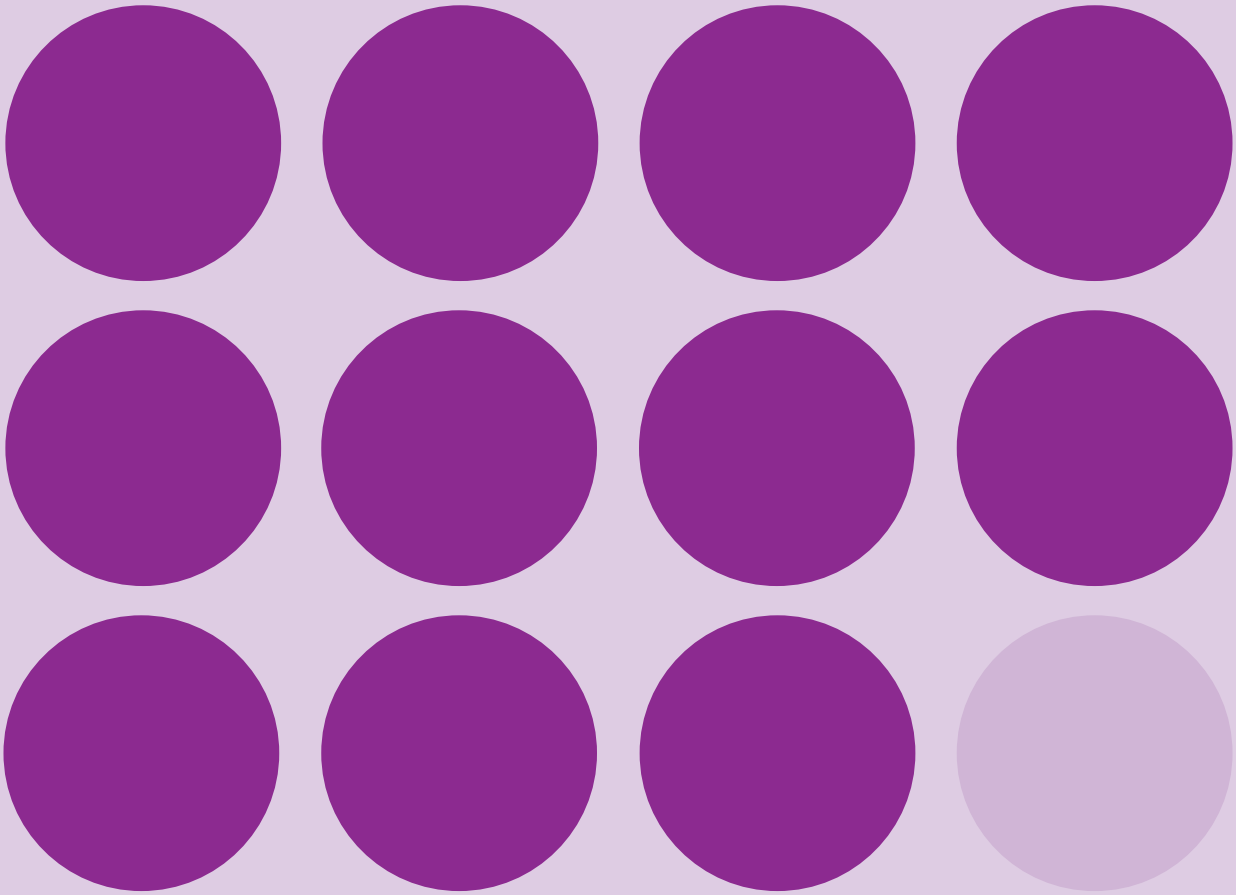
10.8.5 Looking to future outputs

Census 2021 outputs provide a wide range of new methods, skills and product types that could be re-used, where appropriate, for future population and migration statistics releases. As we develop the outputs approach for a more administrative-data based statistical system (see chapter 11), the flexible dissemination made possible by real-time SDC and the 'Create a custom dataset' tool, the range of interactive products and data-visualisation, and the metadata and supporting information provided as part of Census 2021 outputs show what we can achieve. They may provide models, as well as experience and expertise, to support the ongoing development of more flexible and timely outputs to meet a range of user needs.

An important legacy of Census 2021 is the continuation of links made through the engagement activity with stakeholders representing less-represented population groups and communities. The importance of maintaining these links was noted by the National Statistician's Inclusive Data Taskforce. As well as being utilised in census outputs, these links have been carried across into our work on the transformation of population and migration statistics (see section 1.10: census legacy).

Census 2021 and future plans

11



11.1 Introduction

Census 2021 succeeded in delivering a vast amount of data, made available flexibly to meet a wide range user needs, following a highly effective data-collection operation. The previous chapters of this general report have focussed on how the census was planned and run from the decision to hold a census through to its final statistical releases. Alongside the census itself, the ONS's Census and Data Collection Transformation Programme made progress on our journey towards a statistical system based primarily on administrative data. This final chapter summarises both how we are measuring the benefits of the census and the major components our work on the future of population and migration statistics, including the UK Statistics Authority's June 2025 recommendation.

11.2 Census benefits

The census is the largest statistical exercise the ONS undertakes, requiring the deployment of large sums of resource over a period of years to deliver. As set out in chapter 3, Census 2021 for England and Wales cost £539 million as part of a £820 million modernisation programme. Given the scale of the census and the resources required to deliver it, it is important to assess its value for money and justify its expenditure.

Following the 2011 census, we estimated the benefits from using census data to be approximately £500 million a year or 5 billion over 10 years. Building on this analysis, the Census 2021 white paper in 2018 forecast that we expected to realise around £5 of benefit in the wider economy for every £1 spent on Census 2021. The total benefits to central government, local government and private sector users were expected to be £5.5 billion over the 10-year appraisal period, based on the assessed benefits of the 2011 Census, reviewed and refreshed between 2017 and 2018.

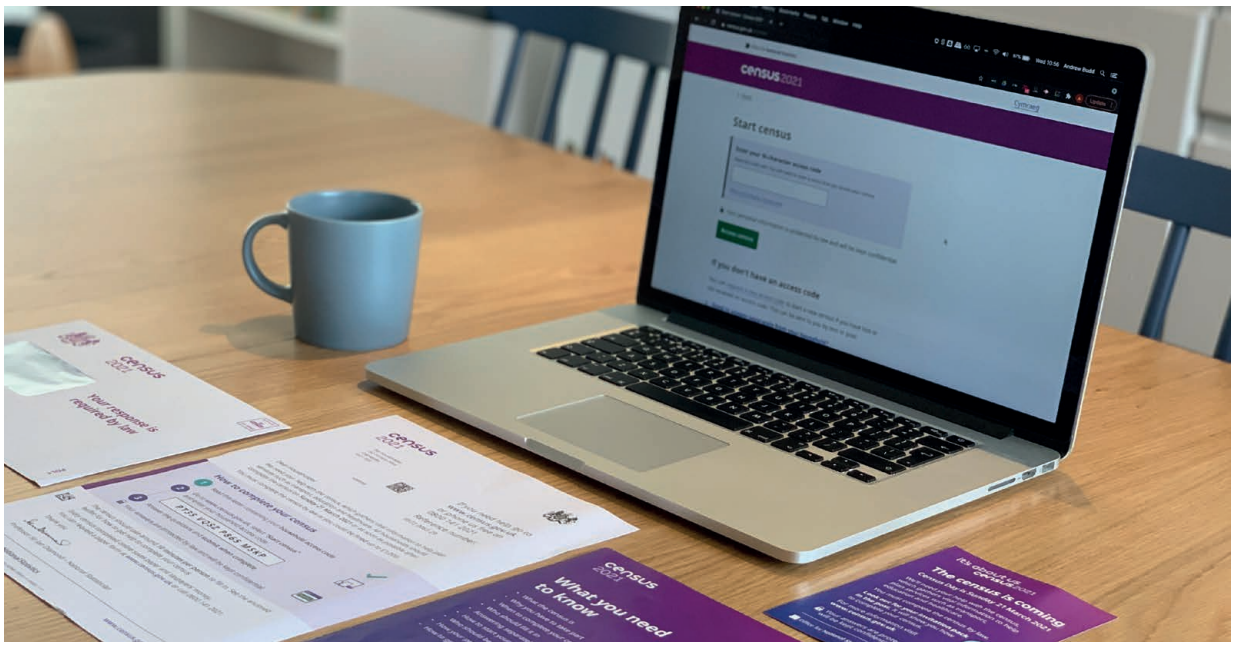
We have recently undertaken an assessment of the benefits arising from the use of Census 2021 data building on previous ONS analysis and engaging external stakeholders on the use and value of census data as well as research on the valuation of census benefits. The resulting census benefits assessment is due to be published in summer 2025

11.3 Future of population and migration statistics

For more than two centuries, the traditional, questionnaire-based census has been the main source of high-quality population statistics in England and Wales, providing a snapshot of the population every ten years. Originally a straightforward population count, the census has continuously evolved, with increasingly sophisticated methods being used and the questions reflecting shifting priorities in our rapidly changing society.

In response to the National Statistician's 2014 recommendation to hold an online first census in 2021 (see section 1.4 The decision to conduct a census in 2021), the then UK Government set out its ambition that "censuses after 2021 will be conducted using other sources of data and providing more timely statistical information". This recognised the potential offered by making good use of the increasingly large amounts of information that public sector organisations hold about people. Such a system would primarily rely on linked administrative data, like tax, benefit and border data. It would be complemented by survey data and a wider range of data sources.

Accordingly, alongside the delivery of a digital-first census in 2021, the ONS has undertaken a programme of research putting administrative data at the core of population and migration statistics. Our aim in doing this is to improve our statistics so that they can respond more effectively to society's rapidly changing needs.



Progress has been made in providing admin-based population and migration statistics. The first statistical population dataset was outlined in 2015 and plans for admin-based data were laid out in the census white paper in 2018.[1] We have been developing timely population and migration estimates, at both national and local authority level to provide to our users in between decennial censuses. We published a statistical design for the future of population and migration statistics in July 2024.[2]

We plan for our admin-based population estimates (ABPEs) to become the official population estimates for England and Wales in 2026, subject to an assessment against published criteria.[3]

The ABPEs and our admin-based Long-term international migration estimates are currently published as official statistics in development; we aim for both estimates to meet the standard required for accredited official statistics during 2026. Our quarterly updates on our work on the future of population and migration statistics[4] "include news about these estimates and other improvements to how we estimate UK population and migration. The update also includes our plans to add further population characteristics to the Admin-based census dataset, the first in-development iteration of which was made available securely to accredited researchers in 2024 through the Integrated Data Service (see section 8.6.1).

Between 29 June and 26 October 2023, we held a public consultation on the future of population and migration statistics in England and Wales. We asked users about their needs in terms of accuracy, timeliness, statistical detail and geographic granularity. The consultation document including the questionnaire can be found on the consultation webpage.[5] We received 706 responses from organisations and individuals across a variety of sectors as well as from those who use statistics for personal purposes. Feedback was also collected through engagement events with stakeholders during the consultation period. A report on the consultation's findings has been published[6] alongside the Authority's recommendation.

We have continued to engage widely with users since the consultation, including through the UK Statistics Assembly in January 2025.[7] Through this engagement, we have heard strong support for a questionnaire-based census in 2031 to help meet their needs for granular data, complemented by continued use of administrative data to provide more frequent and timely population statistics.

On the advice of the National Statistician, and following a review of all evidence, the Authority has recommended a statistical system for population and migration that combines the strengths of data collection through a questionnaire-based census of the whole population with the increased value from administrative data, both to support the delivery of a census in 2031 and to deliver improved outputs each year. The Authority has recommended the following three actions to deliver this vision:

1. That the UK Government commission and resource the ONS to conduct a mandatory questionnaire-based census of the whole population for England and Wales in 2031. This should support coherent UK outputs and maximise the benefits from the ONS's work with administrative data to date, enabling further delivery of such benefits in the future.
2. That the UK Government commission and resource the ONS to develop statistical outputs using administrative data which provide more frequent estimates and are inclusive in representing society. This should include an administrative-based census of the population.
3. That the UK and Welsh Governments provide a commitment to the regular, reliable and ongoing flow of the critical administrative datasets required, ensuring that data owners deliver on that commitment, and invest in the required improvements to those sources and address the known points of friction that prevent data transfer.

The implementation of these recommendations would allow us to maintain the pace and ambition of our work to embed administrative data in our population and migration statistics, while responding to user feedback for a comprehensive and inclusive data collection.

The Authority's recommendation and related documents are available from the Authority's website.[8]

We will continue to work closely with the other UK statistics agencies and devolved governments to deliver coherent population and migration statistics. The power to call a census for England and Wales rests with government ministers. Decisions on the future of the census in Scotland and Northern Ireland will be made by the relevant ministers, based on advice from their statistical authorities, in due course. We have worked closely with the devolved governments to develop shared plans for developing high-quality admin-based population statistics that are coherent and comparable across the UK. Should censuses be held across the UK, we would expect to see this close working continue, accompanied by the valuable UK-wide co-operation seen throughout the 2021 and 2022 censuses.

Endnotes

1 **Census 2021 white paper**
https://www.gov.uk/government/publications/the-2021-census-of-population-and-housing-in-england-and-wales

2 **The future of population and migration: a statistical design**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/thefutureofpopulationandmigrationastatisticaldesign

3 **Criteria for moving to admin-based population estimates as official estimates of population**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/criteriaformovingtoadminbasedpopulationestimatesasofficialestimatesofpopulation/2025-01-31

4 **Quarterly update on population and migration statistics: May 2025**
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/quarterlyupdateonpopulationandmigrationstatistics/may2025

5 **Consultation on the future of population and migration statistics in England and Wales**
https://consultations.ons.gov.uk/ons/futureofpopulationandmigrationstatistics/

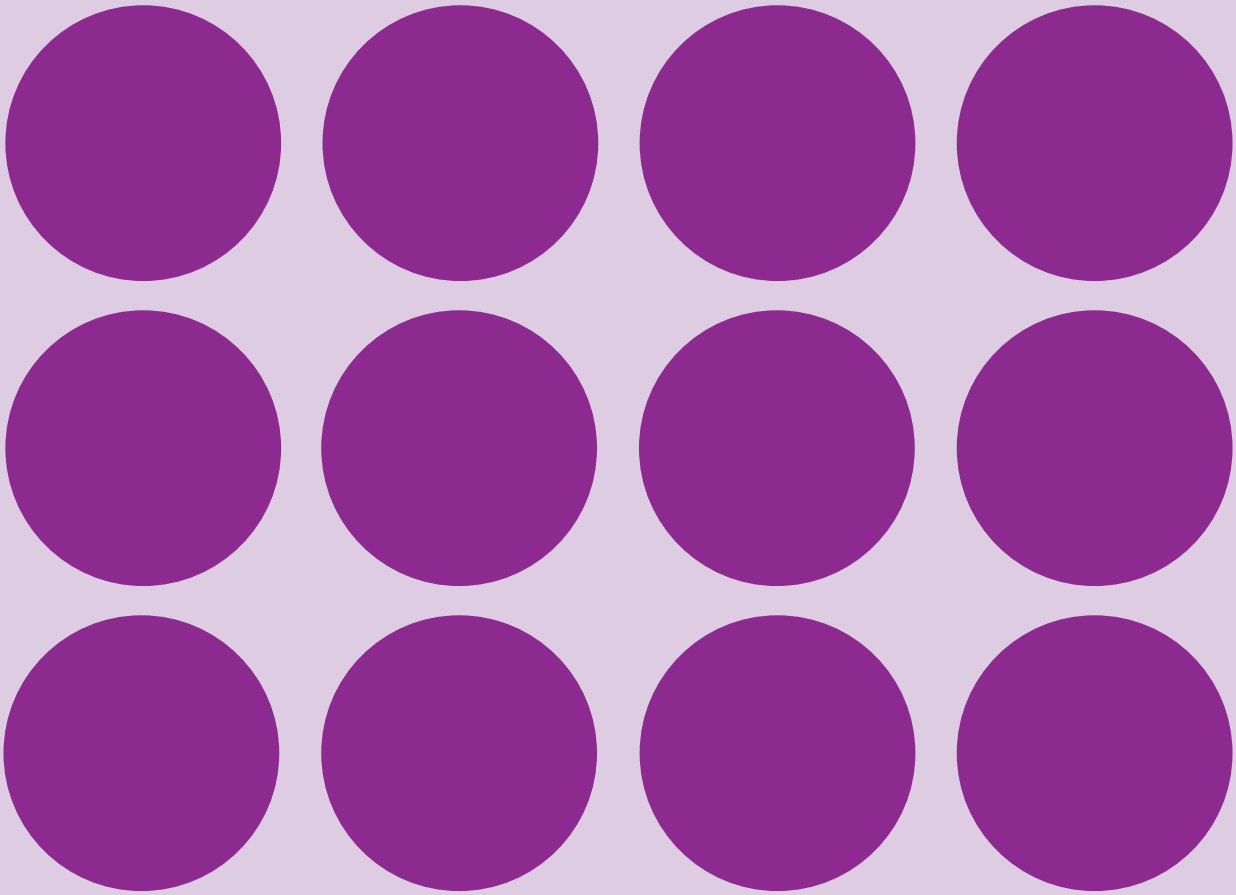
6 **Consultation outcome report**
https://www.ons.gov.uk/aboutus/whatwedo/programmesandprojects/censusanddatacollectiontransformationprogramme/futureofpopulationandsocialstatistics/getinvolved

7 **UK Statistics Assembly 2025**
https://uksa.statisticsauthority.gov.uk/uk-statistics-assembly-2025/

8 **Recommendation from the UK Statistics Authority on the future of population and migration statistics in England and Wales**
https://uksa.statisticsauthority.gov.uk/publication/recommendation-from-the-uk-statistics-authority-on-the-future-of-population-and-migration-statistics-in-england-and-wales/

Abbreviations

12



API
Application Programming Interface

APS
Annual Population Survey

ASG
Approximated Social Grade

BICS
Business Impact of COVID-19 Survey

BSL
British Sign Language

BUA
Built-up Area

CA
Community Adviser

CANCEIS
Canadian Census Edit and Imputation System

CCS
Census Coverage Survey

CDCTP
Census and Data Collection Transformation Programme

CE
Communal Establishment

CEM
Census Engagement Manager

CFS
Census Field Support

CIS
Coronavirus (COVID-19) Infection Survey

DEA
Digital Economy Act 2017

DPIA
Data Protection Impact Assessment

DSE
Dual-system estimation

DWP
Department for Work and Pensions

EIA
Equality Impact Assessment

eQ
Electronic Questionnaire

FWMT
Fieldwork Management Tool

GDPR
UK General Data Protection Regulation

GDS
Government Digital Service

HH
Household

HMRC
HM Revenue and Customs

HRP
Household Reference Person

IDS
Integrated Data Service

IPS
International Passenger Survey

IVR
Interactive Voice Response

LA
Local Authority

LEP
Local Enterprise Partnerships

LPD
Longitudinal Population Dataset

LS
Longitudinal Study

LSOA
Lower layer Super Output Areas

LWS
Lone Worker Solution

MARP
Methodological Assurance Review Panel

MI
Management Information

MP
Member of Parliament

MS
Member of the Senedd (the Welsh Parliament)

MSOA
Middle layer Super Output Area

MYE
Mid-year estimate

NISRA
Northern Ireland Statistics and Research Agency

NRS
National Records of Scotland

OA
Output Area

ONS
Office for National Statistics

ORG
Optimising Response Group

OSR
Office for Statistics Regulation

PHDA
Public Health Data Asset

PQ
Paper Questionnaire

PU
Processing Unit

QA
Quality Assurance

QMI
Quality and Methodology Information

RFP
Removing False Persons

RIO
Refugee Integration Outcomes Cohort Study

RM
Response Management

RMR
Resolving multiple responses

RMT
Regional Management Team

RSS
Royal Statistical Society

SAIL
Secure Anonymised Information Linkage

SDC
Statistical Disclosure Control

SHF
Self Help Facility

SPD
Statistical Population Dataset

SRS
Secure Research Service

SRSA
Statistics and Registration Service Act 2007

UAC
Unique Access Code (for eQ)

UKCC
UK Census Committee

UN-ECE
UN Economic Commission for Europe

URL
Uniform resource locator (website address)

UX
User experience

VOA
Valuation Office Agency

WG
Welsh Government

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