

Statistical Disclosure Control and Outputs for the 2021 Census

Overview

- **Statistical Disclosure Control**
- Webpage Mockups
- SuperWEB2
- Q&A

What is statistical disclosure control?

Statistical Disclosure Control (SDC) is required to:

Prevent the release of any information about an individual, household or enterprise that involves or could lead to:

- their identification, or
- the disclosure of confidential information about them

What is statistical disclosure control?

SDC involves

- either:
 - Introducing sufficient ambiguity/uncertainty into, or reducing the level of detail of published statistics so that the risk of disclosing **confidential information** is reduced to an **acceptable level**
- and / or:
 - Controlling access to data

Why do we need SDC?

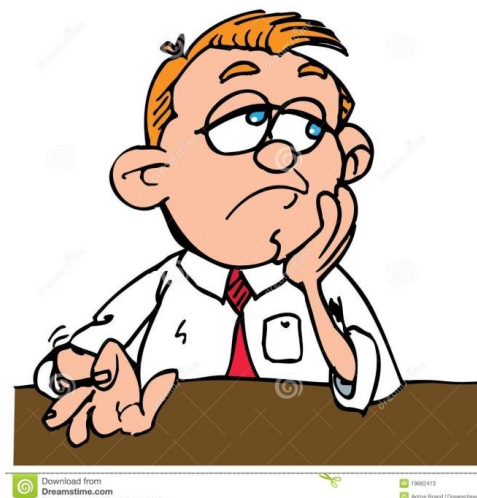
- Legal
 - Census Act 1920
 - Census (Confidentiality) Act 1991
 - Data Protection Act 1998
 - The Census (Scotland) Regulations 2010
- Ethical
- Practical

What we did for the 2011 Census

- Targeted record swapping
 - Targeted to “risky” records
- Table redesign
 - Criteria of % 1s and attribute disclosures that are “real”



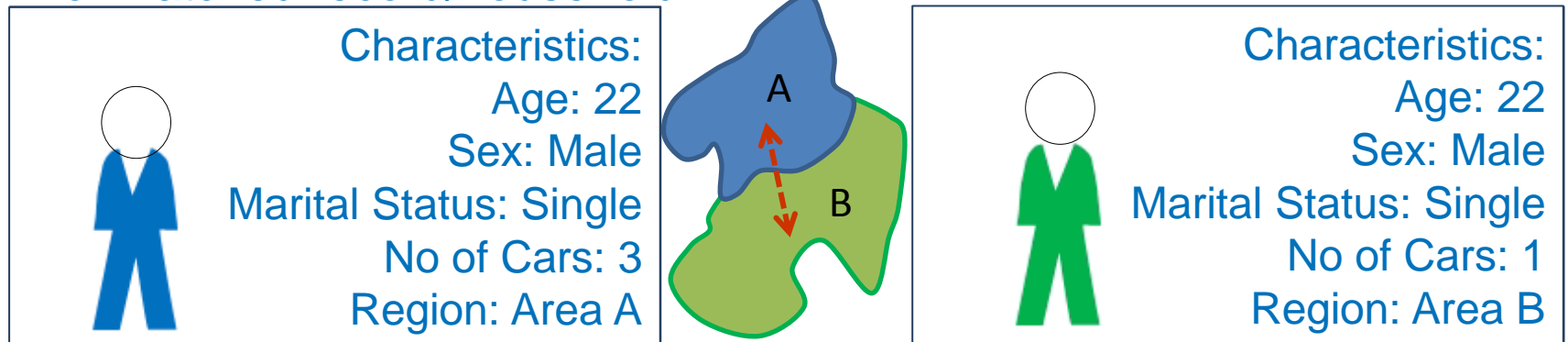
Every table had to be checked for disclosure



Timing was affected

Targeted Record Swapping

- Select a **sample** of records/households to be swapped
- Using a set of variables, find a **match** for each sample record/household
- **Swap** the geographic variables of sample record/household with that of matched record/household



What did we learn from the 2011 Census?

- The process of SDC for the 2011 Census was not as efficient as it could have been:
 - Each table had to be manually checked for disclosure risks, taking up a lot of time and resources
 - Manual manipulation of all tables was required to ensure no disclosure issues occurred
 - At times, this caused lengthy delays in the release of publications and the release of data for customers

This resulted in less than ideal outputs

Sometimes I wanted this table...



They gave me this table



2021 Census

- For the 2021 Census we are planning to build on what was done in 2011
- Planning to use targeted record swapping
- We are planning on using a method of Cell Key Perturbation
- This should:
 - Reduce the time from gathering the data to when we publish data
 - Reduce the need of manually checking tables which would speed up the publication process
- Aim to release some tables at higher geographies unperturbed

Cell Key Perturbation

- 1** Assign each record a random number

Record	Rkey
$r_1 \rightarrow$	54
$r_2 \rightarrow$	4
$r_3 \rightarrow$	93
...	
$r_N \rightarrow$	26

- 2** For each cell, sum rkey and apply a function to get a cell key

Age by sex	Male	Female
0-15	.	.
16-24	.	4
25-34	.	.
...		

Record	Rkey
$r_2 \rightarrow$	4
$r_4 \rightarrow$	61
$r_{56} \rightarrow$	7
$r_{72} \rightarrow$	90
Sum =	162

- 3** Use a look up table to get perturbation value

Cell Key \longrightarrow

	1	2	3	...	61	62	63	...	99
1		+1							
2			+1				-1		
3									+1
4	-1					+1			
5			-1		-1				
...									

Cell Value \downarrow

e.g. take last two digits \rightarrow **Ckey = 62**

- 4** Apply pvalue to cell

Age by sex	Male	Female
0-15	.	.
16-24	.	5
25-34	.	.
...		

Notes for Cell Key Method

- Adapted from “Australian Bureau of Statistics (ABS) method”
- Primarily a protection against ‘differencing’
- Looking at a light touch (record swapping still the primary approach)
- Considering the need to retain 1s and 2s in outputs, by perturbing zeros (KEY PART OF THE PROTECTION)
- Introduces another layer of uncertainty for intruder
- Consistency in same cell across tables
- Some inconsistencies in breakdowns

SDC Questions

- What do you like/dislike about our proposed 2021 SDC methods?
- Do you foresee any problems or issues with the proposed 2021 SDC methods?
- In your opinion is the trade-off of more timely outputs and increased flexibility worth the addition of cell key perturbation.
- Will unperturbed tables be beneficial? If so, which higher level geographies are required.

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New 2021 Census webpages

- We are aiming to produce an updated website/webpages to coincide with 2021 Census data.
 - Incorporate a new user interface
 - Overhaul the website meaning a more streamlined user experience and modern look
 - New functions and features may be added to improve the workflow and overall experience
 - Integrated Metadata
 - Utilisation of Infographics and pre-defined tables
 - Mobile device functionality
 - More functionality in creating tables by utilising a flexible table generator
 - Encouraged to create a login to get access to extra options and functions

2021 Webpages – Home Page

The screenshot shows the homepage of the Scotland's Census 2021 website. At the top, there is a navigation bar with the URL <http://www.census2021.com/outputs/home> and a search bar. The main header features the Scotland's Census logo with the tagline "Shaping our future" and a search bar. Below the header, there is a breadcrumb trail: Home > Outputs > Landing Page. The left sidebar contains a menu with links to Home, News, About the 2021 Census, Access pre-built tables, Create your own tables, Interactive Charts and Visualisations, Publications and Reports, Metadata, Statistical Disclosure Control, Information on Previous Censuses, Comparisons with Previous Censuses, Geography, FAQ's, Links to other related websites, and Contact Us. The main content area is divided into several sections. The top section features a map of Scotland and the headline "Scotland's 2011 Census Day Population was 5,295,403". Below this, there are two search boxes: "Graphs/Charts by Area" and "Pre-Built Tables". The "Statistics by Category" section includes icons and text for Population, Housing, Identity, Health, Education, and Labour Market. The right sidebar contains "Latest News & Publications" with a link to "The Inhabited Islands analytical report" and "Gaelic Skills" with a pie chart showing the distribution of Gaelic skills among people who know Gaelic.

Scotland's Census
Shaping our future

Search this site

Home > Outputs > Landing Page

Home

News

About the 2021 Census

Access pre-built tables

Create your own tables

Interactive Charts and Visualisations

Publications and Reports

Metadata

Statistical Disclosure Control

Information on Previous Censuses

Comparisons with Previous Censuses

Geography

FAQ's

Links to other related websites

Contact Us

Key Facts

Highest Ever Population

The population of Scotland on census day in 2011 was estimated to be 5,295,403 - the highest ever and a 4.6 per cent rise since 2001.

Scotland's 2011 Census Day Population was 5,295,403

Graphs/Charts by Area

Enter postcode or area

Search

Pre-Built Tables

Enter variable name

or go to table searcher

Search

Statistics by Category

Population

There were more women (2,728,000) than men (2,567,400) in Scotland

Housing

One person households are now the most common household type.

Identity

83% of the population of Scotland felt they had some Scottish national identity

Health

82% of the population said their health was very good or good

Education

79% of 16 and 17 year olds were in education

Labour Market

'Health and social work' and 'Retail activities' were the two largest industry sectors in 2011

Latest News & Publications

The Inhabited Islands analytical report that was published on 24/09/2015 showed that the islands population has increased in recent years.

More Info

Gaelic Skills

Full Skills

Only Spoken

Writes/Knows

Understands


The Gaelic Language report, published on 30/09/2015, shows that among people who know Gaelic, the full users are a minority.

More Info

2021 Webpages – Visualisation

Homepage


http://www.census2021.com/outputs/population/age

 **Scotland's Census**
Shaping our future

Home > Outputs > Visualisations > Population

Home
News
About the 2021 Census
Access pre-built tables
Create your own tables
Interactive Charts and Visualisations
Publications and Reports
Metadata
Information on Previous Censuses
Geography
FAQ's
Links to other related websites
Contact Us

Key Facts
In 2011 the average age was 40 for men and 42 for women.

 **Population...Age**

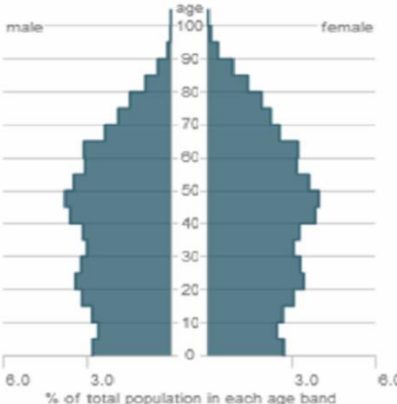
Search this site

Initial Area

Select an area type
Select an Area Type

Select an area
...or click to select an area on the map

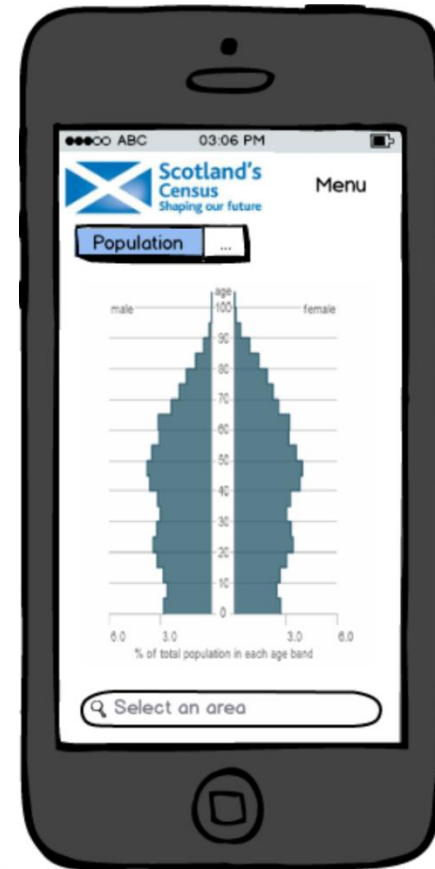
Comparison Area



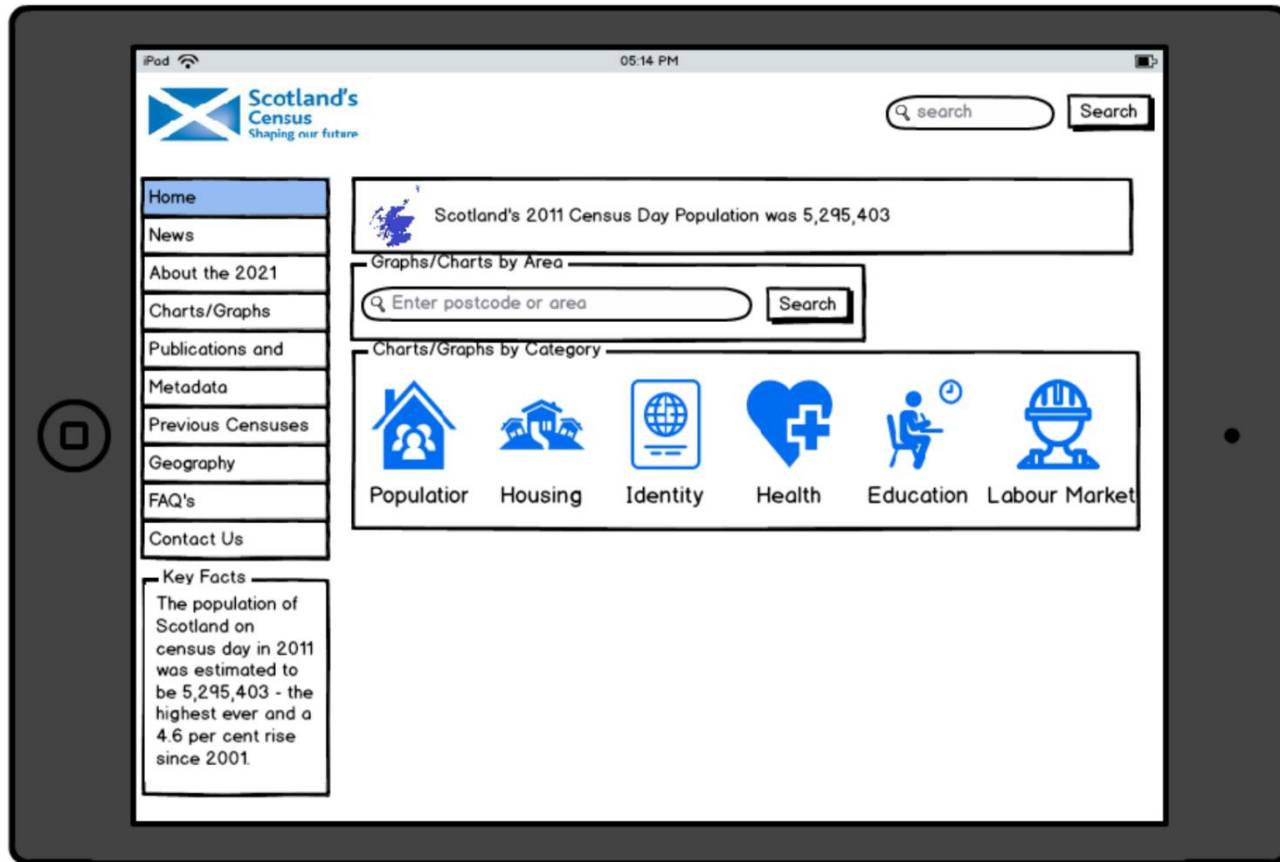
View Source Data
Metadata

Sex	Age	Marital Status	Resident Type	Household Composition	
Population	Housing	Identity	Health	Education	Labour Market

2021 Webpages – Mobile View



2021 Webpages – Tablet View



2021 Webpages– General Health Table



2021 Webpages– Table Generator

The screenshot shows the 'Tables' page of the Scotland's Census 2021 website. The browser address bar shows 'http://www.census2021.com/outputs/tables'. The page features the Scotland's Census logo and a search bar. A navigation menu on the left includes links like 'Home', 'News', and 'Access pre-built tables'. The main content area has a 'Group Name' section with a year selector set to '2021' and a 'Keyword search' field. Below this are dropdown menus for 'Economic Activity' and 'Industry', and another set for 'Geography'. A 'Download all tables at this geography' button is also present. A list of table categories is shown, with 'Economic Activity by Industry' selected. A metadata section provides population statistics for Scotland. On the right, a map of Scotland is displayed with various geographical features and city names like Edinburgh and Newcastle upon Tyne.

Scotland's Census
Shaping our future

Search this site Search

Help

Home > Outputs > Tables

Home
News
About the 2021 Census
Access pre-built tables
Create your own tables
Interactive Charts and Visualisations
Publications and Reports
Information of Previous Censuses
Geography
FAQ's
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Group Name

2021 Keyword search

Economic Activity Industry

Geography Geography Download all tables at this geography

...or click to select an area on the map

- Economic Activity
- Industry
- Economic Activity by Industry**
- Economic Activity by Age
- Economic Activity by Sex
- Industry by Age
- Industry by Sex
- Industry by Economic Activity by Sex
- Economic Activity by Occupation

Population - people aged 16 to 74 in employment - 2,516,895

Scotland
Council Area
Health Board

Metadata
Economic Activity - all people aged 16 and over - 4,379,072
Industry - all people aged 16 to 74 in employment - 2,516,895

North Sea
Edinburgh
Newcastle upon Tyne
NORTH IRELAND

2021 Webpages– Differing Geography View

The screenshot shows the 'Tables' page on the Scotland's Census 2021 website. The browser address bar displays 'http://www.census2021.com/outputs/tables'. The page features the Scotland's Census logo and a search bar. A navigation menu on the left includes links for Home, News, About the 2021 Census, Access pre-built tables (highlighted), Create your own tables, Interactive Charts and Visualisations, Publications and Reports, Metadata, Information on Previous Censuses, Geography, FAQ's, Links to other related websites, and Contact Us. The main content area is titled 'Group Name' and includes a '2021' dropdown, a 'Keyword search' field, and two 'Variable' dropdowns. Below these are 'Council Area' and 'Geography' dropdowns, and a 'Download all tables at this geography' button. A list of variables is shown, including Age, Country of Birth, Disability, Economic Activity, Health, Highest Level of Qualification, Industry, Occupation, and Religion. A second 'Download all tables available at this geography' button is located below the list. On the right, a map of Scotland is displayed with a red-shaded region in the central-eastern part of the country. The map includes a scale bar (0 to 20 miles) and various navigation controls.

2021 Webpages– SDC Pop-up

The screenshot shows a web browser window titled "Table Builder" with the URL <http://www.census2021.com/outputs/tablebuilder>. The page header includes the Scotland's Census logo and the tagline "Shaping our future". A search bar and a "Help" button are located in the top right corner. The breadcrumb navigation shows "Home > Outputs > Table Builder".

Below the navigation, there are four buttons: "Get Data", "Clear Table", "Download Table", and "Settings".

The "Variables" section on the left contains a list of categories with checkboxes:

- Age
 - Single Year of Age
 - 5 Year Age Bands
 - 10 Year Age Bands
 - Custom Age Bands
- Sex
- Marital Status
- Health
 - Very Good
 - Good
 - Fair
 - Bad
 - Very Bad
- Disability
- Economic Activity
- Religion
- Ethnicity

Below the variables list are two buttons: "Add to Column" and "Add to row".

The "Geography" section on the left contains a list of categories with checkboxes:

- Scotland
- Council Area
- Datazone
- Healthboard
- Datazone
- Output Areas

Below the geography list are two buttons: "Load Geography" and "Map".

In the center of the page, a "Statistical Disclosure Control" pop-up message is displayed:

Statistical Disclosure Control
Statistical Disclosure Control (SDC) is applied to all tables in the flexible table builder. This means that totals may not sum within tables. This can be changed in the settings so that the totals will sum within a table. For more information on the SDC methods used visit the [SDC metadata](#)

Do not show this message again

Accept

2021 Webpages– SDC Pop-up

Table Builder

http://www.census2021.com/outputs/tablebuilder

Scotland's Census
Shaping our future

Search this site Search Help

Home > Outputs > Table Builder

Get Data Clear Table Download Table Settings

Variables

- Age
 - Single Year of Age
 - 5 Year Age Bands
 - 10 Year Age Bands
- Sex
- Marital Status
- Health
 - Very Good
 - Good
 - Fair
 - Bad
 - Very Bad
- Disability
- Economic Activity
- Religion
- Ethnicity
- Provision of Unpaid Care

Add to Column Add to row

Geography

- Scotland
- Council Area
- Datazone
- Healthboard
- Datazone
- Output Areas

Load Geography Map

		Very Good	Good	None	Fair						
		Limited a lot	Limited a Little	Not Limited	Limited a lot	Limited a Little	Not Limited	Limited a lot	Limited a Little	Not Limited	Limited a lot
Age	Provision of Unpaid Care										
	Health										
	Disability										
	Marital Status										
	Single										
	Married or in a same sex civil partnership										
	Separated										
	Divorced										
	Widowed										
	Single										
16	Married or in a same sex civil partnership										
	Separated										
	Divorced										
	Widowed										
	Single										
17	Married or in a same sex civil partnership										
	Separated										
	Divorced										
	Widowed										
	Single										
10	Married or in a same sex civil partnership										
	Separated										
	Divorced										
	Widowed										
	Single										
19	Married or in a same sex civil partnership										
	Separated										
	Divorced										
	Widowed										
	Single										
20	Married or in a same sex civil partnership										
	Separated										

This table does not pass sparsity
For more information on sparsity and SDC methods click [here](#).
There are currently _ cells in this table.
The maximum number of cells for this table is _.
To reduce the number of cells in this table try:
Grouping variables
Reducing the number of variables
Selecting a higher geography

Accept

Overview

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SuperWEB2

While using the SuperWEB2 package think over these questions:

- How easy is it to use?
- Are all desired functions available?
- What would you like to see added?
- Were there any issues with the software?
- Would you be happy to use this type of software to create your own tables?

Next Steps

- After the event we will email you with a
 - Link to the slides from this event on our website.
 - Link to a questionnaire to obtain more detailed feedback on your views of our SDC and output plans.
- We will then analyse all the feedback we receive from this event and from the questionnaires
- In August/September we plan to:
 - Publish a summary of all the responses we have received
 - Release synthetic data (based on the structure of the 2011 Census) with our existing flexible table generator.

Finally

- Thanks for all your contributions today
- Please complete our short feedback form before leaving
- If you have any further questions please speak to us or email scotlandscensus@nrscotland.gov.uk