

Northern Ireland Census 2011



2011 Census Key Statistics for Northern Ireland

Quality Assurance Report

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Contents

1	Introduction	2
2	Background	3
3	Overview of the Quality Assurance work undertaken in support of this Key Statistics release	6
4	Other important aspects of the Quality Assurance Work.....	18
5	Conclusion.....	18
6	Further releases	19
	Annex 1 – 2011 Census Quality Orientated Initiatives.....	20
	Annex 2 – Item Non-Response Rates (updated March 2015).....	22
	Annex 3 – LGD Breakdown for each of the three Northern Ireland Delivery Groups	25
	Annex 4 – Category 4 Quality Assurance checks (detail) (updated March 2015).....	26

1 Introduction

1.1 The 2011 Census in Northern Ireland was conducted on 27 March 2011, in line with arrangements across the rest of the UK. All of the planning, development, testing and operational aspects for the Census were underpinned by the following high-level strategic aims:

- to provide high quality, value for money statistics that are fit for purpose and meet the needs of users;
- to maximise response rates by actively encouraging public participation in the Census and raising awareness of its important role;
- to protect, and be seen to protect, the confidential personal information collected through the Census; and
- to secure public and user confidence in the final results and deliver them in a timely manner.

1.2 The Key Statistics, released on 11 December 2012, represent the third report from the 2011 Census and provide information for the majority of questions and topics included on the Census questionnaire.

1.3 In keeping with the high-level strategic aims outlined above, the purpose of this paper is to provide an overview of the Quality Assurance (QA) work that was undertaken by the Northern Ireland Statistics and Research Agency (NISRA) in order to ensure that 2011 Census Key Statistics for Northern Ireland are of a high quality, fit for purpose and meet the needs of users.

1.4 Supporting detail on the Quality Assurance work can be found in the NISRA paper [Quality Assurance of the 2011 Census in Northern Ireland](#), which was published in May 2012 and the papers [Quality Assurance of the 2011 Census in Northern Ireland](#) and [Population and Household Estimates for Northern Ireland – Quality Assurance Report](#), which were published along with the first and second releases of results from the Census on the 16 July and 19 September 2012 respectively.

2 Background

- 2.1 The [Methodology Overview for the First Release](#) provides a synopsis of the key 2011 Census processes that were deployed in Northern Ireland, some of which are mentioned in this paper in order to contextualise the quality assurance work. From the outset, NISRA recognised the importance of considering the overall Census design along with the key operational aspects from a quality perspective (for example, address register development, field work, assistance to the general public, publicity and advertising, data capture and processing). This resulted in a number of specific quality orientated initiatives being introduced, which are summarised in Annex 1.
- 2.2 From a key statistics perspective, it is important to stress that in addition to these initiatives, the development of the 2011 Census questionnaire was underpinned by an authoritative programme of (i) user consultation, which started in December 2004 and (ii) question testing, through the use of NISRA Omnibus Surveys, the 2007 Census test, the 2009 Census rehearsal and the use of targeted focus groups. Importantly, this work was undertaken in conjunction with the other UK Census Offices, which helped to ensure a harmonised approach and common standards across the UK, while strengthening the pool of experienced resources available to undertake the work. Both of these key development activities were pivotal in producing a questionnaire that (i) the general public could readily understand, (ii) was relatively easy to complete (the vast majority of questions could be answered by simply ticking those boxes that best described an individual's circumstances) and (iii) would yield the key information required by users as identified through the consultation (for example, the Key Statistics released today).
- 2.3 While the Census places a legal obligation on every household and person in Northern Ireland to provide accurate answers to the various questions on the Census questionnaire, a minority of people omit to provide answers to particular questions or make mistakes when answering them. In order to address this, NISRA (in line with the other Census Offices across the UK) deployed a donor edit and item imputation system. While seeking to preserve the relationships between the Census characteristics, the aim of the process was to (i) estimate the missing details and thus ensure the dataset was complete and (ii) check that the information was internally consistent. The approach, which was first used in the 2001 Censuses across the UK, facilitates the production of key statistics that are

representative of the entire population and are considered to be unbiased. Annex 2 (updated in March 2015) shows the Item Imputation Rates on a question-by-question basis for the Individual and Household questionnaires.

- 2.4 In addition, it is important to recognise that the responses provided by the general public, which are reflected in the key statistics, represent a **self-assessment** of their particular circumstances, based on their interpretation of the available guidance. All of the information provided was captured via a specifically developed electronic character recognition and capture system. In the case of returns that were made on a paper questionnaire, clearly the quality of the respondent's handwriting will have had an impact on the accuracy with which the information was captured. As in 2001, conflicting responses were resolved through the use of appropriate filter and coding rules and the item imputation process mentioned above. Challenging service level agreements in respect of the capture and coding processes were imposed on the contractor and the monitoring of their performance against these constituted an important component of the quality assurance work.
- 2.5 Finally, one of the primary aims of the Census is to estimate the number of people who live in Northern Ireland (that is, the number of usual residents) along with the number of occupied households. While every household and individual in Northern Ireland was legally obligated to participate in the Census, it was anticipated, as in previous Censuses, that some would be missed, resulting in under-enumeration.
- 2.6 Accordingly, NISRA's under-enumeration project was designed and developed to ensure that the Census estimates would be representative of the entire usually resident population in Northern Ireland. From a coverage perspective this comprised two key components, namely:
- using high quality administrative data from the Health Card Register (which contained information on the list of people registered with a GP practice and activity data such as the collection of a prescription, changes to registration details and treatment by a dentist or optician in the two year period prior to the Census) in conjunction with information provided by the Census Field Staff to identify, for all non-responding households, (i) if a Census questionnaire should have been returned for a particular address (that is, was there robust evidence of occupancy) and, that being the case, (ii) the key demographic characteristics (for example, age and sex) of those living at that

address. This new approach for 2011 was developed and piloted through both the 2007 Census Test and 2009 Census Rehearsal. In addition, the distribution of key demographic details from a random sample of some 30,000 actual Census returns was compared with that derived on the basis of the details recorded on the Health Card Register for the same addresses. From this, it was found that the distribution from the Census returns could be replicated with a high degree of precision. It is considered that this component of the under-enumeration methodology enhanced the coverage assessment and adjustment process in Northern Ireland and has improved the overall reliability and quality of the population estimates.

- The re-enumeration of a specifically targeted stratified random sample of approaching 15,000 households across Northern Ireland, through a Census Coverage Survey, with the aim of estimating the key demographic characteristics of those who had been missed by the Census.

2.7 All of the above activities, along with the comprehensive quality assurance work detailed in the remainder of this paper, have been integral to the production of high quality key statistics that are fit for purpose and meet the needs of users.

3 Overview of the Quality Assurance work undertaken in support of this Key Statistics release

Processing and Governance of the 2011 Census Data

- 3.1 The capture, coding and delivery of the 2011 Census data were undertaken by Lockheed Martin UK Ltd in accordance with a joint contract with NISRA and the Office for National Statistics (ONS). This provided for the delivery of two distinct streams of data that were each utilised in the quality assurance process, namely, 'Early Extract' data and 'Tranche1' data. The quality assurance work that was undertaken on each of these streams of data is described in the sections that follow.
- 3.2 Once the data had been captured and coded by the contractor, they were transferred under secure protocols to ONS, who managed the joint England & Wales and Northern Ireland 'Downstream' processing system (DSP). In summary, the main functions of the DSP were to enable NISRA and ONS to:
- validate that the captured data were delivered by the contractor in accordance with the agreed specification and service levels;
 - identify and address any duplicates in the data;
 - identify any missing items in the data and impute the required values in accordance with methodology agreed across the UK;
 - undertake an assessment of coverage and adjust the results as appropriate; and
 - apply the necessary statistical disclosure control techniques in order to ensure that the confidentiality of the information provided by the general public is protected in the aggregate outputs produced from the Census.
- 3.3 Any data quality issues that emerged from the analysis of the data provided by the contractor (that is, both 'Early Extract' and 'Tranche1' data) and the execution of the 'Downstream' processes outlined above were considered and managed through two joint England & Wales and Northern Ireland forums (that is, the Data Quality Forum – DQF and

the Processing Operations Management Forum – POMF), which both met on a daily basis during live operations.

Phase 1 of the Quality Assurance work – Utilising intelligence from the ‘Early Extract’ data

- 3.4 By way of background, questionnaire delivery by Royal Mail started on 14 March 2011, and prior to Census Day (27 March 2011) some 180,000 responses had already been received. A further 150,000 were received over the course of Census Day and 28 March. The flow of data through to NISRA (referred to as ‘Early Extract’ data), which could be requested at any stage, commenced soon after this and included all responses (both paper and internet) that had been processed at any particular point in time.
- 3.5 From a quality assurance perspective, having access to this data was invaluable as it afforded both NISRA and the ONS the opportunity to examine the data prior to the planned formal deliveries (that is, the deliveries of ‘Tranche1’ data) that were scheduled in the contract. This enabled the quality assurance team to identify, at an early stage, if:
- the data planned to be delivered by the processing contractor (Lockheed Martin UK Ltd) were being captured and processed in accordance with the agreed Data Capture Requirement Specification (DCRS);
 - if there was any evidence of systematic errors being introduced through, for example, phantom ticks arising from marks on the questionnaire being mistakenly read as proper responses, automated coding errors that required fine tuning and other inconsistencies arising from the manual coding process; and
 - how well the questionnaire had been understood by the general public (for example, had the routing been followed correctly).
- 3.6 Checks on the plausibility of the data provided specifically for this purpose included an examination of the following areas as summarised in the diagrams below:

Quality Assurance Phase 1 Utilising Early Extract Data



Conducted specific checks to:

- Assess how well the routing was followed on the questionnaire
- Assess the extent to which the questions were answered correctly
- Identify systematic errors

Four main areas of focus:-

Routing	Did people answer the questions that they should have? Did people answer any questions that they shouldn't have?
Single tick questions	Have most people ticked only one box?
Multi-tick questions	Have most people ticked a small number of boxes?
Range checks	Have most people entered valid values?
Frequency distributions	Do these look plausible?

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Quality Assurance for Systematic Errors



Questionnaire routing

Question 5	Question 6
Yes	Expect an answer
No	Don't expect an answer

Question 10	Questions 11 & 12
Yes	Expect an answer
No	Don't expect an answer

5 Are you a schoolchild or student in full-time education?

Yes

No ➔ **Go to 7**

6 During term time, do you live:

at the address on the front of this questionnaire?

at another address? ➔ **Go to 45**

10 Have you lived outside Northern Ireland for a continuous period of one year or more?

Yes

No ➔ **Go to 13**

11 During this time outside Northern Ireland, what was the last country you lived in?

12 When did you most recently arrive to live in Northern Ireland?

Month Year

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Single tick questions

- Would expect all people to tick 1 box only
- In question 7, If 'Elsewhere...' is ticked, would expect most people to have written something in

Key Question

- Does the distribution of responses look sensible?

H7 What type of accommodation is this?

A whole house or bungalow that is:

- detached
- semi-detached
- terraced (including end-terrace)

A flat, maisonette or apartment that is:

- in a purpose-built block of flats or tenement
- part of a converted or shared house (including bedsits)
- in a commercial building (for example, in an office building, hotel, or over a shop)

A mobile or temporary structure:

- a caravan or other mobile or temporary structure

7 What is your country of birth?

- Northern Ireland → Go to 10
- England → Go to 10
- Scotland → Go to 10
- Wales → Go to 10
- Republic of Ireland
- Elsewhere, write in the current name of country

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Multi tick questions

- Would expect the majority of people to tick 1 box only?
- Would expect a smaller number to tick a combination of boxes
- If 'Other' is ticked, would expect most people to have written something in

Key Question

- Does the distribution of responses look sensible?

H11 What type of central heating does this accommodation have?

↻ Tick all that apply, whether or not you use it.

↻ Central heating is a central system that generates heat for multiple rooms.

- No central heating
- Gas
- Electric (including storage heaters)
- Oil
- Solid fuel (for example, wood, coal)
- Other central heating

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Quality Assurance for Systematic Errors



Range checks

- If number provided is valid, then that number will be included in the data. Otherwise 'invalid response'.

Key Question

- Does the distribution of coded written responses look sensible?

H9 How many rooms are available for use only by this household?

- Do not count bathrooms, toilets, halls or landings, or rooms that can only be used for storage such as cupboards.
- Count all other rooms (for example, kitchens, living rooms, utility rooms, bedrooms, studies and conservatories).
- If two rooms have been converted into one, count them as one room.

Number of rooms

H14 In total, how many cars or vans are owned, or available for use, by members of this household?

- Include any company car(s) or van(s) available for private use.

None

1

2

3

4 or more, write in number

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Quality Assurance for Systematic Errors



Frequency distributions

- Expect the distribution of responses to vary with age
- 'No condition' – perhaps the highest response category?
- Wouldn't expect a high percentage of respondents to tick the 'No condition' box with one or more of the other tick boxes

23 Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months?

- Tick all that apply.
- Deafness or partial hearing loss
- Blindness or partial sight loss
- Communication difficulty (a difficulty with speaking or making yourself understood)
- A mobility or dexterity difficulty (a condition that substantially limits one or more basic physical activities such as walking, climbing stairs, lifting or carrying)
- A learning difficulty, an intellectual difficulty, or a social or behavioural difficulty
- An emotional, psychological or mental health condition (such as depression or schizophrenia)
- Long-term pain or discomfort
- Shortness of breath or difficulty breathing (such as asthma)
- Frequent periods of confusion or memory loss
- A chronic illness (such as cancer, HIV, diabetes, heart disease or epilepsy)
- Other condition
- No condition

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Phase 2 of the Quality Assurance work – Utilising intelligence from the Data Load and Validation stage of ‘Downstream’ processing

- 3.7 As part of the data processing contract, Lockheed Martin UK Ltd was obligated to formally deliver the Northern Ireland Census data to NISRA in three waves, referred to as the Northern Ireland ‘Delivery Groups’. In summary, the three Delivery Groups covered Belfast and surrounding area, east of Northern Ireland and west of Northern Ireland and were referred to as the ‘Tranche 1’ data (see Annex 3 for further detail on the Local Government District areas included in each Delivery Group). Once the data had been delivered by the contractor and had been successfully loaded and validated as part of the agreed internal ‘Downstream’ processes, NISRA was contractually obligated to accept or reject the data within a specified timeframe (that is, 12 weeks).
- 3.8 The key focus of this phase of the QA work on the ‘Tranche 1’ data was to repeat and build on the Phase 1 activities undertaken on the ‘Early Extract’ data. This work was pivotal to the decision making process regarding formally accepting or rejecting the ‘Tranche 1’ data. It was also particularly important as the data in question, unlike the ‘Early Extract’ data, would ultimately be reflected in the final outputs after passing through the remaining planned ‘Downstream’ processes (for example, Edit & Imputation, Coverage Assessment & Adjustment and Statistical Disclosure Control).
- 3.9 The additional activities undertaken during Phase 2 of the QA process included examining:
- if the accuracy levels for both the data capture process and the data coding process were in accordance with agreed service levels;
 - if the DCRS had been correctly implemented;
 - if the number of households, communal establishments and people in the captured data from those that had responded to the Census looked plausible;
 - if the age/sex distributions and age/sex ratios that could be derived from the captured data from those that had responded to the Census looked plausible; and
 - the diagnostics from agreed ‘Downstream’ processes such as range checks and reconciling multiple responses (for example, when a household returns both an internet response and a paper questionnaire).

3.10 In terms of the data capture process, Table 1 below shows the accuracy levels that were achieved across the three delivery groups¹ of 'Tranche1' data for three key demographic variables and each of (a) optical mark recognition, (b) numeric capture and (c) alphanumeric capture. All of the accuracy levels achieved exceeded the minimum acceptable accuracy levels contained in the Data Quality Management Plan (DQMP) that underpinned the capture operation.

Table 1 – Capture Accuracy Levels by Delivery Group

Variable/Capture Component	DG509 Belfast (and Surrounding Area)	DG527 East of Northern Ireland	DG539 West of Northern Ireland
Sex	99.96%	99.96%	99.94%
Civil Status	99.93%	99.89%	99.85%
Year of Birth	100.00%	100.00%	100.00%
Optical Mark Recognition	99.77%	99.77%	99.79%
Numeric Capture	98.91%	98.80%	98.84%
Alphanumeric Capture	97.47%	97.81%	97.71%

Civil Status: marital or same-sex civil partnership status

3.11 Table 2 below shows the results of specific checks that were undertaken by NISRA in respect of a number of variables with write-in responses. The purpose of the checks, which again were undertaken at Delivery Group level, was to assess the accuracy with which the write-in responses incorporated in the outputs were captured. Overall, the findings from this extensive exercise were very encouraging with the accuracy levels for each of the variables examined exceeding 97%.

Table 2 – Capture Accuracy Levels for Write-in Responses by Delivery Group

Variable	DG509 Belfast (and Surrounding Area)	DG527 East of Northern Ireland	DG539 West of Northern Ireland
Country of Birth	99.50%	99.70%	99.70%
Religion	97.80%	98.00%	97.90%
National Identity	99.20%	99.00%	99.30%
Main Language	97.40%	98.60%	98.60%
Passports Held	99.90%	99.90%	99.90%
Country of Previous Residence	99.80%	99.70%	99.70%
Ever Worked	100.00%	100.00%	100.00%

¹ Details of the Local Government Districts that were included in the Delivery Groups can be found in Annex 3.

3.12 In terms of the coding process, which takes the information provided by respondents and transforms it into coded categories, Table 3 below shows the accuracy levels that were achieved for a number of the key Census variables, all of which were above the minimum acceptable accuracy levels contained in the DQMP that underpinned the coding operation.

Table 3 – Coding Accuracy Levels by Delivery Group

Variable	DG509 Belfast (and Surrounding Area)	DG527 East of Northern Ireland	DG539 West of Northern Ireland
Country of Birth	99.74%	99.78%	99.82%
Ethnic Group	96.84%	95.54%	96.37%
Religion	99.14%	99.09%	98.88%
National Identity	99.86%	99.73%	99.69%
Main Language	98.87%	99.49%	99.58%
Passports Held	99.54%	99.89%	99.85%
Industry	92.98%	92.16%	93.25%
Occupation	93.73%	93.95%	94.06%
Workplace Address	94.11%	93.22%	91.34%
Address 1 Year Ago	96.89%	98.12%	98.46%
Visitors' Address	98.37%	96.66%	98.08%

Phase 3 – Utilising intelligence following the Edit & Imputation and Coverage Assessment & Adjustment stages of ‘Downstream’ processing

- 3.13 While completion of a Census questionnaire is a legal requirement, the reality is that a minority of individuals will not comply fully with the Census. Detailed statistical processes (that is, Edit & Imputation and Coverage Assessment & Adjustment) were used to address this and make appropriate adjustments to the Census counts to ensure that the outputs from the Census provide the best estimate of the true population. These processes, which the ONS took the lead in developing, were harmonised across the UK.
- 3.14 Following the application and sign-off of these processes, the Census data were considered to represent the best estimate of the true population in Northern Ireland (along with its associated characteristics).
- 3.15 The main thrust of the QA checks that were undertaken during phase 3 of the quality assurance work for this release of Key Statistics concentrated on the Census estimates at both the Northern Ireland and Local Government District levels. The QA team had the capability and scope to examine the Census data at lower level geographies if it was considered necessary and appropriate comparator data were available.

3.16 The checks concentrated on the usually resident population of Northern Ireland (that is, those who, at the time of the Census, had lived in Northern Ireland, or who were intending to stay in Northern Ireland, for 12 months or more – this is consistent with both the official UN definition of the resident population and with the Mid-Year Population Estimates) and fell into 5 main categories, namely:

- **Category 1:** those that provided the necessary assurance that the household count (both occupied and vacant) and communal establishment count is correct;
- **Category 2:** those that provided assurance that the number of people in both the overall population and main population sub-groups is correct, and that the distribution of households by household size and the average household size is correct;
- **Category 3:** those that provided assurance that the overall distributions of people by age and sex are correct;
- **Category 4:** those that provided assurance that the distributions for key Census topics and questions are plausible and fit for purpose; and
- **Category 5:** those aimed at assessing the variation in return rates across Local Government Districts and within Local Government Districts.

3.17 The results of the work associated with the category 1, category 2, category 3 and category 5 checks have already been covered in the papers [Quality Assurance of the 2011 Census in Northern Ireland](#) and [Population and Household Estimates for Northern Ireland - Quality Assurance Report](#), which were published along with the first and second releases of results from the Census on the 16 July and 19 September 2012 respectively. Accordingly, the discussion that follows addresses the quality assurance work that was undertaken in respect of the Category 4 checks (that is, those that provided assurance that the distributions for key Census topics and questions are plausible and fit for purpose).

Category 4 QA checks: Distributions for key Census topics and questions

- 3.18 As already outlined, the content of the 2011 Census questionnaire was shaped through extensive consultations with users and agreed by the Northern Ireland Assembly as part of the Census legislative process.
- 3.19 While many of the topics and questions included in the 2011 Census questionnaire were either identical, or very similar, to those that were asked in the 2001 Census, several new questions were included. Table 4 below details those questions that were either identical to, or very similar to, a 2001 question.
- 3.20 A considerable raft of work was undertaken to ensure that the variable distributions for the 2011 Census topics and questions that were identical and/or similar to those included in the 2001 Census were broadly comparable with those observed in the 2001 Census. In respect of the new questions that were introduced in 2011 (for example, household adaptations, last country lived in, date arrived in Northern Ireland, passports held, national identity, main language, use of English as a main language, ability in Ulster-Scots, long-term conditions, voluntary work) work was also undertaken to ensure that the distributions looked plausible when compared against relevant information from sample surveys and/or administrative data sources. The detail of all of this work is summarised in Annex 4.
- 3.21 Further information on the comparability of the 2001 and 2011 Census questionnaires can be found in [Comparability of the Census questionnaire in Northern Ireland between 2001 & 2011](#).

Table 4 – 2011 Census topics and questions compared to 2001

Question Type	Questions	Key Comparator data
2011 Census topics and questions that were identical to those included in the 2001 Census	<p><u>Household Questions</u> Type of accommodation Self-contained accommodation Number of rooms Number of cars/vans available</p> <p><u>Individual Questions</u> Schoolchild/student in full-time education Term-time address Country of birth Ethnic group Caring for others Employment status Occupation Supervisor Status Employer's business</p>	2001 Census
2011 Census topics and questions that were similar to those included in the 2001 Census	<p><u>Household Questions</u> Residents and Visitors Type of central heating Tenure Landlord Relationship Matrix</p> <p><u>Individual Questions</u> Legal marital or same-sex civil partnership status Address one year ago Ability in Irish Disability Health Qualifications Religion Employer's Name Hours worked Address travelled to for work/study Type of transport to work/study</p>	2001 Census

Phase 4 – Protecting the Confidentiality of Individual Census Returns

- 3.22 While most Census outputs take the form of statistical counts, there is a risk that information about an individual person could be deduced from Census outputs. For example, if everybody in a particular geographic area was aged under 50 years old apart from one older person living in a single person household, a cross-tabulation of age and general health would reveal the response of that older person to the Census question on general health.
- 3.23 One of the high-level strategic aims for the Census was to protect, and be seen to protect, the confidential personal information collected through the Census and, accordingly, respondents were assured on the Census questionnaire that the information they provide will be treated as confidential. To this end, statistical disclosure control techniques have been applied as part of the 'Downstream' processes to mitigate the risk of inadvertent disclosure in the Key Statistics released today. Further detail on [statistical disclosure control](#) can be found on the ONS website.

4 Other important aspects of the Quality Assurance Work

The 2011 Census Quality Survey

4.1 In line with arrangements across the rest of the UK, Census Office undertook the 2011 Census Quality Survey, participation in which was voluntary. The field work for the survey, which was conducted by NISRA's Central Survey Unit (CSU) between 6 June 2011 and 9 July 2011, covered some 2500 households, 70% of whom participated. By way of summary, CSU's experienced field staff conducted face-to-face interviews with Census respondents, asking them to answer a number of the 2011 Census questions again – this process was facilitated through the use of 'show cards' which contained copies of the Census questions. The analysis from the survey, which is presently underway, will seek to establish the extent to which inconsistent responses were given between participation in the Census and participation in the Census Quality Survey. This in turn will provide insight into the overall quality of the information collected in the Census. A report on the [2011 Census Quality Survey](#) will be published when the analysis has been completed (*published July 2013*).

5 Conclusion

5.1 Quality considerations have been integral to the design and conduct of the 2011 Census in Northern Ireland. Following both the successful field work and data capture and coding phases, the information was adjusted for under-enumeration in accordance with tried and tested methodologies to ensure that the results were representative of the entire population. The resulting distributions of the various 2011 Census variables have been subjected to comprehensive quality assurance, as detailed in the body of this report. The coverage, quality and plausibility of the key statistics estimates are strongly supported by their close alignment with the appropriate comparator datasets and, as such, they are considered to be fit for purpose.

6 Further releases

6.1 Planned Release Schedule

Information from the 2011 Census will be made available through a number of planned releases, as outlined in the [Northern Ireland Census 2011 Output Prospectus](#).

6.2 Contact Details

For further information relating to the 2011 Census please contact:

Census Customer Services

McAuley House
2-14 Castle Street
Belfast
BT1 1SA

Telephone: 028 9034 8160

Fax: 028 9034 8161

Email: census.nisra@dfpni.gov.uk

Website: www.nisra.gov.uk

2011 Census

Quality Orientated Initiatives

- The development of an authoritative address register to support the delivery of Census questionnaires;
- The implementation of a robust field methodology that identified and rectified deficiencies in the address register through a full address check, followed-up any undelivered questionnaires, followed-up any non-responding households, and identified those non-responding households from which a completed questionnaire would have been expected (this is key from a coverage assessment perspective);
- The postal delivery of Census questionnaires by Royal Mail, with each questionnaire incorporating a unique barcode associated with each address to facilitate both the delivery and tracking of the questionnaires;
- The provision of an internet response channel;
- The provision of public interface services, including the provision of a dedicated 2011 Census 'self-help' website, a dedicated telephone help line and an in-house 'fulfilment' team to respond to requests from the general public and issue a questionnaire to any newly identified addresses;
- The implementation of a comprehensive publicity campaign to ensure that everyone realised the importance of the Census and their obligation to take part;
- The development and implementation of a comprehensive data capture requirement specification with challenging associated service levels and quality control measures; and

- The development of robust 'Downstream' processes to, for example:
 - ▶ validate that the captured data are in accordance with the agreed specification and service levels;
 - ▶ identify and address any duplicates in the data;
 - ▶ identify any missing items in the data and impute the required values in accordance with the methodology agreed across the UK;
 - ▶ undertake an assessment of coverage and adjust the results as appropriate; and
 - ▶ apply the necessary statistical disclosure control techniques in order to ensure that the confidentiality of the information provided by the general public is protected in the aggregate outputs produced from the Census.

(Note – this Annex was updated in March 2015)

Item Imputation Rates

Tables 1 and 2 below show the Item Imputation Rates on a question-by-question basis for the Individual and Household questionnaires. Responses were imputed if they had been missing, if two or more boxes were ticked where only one should have been ticked (a failed multi-tick), if written responses could not be recognised (identified from an existing list), that is, uncodable or if numerical responses were out of range.

The information below has been generated from a copy of the data taken during data processing after:

- the raw data had been captured and coded by the contractor;
- any multiple responses for Individuals and Households had been reconciled; and
- the data had been processed to apply the routing in the questionnaires (based on the respondent's preceding entries) and ensure internal consistency,

but before item imputation was conducted.

Item Imputation Rates are reported for each separate question, based on the appropriate pool of records, that is, those who gave a response to the most recent 'routing-filter' question in the questionnaire.

Individual Questions

Table 1 below shows the Item Imputation Rates for the Census questions asked about individuals in the Census Household questionnaire.

In general, most Item Imputation Rates were reassuringly low. Those for the key demographic variables (for example, sex and marital status) were very low, while those for the health, education and economic questions were only slightly higher. Although they were higher for some variables, these were regarded as acceptably so and also tended to be relatively high in England and Wales. In the case of 'Workplace/Study address', for example, respondents may have omitted to tick the correct box and simply entered their work address. Where possible, steps were taken to validate such responses.

Table 1 – Individual Questions – Item Imputation Rates

Question Number	Question	Expected Number of Respondents	Item Imputation Rate (%)
2	Sex	1,654,000	0.5
3	Age (derived from date of birth information)	1,654,000	0.7
3	Date of birth – month	1,654,000	0.5
3	Date of birth – year	1,654,000	0.7
4	Marital status	1,654,000	4.7
5	Student indicator	1,654,000	5.0
6	Term time address indicator	363,000	0.3
7	Country of birth	1,570,000	0.8
10	Lived outside Northern Ireland	1,570,000	2.7
11	Country of previous residence	193,000	8.2
12	Date arrived in Northern Ireland – month	193,000	12.8
12	Date arrived in Northern Ireland – year	193,000	9.6
13	Address one year ago – tick box	1,549,000	3.0
13	Address one year ago - other UK address – Postcode	87,000	5.8
14	Passports held – tick box	1,570,000	1.3
14	Passports held – text	55,000	0.9
15	National identity – tick box	1,570,000	2.3
15	National identity – text	4,000	2.7
16	Ethnicity – tick box	1,570,000	1.7
16	Ethnicity – text boxes	13,000	10.5
18	Religion brought up in	200,000	16.9
19	Main language	1,570,000	1.6
20	How well can you speak English	53,000	2.8
21	Understand, speak, read or write Irish or Ulster-Scots	1,570,000	2.6
22	Day-to-day activities limited?	1,570,000	2.7
23	Health conditions	1,570,000	4.8
24	General health	1,570,000	1.6
25	Unpaid care	1,570,000	3.5
27	Qualifications	1,235,000	4.2
28	Voluntary work	1,235,000	3.5
29	Employment last week	1,235,000	3.5
30	Looking for paid work in the last four weeks	591,000	5.8
31	Available to start work within two weeks	591,000	8.9
32	Waiting to start a job already obtained	591,000	9.8
33	Other activity last week	591,000	7.4
34	Ever worked	591,000	1.6
34	Year last worked	478,000	15.8
36	Employment status in last main job	1,145,000	4.6
37,38	Job title	1,145,000	4.7
39	Supervision of employees	1,145,000	5.0

Question Number	Question	Expected Number of Respondents	Item Imputation Rate (%)
40	Industry	1,145,000	12.5
41	Employer's name	1,145,000	7.8
42	Hours usually worked per week	1,145,000	5.0
43	Workplace/Study address – tick box	1,570,000	10.9
43	Workplace/Study address – Postcode	819,000	0.3
44	Method of travel to place of work/study	908,000	1.5

Household Questions

Table 2 shows the Item Imputation Rates for the Census questions asked about Households in the Census Household questionnaire.

Again, in general, most Item Imputation Rates were reassuringly low. Those for the key demographic variables (for example, type of accommodation and whether or not it was a self-contained household) were very low, while those for household adaptations, although higher, were still acceptable. Again, all responses were validated where possible.

Table 2 – Household Questions – Item Imputation Rates

Question Number	Question	Expected Number of Respondents	Item Imputation Rate (%)
7	Type of accommodation	702,000	2.4
8	Accommodation self-contained	702,000	2.5
9	Number of rooms available	702,000	6.7
10	Adaptations – tick box	702,000	9.5
10	Adaptations – text	1,000	8.1
11	Type of central heating	702,000	6.3
12	Accommodation owned or rented	702,000	8.1
13	Landlord	206,000	1.3
14	Number of cars/vans owned or available	702,000	8.1

Annex 3

LGD Breakdown for each of the three Northern Ireland Delivery Groups

Delivery Group 1 (Belfast and Surrounding Area – DG509)

LGD Code	LGD Name
95GG	Belfast
95II	Castlereagh
95SS	Lisburn

Delivery Group 2 (East of Northern Ireland – DG527)

LGD Code	LGD Name
95AA	Antrim
95BB	Ards
95CC	Armagh
95DD	Ballymena
95FF	Banbridge
95HH	Carrickfergus
95LL	Craigavon
95NN	Down
95QQ	Larne
95VV	Newry & Mourne
95WW	Newtownabbey
95XX	North Down

Delivery Group 3 (West of Northern Ireland – DG539)

LGD Code	LGD Name
95EE	Ballymoney
95JJ	Coleraine
95KK	Cookstown
95MM	Derry
95OO	Dungannon
95PP	Fermanagh
95RR	Limavady
95TT	Magherafelt
95UU	Moyle
95YY	Omagh
95ZZ	Strabane

(Note – this Annex was updated in March 2015)

Category 4 Quality Assurance checks that were undertaken in respect of the Distributions for key Census topics and questions

Demography			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Number of Usual Residents	KS101NI	The key QA checks that were undertaken to ensure that the numbers of: (i) Usual Residents; (ii) Households; and (iii) Usual Residents Living in Households were plausible were detailed in the two separate quality assurance reports that accompanied phase 1 and phase 2 of the first results. These were released on the 16 July and 19 September 2012 respectively. The following are the direct links to the quality assurance reports in question, which also detail the work that was undertaken to ensure that age by sex distributions at both the NI and LGD levels were plausible. 16 July 2012: Quality Assurance of the 2011 Census in Northern Ireland 19 September 2012: Population and Household Estimates for Northern Ireland - Quality Assurance Report	2001 Northern Ireland Census
Number of Households	KS401NI		NISRA Demography and Methodology Branch Mid-Year Population Estimates
Number of People Living in Household	KS403NI		NISRA Demography and Methodology Branch Small Area Population Estimates
Age Structure	KS102NI		Department for Work and Pensions (DWP) Pensions data
			General Register Office Births data
			National Health Service Patient Register data (Two datasets - 'Standard' and 'Active')
			Department of Education NI School Census data
			HM Revenue and Customs (HMRC) Child Benefit data

Demography			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Marital and Same-Sex Civil Partnership Status	KS103NI	This was a modified question for 2011, reflecting changes that arose from the Civil Partnership Act 2004. The distributions for this variable were checked, at both Northern Ireland and LGD level, to ensure they were plausible.	Marriage and same-sex civil partnership Registration data 2001 Northern Ireland Census
Living Arrangements	KS104NI	The distributions for each of these derived Census variables were checked, at both Northern Ireland and LGD level, to ensure they were plausible. Key demographic changes that have taken place since the 2001 Census were factored into the QA process.	2001 Northern Ireland Census
Household Composition	KS105NI		
Households with Adults not in Employment, Dependent Children and Persons with a Long-Term Health Problem or Disability	KS106NI		
Lone parent Households with Dependent Children	KS107NI		

Ethnicity, Identity, Language and Religion			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Ethnic Group	KS201NI	<p>The distributions of Ethnic Group, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of migration patterns between the 2001 and 2011 Censuses.</p> <p>The distributions were cross-referenced against other variables (for example, Country of Birth and National Identity) to ensure consistency. A breakdown of the 'Other' category was also examined and the findings were considered to be plausible.</p>	2001 Northern Ireland Census
National Identity	KS202NI	<p>This was a new question for 2011, for which comparator data were not available. The distributions of National Identity were checked at both Northern Ireland and LGD level and then cross-referenced against other variables (for example, Passports Held and Country of Birth). The findings were considered to be plausible.</p>	New question for 2011, No administrative data available
Country of Birth	KS204NI	<p>The distributions of Country of Birth, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of migration patterns between the 2001 and 2011 Censuses.</p> <p>The distribution of the 'Elsewhere' Country of Birth category was cross-referenced against other variables (for example, National Identity and Ethnic Group) to ensure the consistency of results.</p>	2001 Northern Ireland Census

Ethnicity, Identity, Language and Religion			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Passports Held	KS205NI	This was a new question for 2011, for which comparator data were not available. The distributions of Passports Held were checked at both Northern Ireland and LGD level, and then also cross-referenced against National Identity to ensure consistency. The findings were considered to be plausible.	New question for 2011, No administrative data available
Main Language	KS207NI	This was a new question for 2011, for which comparator data were not available. The distributions of Main Language were checked at both Northern Ireland and LGD level. Additionally, the distribution of write-ins (for those whose Main Language was not English) was examined at LGD level, and cross-referenced against other appropriate variables to ensure consistency of results. For example, those with a Main Language of 'Irish' or 'Gaelic' were cross-referenced with their reported Knowledge of Irish to ensure consistency. The findings were considered to be plausible.	New question for 2011, No administrative data available
Knowledge of Irish	KS209NI	The distributions of Knowledge of Irish, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census.	2001 Northern Ireland Census
Knowledge of Ulster-Scots	KS210NI	This was a new question for 2011, for which comparator data were not available. The distributions of Knowledge of Ulster-Scots were checked at both Northern Ireland and LGD level and the findings were considered to be plausible.	New question for 2011, No administrative data available

Ethnicity, Identity, Language and Religion			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Religion Belong To / Religion Brought Up In	KS211NI	<p>The distributions of Religion, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of the demographic changes (for example, differences in fertility and mortality rates) that occurred between 2001 and 2011.</p> <p>Checks were also undertaken at the Northern Ireland level using the most recent information from both the School Census and the Continuous Household Survey.</p>	<p>2001 Northern Ireland Census</p> <p>School Census</p> <p>Continuous Household Survey</p>

Health			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Health	KS301NI	<p>This question was modified from the 2001 question to include five tick-box options (that is, 'Very good', 'Good', 'Fair', 'Bad', and 'Very bad') as opposed to the three options included in the 2001 Census (that is, 'Good', 'Fairly good' and 'Not good'). The 2011 distributions were checked at both Northern Ireland and LGD level, and while not directly comparable with 2001 due to the changes to the question, the findings were considered to be plausible.</p> <p>In addition, results were cross-referenced against other health orientated variables to ensure consistency.</p>	2001 Northern Ireland Census
Provision of Unpaid Care	KS301NI	<p>The distributions of Provision of Unpaid Care, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census.</p> <p>In addition, results were cross-referenced against those for Hours Worked to ensure consistency. The findings were considered to be plausible.</p>	2001 Northern Ireland Census

Health			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Long-Term Condition	KS302NI	<p>This was a new question for 2011 for which comparator data were available from the Northern Ireland Survey of People with Activity Limitations and Disabilities (NISALD). The distributions were checked at both Northern Ireland and LGD level, for those reported as having either 'No condition' or any of the conditions listed, as well as for those reported as having each of the conditions separately.</p> <p>The proportions of those reported as having 'No condition' and those reported as having any of the conditions listed separately were cross-referenced against other health orientated variables to ensure consistency.</p> <p>Taking into account the different methodologies employed in the Census and the NISALD, the Census findings were considered to be plausible.</p>	<p>New question for 2011, NISRA Northern Ireland Survey of People with Activity Limitations and Disabilities</p>

Housing and Accommodation			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Accommodation Type	KS401NI	The distributions of Accommodation Type, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of whether the area was urban or rural in nature (for example, proportionately fewer terraced houses in rural areas).	2001 Northern Ireland Census
Tenure and Landlord	KS402NI	The distributions of both Tenure and Landlord, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census. In addition, the distribution of Landlord was compared with Northern Ireland Housing Executive (NIHE) data to ensure that the number of NIHE properties was plausible.	2001 NI Census Northern Ireland Housing Executive data
Central Heating	KS404NI	The proportion of households, at both Northern Ireland and LGD level, with and without Central Heating, was checked to ensure they were plausible when compared to the results from the 2001 Census. In addition, the distribution of Central Heating type was compared with data from the latest House Condition Survey (HCS) to ensure that findings were plausible.	2001 Northern Ireland Census Northern Ireland Housing Executive House Condition Survey
Cars or Vans	KS405NI	The distributions of the Number of Cars or Vans, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census.	2001 Northern Ireland Census
Household Adaptations	KS406NI	This was a new question for 2011, for which comparator data were not available. The distributions of Household Adaptations were checked at both Northern Ireland and LGD levels and the findings were considered to be plausible.	New question for 2011, No administrative data available

Housing and Accommodation			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Communal Establishments	KS407NI	<p>The overall number of Communal Establishments (CEs) at Northern Ireland level was checked to ensure that it was broadly comparable with results from the 2001 Census and the 2011 Census Address Register that was developed for the enumeration phase.</p> <p>The geographic location of all larger CEs (that is, those with more than 50 usual residents such as Universities, Prisons) and in particular Nursing Homes (with more than 20 usual residents) was checked to ensure that it was plausible.</p> <p>In respect of the establishments, information relating to their nature (for example, Mental Health Hospital / Unit), the group of clients they catered for (for example, Mental Illness) and their management type (for example, Health and Social Care Body) was checked for internal consistency.</p> <p>In addition, checks were undertaken to ensure that the client group (for example, young people) was consistent with the type of establishment (for example, Children's Homes).</p>	<p>2001 Northern Ireland Census</p> <p>2011 Census Address Register</p>

Qualifications			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Qualifications and Students	KS501NI	<p>The distributions of Highest Level of Qualifications, at both Northern Ireland and LGD levels, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of the improvements that were made to the 2011 question to, for example, more accurately assess the extent of 'No Qualifications', given demographic changes between 2001 and 2011 (for example, migration).</p> <p>Additionally, the findings were also cross-referenced with data from the Department of Enterprise, Trade and Investment (DETI) Labour Force Survey (LFS) Quarterly Supplement July – September 2012, to ensure they were plausible.</p> <p>The distributions for the Number of Students aged 16 and over, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those reported in the 2001 Census and both the Higher Education Statistics Authority (HESA) and Department for Employment and Learning (DEL) Further Education (FE) figures.</p> <p>Variations at LGD level reflected the higher numbers of students aged 19-24 in known 'university areas'.</p>	<p>2001 Northern Ireland Census</p> <p>NI Department of Enterprise, Trade and Investment Labour Force Survey</p> <p>Higher Education Statistics Authority data</p> <p>NI Department of Employment and Learning Further Education data</p>

Labour Market			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Economic Activity	KS601NI	<p>The distributions of Economic Activity, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census.</p> <p>Economic Activity is derived from a variety of information collected in the 2011 Census (for example, Activity Last Week, Employment Status, Age, etc.). Activity Last Week is itself derived from the data in questions 29 to 34. In addition to the Economic Activity checks that were carried out, several checks of Activity Last Week were carried out at both Northern Ireland and LGD level to ensure they were plausible when compared with those from the 2001 Census.</p> <p>Additionally, the findings were cross-referenced with data from the LFS Quarterly Supplement July – September 2012, to ensure they were plausible.</p>	<p>2001 Northern Ireland Census</p> <p>NI Department of Enterprise, Trade and Investment Labour Force Survey</p>
Hours Worked	KS604NI	<p>The distributions of Hours Worked, at both Northern Ireland and LGD levels, were checked to ensure they were plausible when compared with those from the 2001 Census.</p>	<p>2001 Northern Ireland Census</p>
Industry of Employment	KS605NI	<p>The distributions of Industry of Employment, at both Northern Ireland and LGD levels, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of the different classification deployed in 2011 (that is, SIC 2007 as opposed to SIC 92 in the 2001 Census).</p> <p>Additionally, the Northern Ireland distribution was cross-referenced against data from the DETI 2011 Census of Employment to ensure they were plausible.</p>	<p>2001 Northern Ireland Census</p> <p>NI Department of Enterprise, Trade and Investment Census of Employment</p>

Labour Market			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Occupation	KS608NI	<p>The distributions of Occupation, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of the different classification deployed in 2011 (that is, SOC 2010 as opposed to SOC 2000 in the 2001 Census).</p> <p>In addition, results were compared with those from the April-June 2001 and April-June 2011 LFS and the findings were considered to be plausible.</p>	<p>2001 Northern Ireland Census</p> <p>NI Department of Enterprise, Trade and Investment Labour Force Survey</p>
National Statistics – Socio-economic Classification (NS-SeC)	KS611NI	<p>The distributions of NS-SeC, at both Northern Ireland and LGD level, were checked to ensure they were plausible when compared with those from the 2001 Census, taking account of the amended method of deriving NS-SeC in 2011.</p>	<p>2001 Northern Ireland Census</p>

Travel to work or place of study			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Method of Travel to Work or Place of Study	KS701NI	This question was modified to include travel to main place of work or study (including school), as opposed to travel to work in the 2001 Census. The 2011 distributions were checked at both Northern Ireland and LGD levels. While not directly comparable with 2001 due to the changes to the question, the findings were considered to be plausible.	2001 Northern Ireland Census

Migration			
Census Topic(s)	2011 Table	Summary of Quality Assurance Checks	Data Sources used for QA Checks
Migration	KS801NI	<p>The overall distributions of Country of Birth at both Northern Ireland and LGD level were checked against the distribution from the 2001 Census to ensure they were plausible. In addition, the distribution of those with a Country of Birth in the 'Accession 8' countries was checked, at Northern Ireland and LGD level, and by Age, and was found to be broadly comparable with the latest available migration data.</p> <p>The Lived Outside Northern Ireland and Date of Arrival to Northern Ireland were new questions for 2011, for which comparator data were not available. The distributions of those who had lived outside Northern Ireland for one year or more and their date of arrival to Northern Ireland were checked at both Northern Ireland and LGD levels and were considered plausible.</p>	<p>2001 Northern Ireland Census</p> <p>NISRA DMB – Migration Statistics</p>