

Estimating the population

September 2011

Coverage assessment and QA

Aim:

- to get to LA by age-sex estimates
- to ensure the estimates are high quality

How:

- Census Coverage Survey
- Estimation
- Quality Assurance

External Assurance

- Independent Review commissioned by ONS in 2010
- Assure us and you of the methods and their application
- Review team:
 - Professor Ian Plewis (Manchester University)
 - Professor Ludi Simpson (Manchester University)
 - Dr Paul Williamson (Liverpool University)
- Report published February 2011

External Assurance (2)

- Initial review made a series of 23 recommendations but concluded that the methods:

"give confidence that the resulting final census population estimates will be better than any other method and will be suitable for use in resource allocation and planning".

- ONS provided a response to each recommendation
- Review team commissioned to carry out a follow on review, published in May 2011
- ONS subsequently published its response to this

Part 1 – Coverage Assessment

Introduction

Address
Register

Engagement
& Comms

Field
Operations

Online
Services

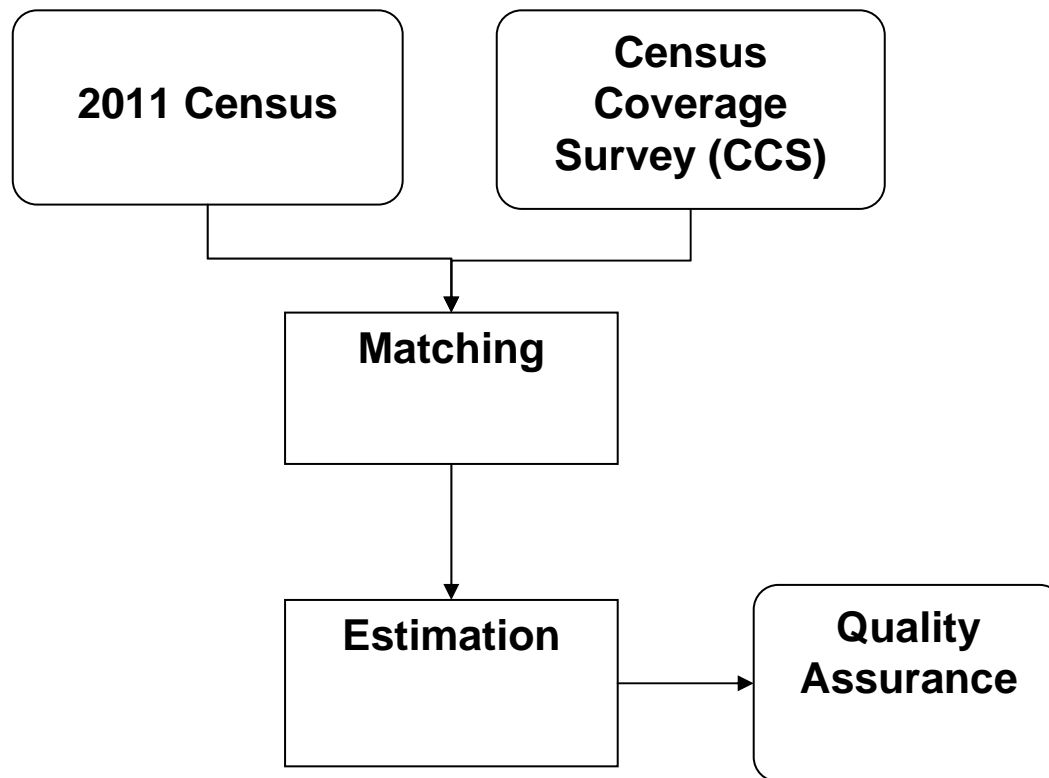
Data
Processing

Estimating the
Population

Census
Outputs

Summary

Coverage assessment overview



Major steps on from 2001

- Revised CCS design and sample allocation (later)
- Improved estimation procedures
- Added additional methods for adjusting estimates where underlying assumptions are not realistic
 - DSE bias adjustments
- Overhaul of methods for adjusting the census database

Census Coverage Survey- Sample selection

- **Reminder:**
 - Independent survey of small areas (postcodes)
 - Doesn't use address listing or any census information
 - Doorstep interview, ~13 questions
 - Prompts for population we know are missed (babies etc)
 - Call back lots of times
- **Sample of 18,000 postcodes in 5,800 Output Areas = 340,000 households**
 - Slightly larger than in 2001
- **Sample for each LA by HtC**

More sample in Hard to count areas

	England and Wales	
Hard to Count (HtC)	2011	2001
1	2.0%	3.4%
2	3.0%	3.7%
3	4.8%	4.5%*
4	6.2%	
5	7.2%	

* 2001 HTC 3 split into 3 hard to count groups in 2011

Estimation

3 parts to the estimation process:

(1) Dual System Estimation (DSE)

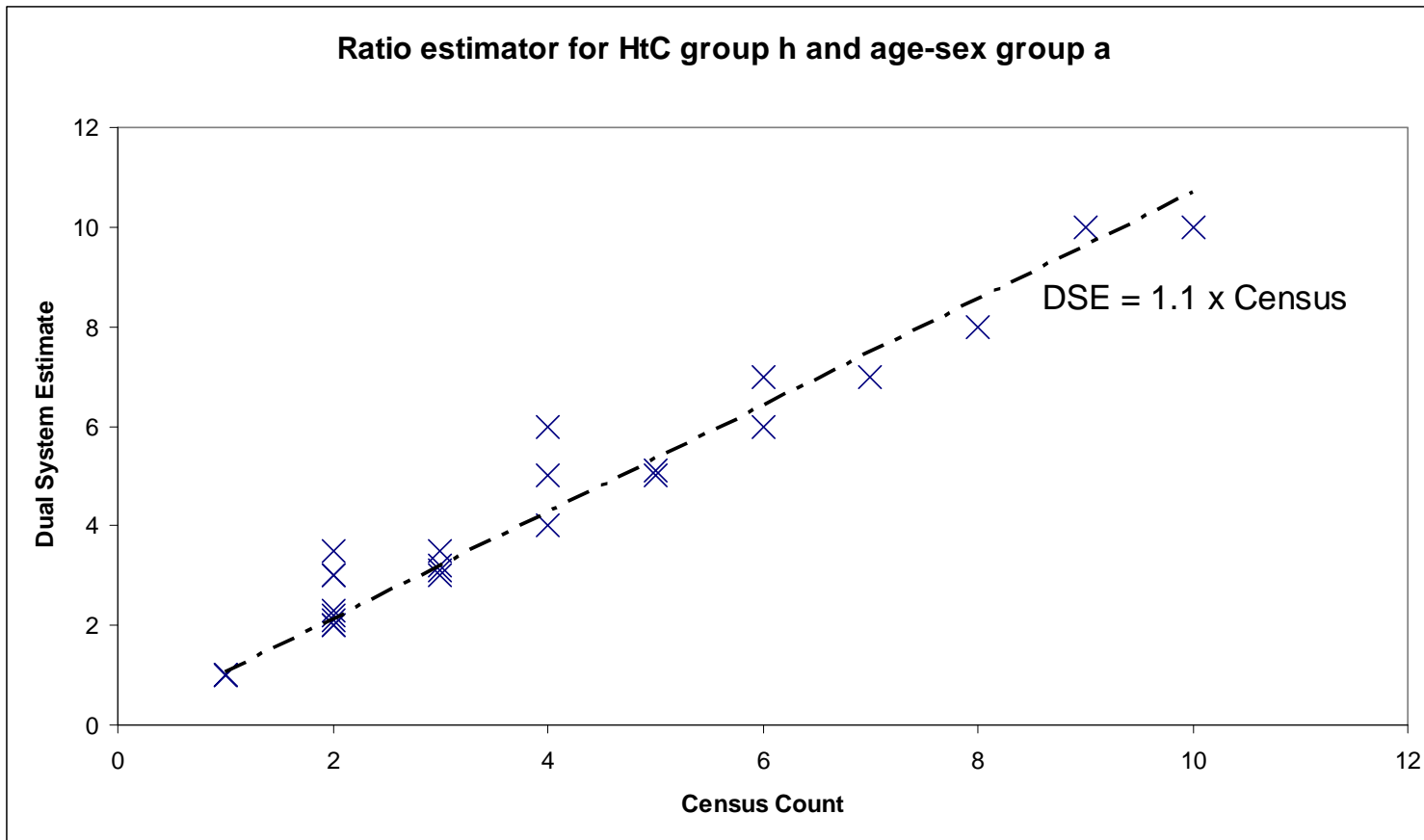
- What is the true population in the sampled areas
- Makes adjustment for 'missed in both'
- Applied in each sampled cluster by age-sex

(2) Ratio Estimation

- Estimates for non-sampled areas
- Estimation Area (EA) level – Contiguous groups of LAs
- Find relationship between DSE and Census count

Ratio estimation

- Coverage 'rate' is obtained by ratio between DSE and census count across the clusters (slope of the line of best fit through the origin)
- Population estimate is the rate applied to the total census count



x Each point marks the DSE population and the Census count for an age-sex group in a cluster of postcodes within a hard-to-count stratum for an Estimation area.

Estimation

(3) Local Authority Estimation

- Use age-sex by HtC patterns at EA level to get LA level estimates

Estimation to QA

- Estimation produces LA by age-sex estimates
 - With confidence intervals
- Imputation process imputes households and persons
 - This provides the other characteristics of those missed (for those variables not measured in CCS)
 - We are not aiming to get exactly the right number of people in every address or every Output Area
- Population by age and sex goes to Quality Assurance process

Part 2 – Quality Assurance

Introduction

Address
Register

Engagement
& Comms

Field
Operations

Online
Services

Data
Processing

Estimating the
Population

Census
Outputs

Summary

Quality Assurance

Key objectives:

- Checking methods have been applied correctly
- Checking no evidence of systematic errors
- Identify Local Authorities with largest inconsistencies against comparator data
- Identify where supplementary analysis is required
- Produce best possible population estimates

Major steps on from 2001

- More extensive 'core' QA for all LAs
- Clarity on when to undertake supplementary work
- Supplementary QA before publication of results
- Improvement methods prepared, reviewed and available to use if required
- Recognises importance of LA estimates and emerging regional/national estimates
- Additional QA Panels
 - High level panel includes external membership

Framework for QA

Level	Core Checks	Supplementary Checks	Improvements
Local Authority	<ul style="list-style-type: none"> • Compare to other sources (households/persons) • Operational Intelligence • LA provided evidence 	<ul style="list-style-type: none"> • Comparisons to low geographic levels (households/persons) • Data matching to administrative data 	<ul style="list-style-type: none"> • Calibrate to external sources • Adjust Coverage Estimation
Regional	<ul style="list-style-type: none"> • Compare to other sources (households/persons) • Operational Intelligence • LA provided evidence 	<ul style="list-style-type: none"> • Data matching using visitor and second residence • Assessment of Census Non-Response Link Study (CNRLS) 	<ul style="list-style-type: none"> • Calibrate to external sources • Adjust Coverage Estimation • Adjust using CNRLS
England & Wales	<ul style="list-style-type: none"> • Compare to other sources (households/persons) • Operational Intelligence • LA provided evidence 	<ul style="list-style-type: none"> • Data matching using visitor and second residence • Assessment of CNRLS • Assessment of Longitudinal Study 	<ul style="list-style-type: none"> • Calibrate to external sources • Adjust Coverage Estimation • Adjust using CNRLS • Adjust using Longitudinal Study

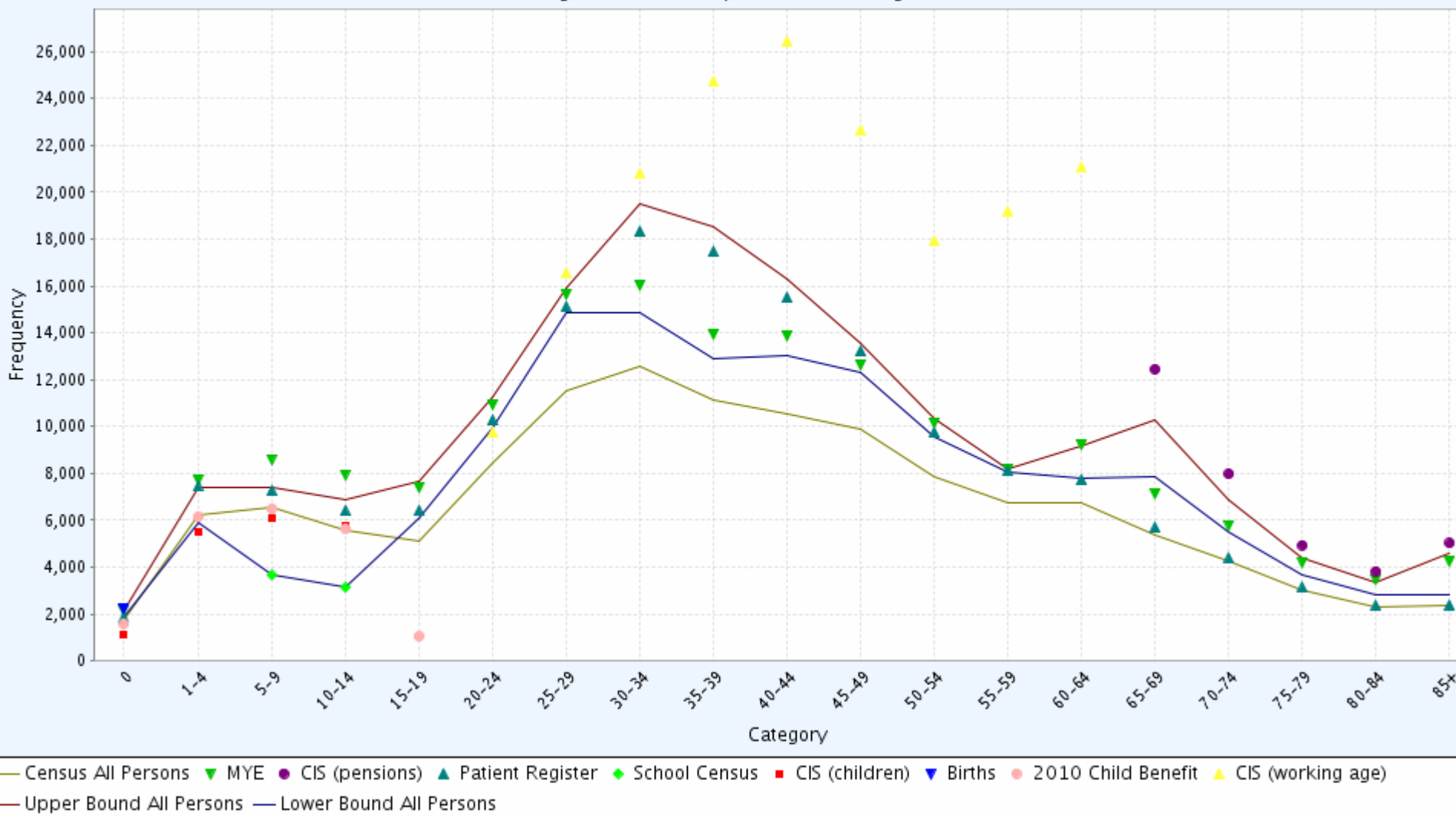
Core QA Checks

- All Local Authority census population estimates subject to core checks
 - Comparison to alternative estimates
 - Demographic analysis
 - Operational checks
- Highest weighting given to checks with most confidence in comparator data e.g. babies (patient register), children (school census)
- Paper published in July 2011 setting out when supplementary analysis will be carried out – using this weighting

Core QA Checks - sources

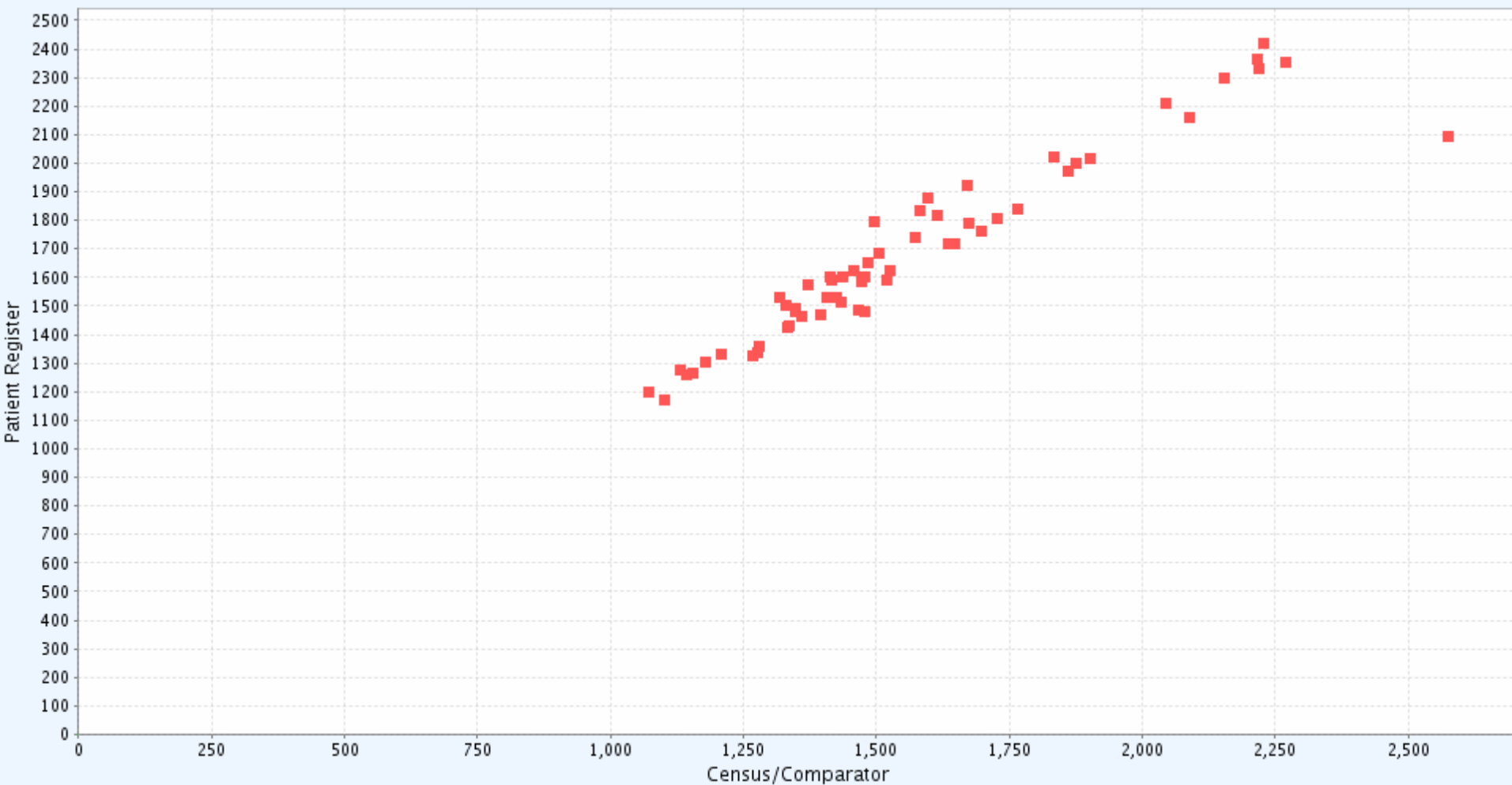
- For main age-sex LA estimates:
 - Patient Register
 - Mid Year Estimates
 - School Census
 - Child benefit
 - CIS Benefits
- Households:
 - Address register (post-census)
 - VOA
 - Council Tax (LA provided)
- For other populations:
 - HESA (Students)
 - MoJ prisons data
 - DASA (Armed Forces)

Real example: LA by age



* Provisional counts (pre-estimation)

Real example: Low level check



* Provisional counts (pre-estimation)

Introduction

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Engagement & Comms

Field Operations

Online Services

Data Processing

Estimating the Population

Census Outputs

Summary

Supplementary QA Checks (1)

- **Directed by findings from outcome of core checks**
- **Generally undertaken at geographic levels below LA**

Household Level Analysis

- Comparison to a 'refined' patient register count of households
- Comparison to LA provided Council Tax data

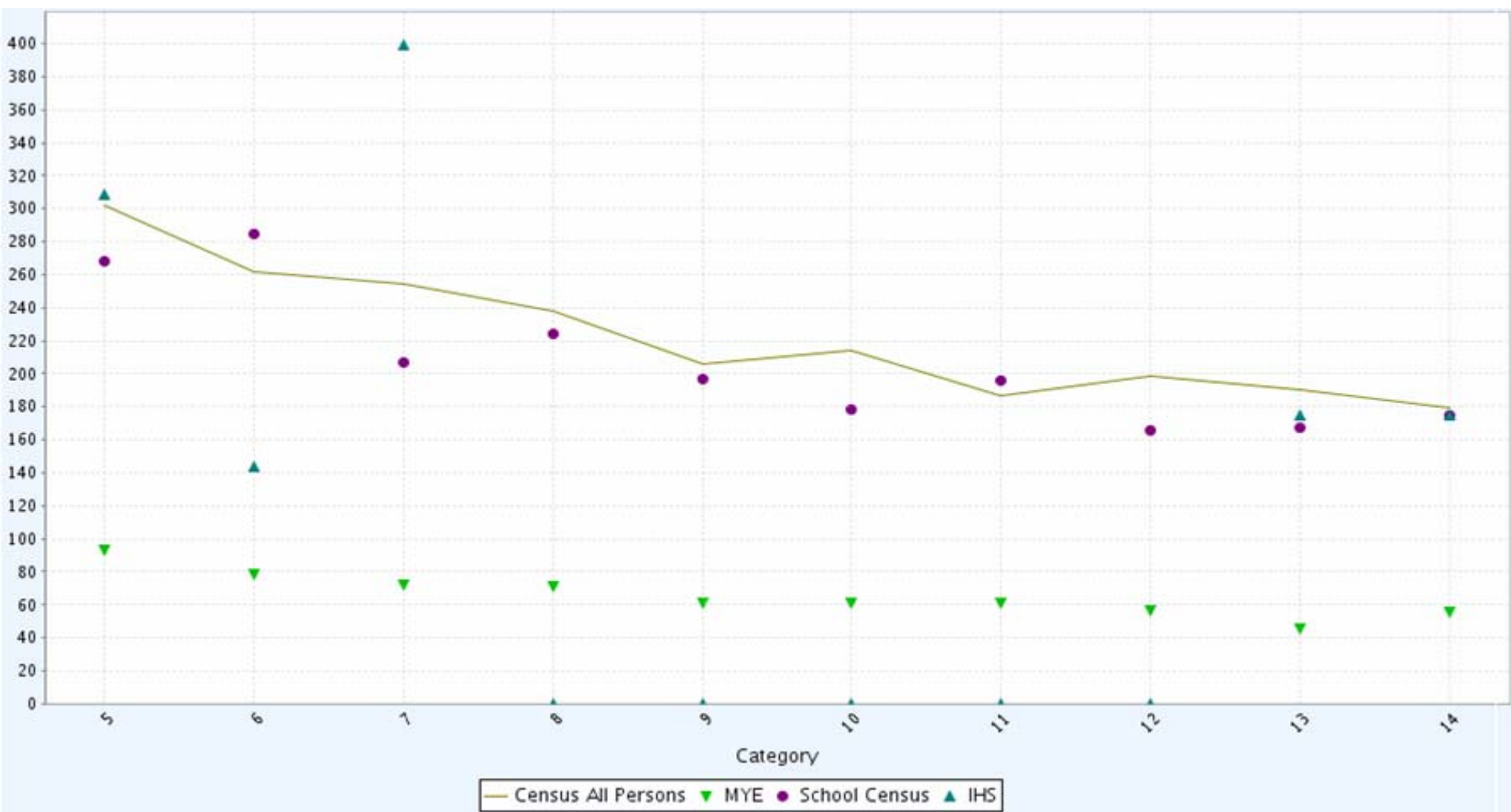
Individual Level Analysis

- Incorporate census short-term migrants in comparison
- Comparison to a 'refined' patient register count of individuals

Supplementary QA Checks (2)

- Not all the supplementary analysis will point to missed people
- Second resident / second residence, short term migrant checks will identify some people who should not be included in the final outputs
 - Even though they are on administrative datasets

Real example: Low level check



* Provisional counts (pre-estimation)

Introduction

Address Register

Engagement & Comms

Field Operations

Online Services

Data Processing

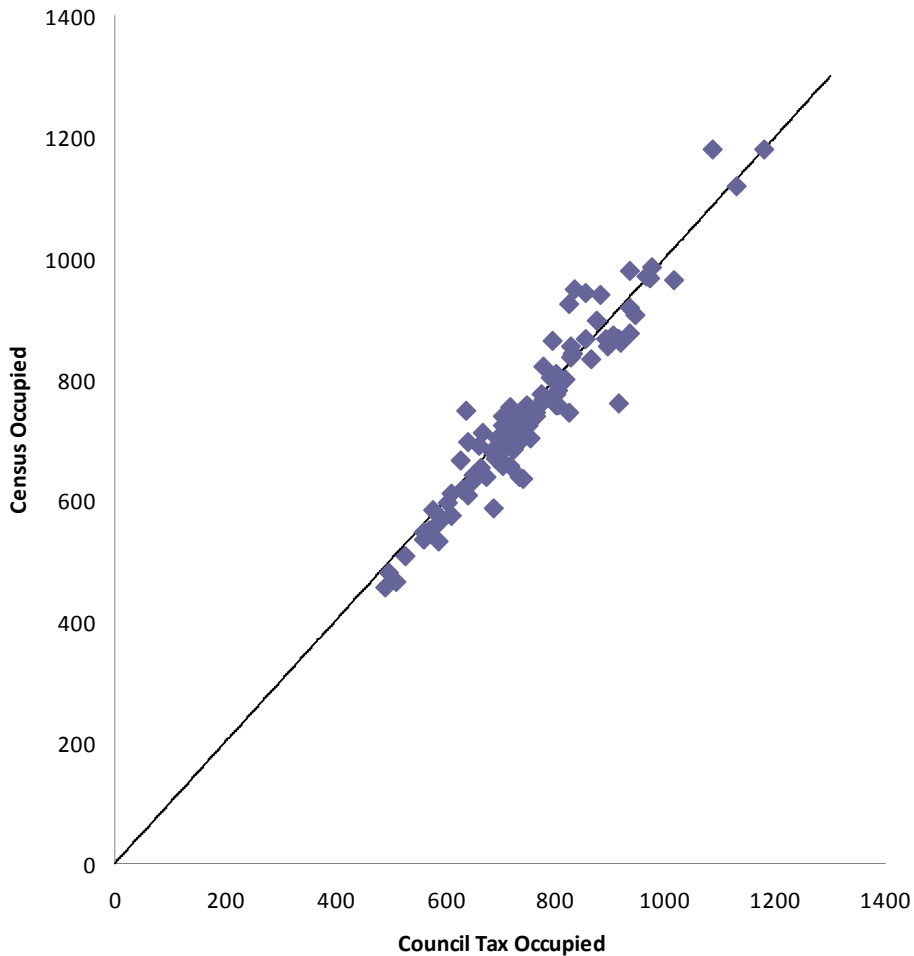
Estimating the Population

Census Outputs

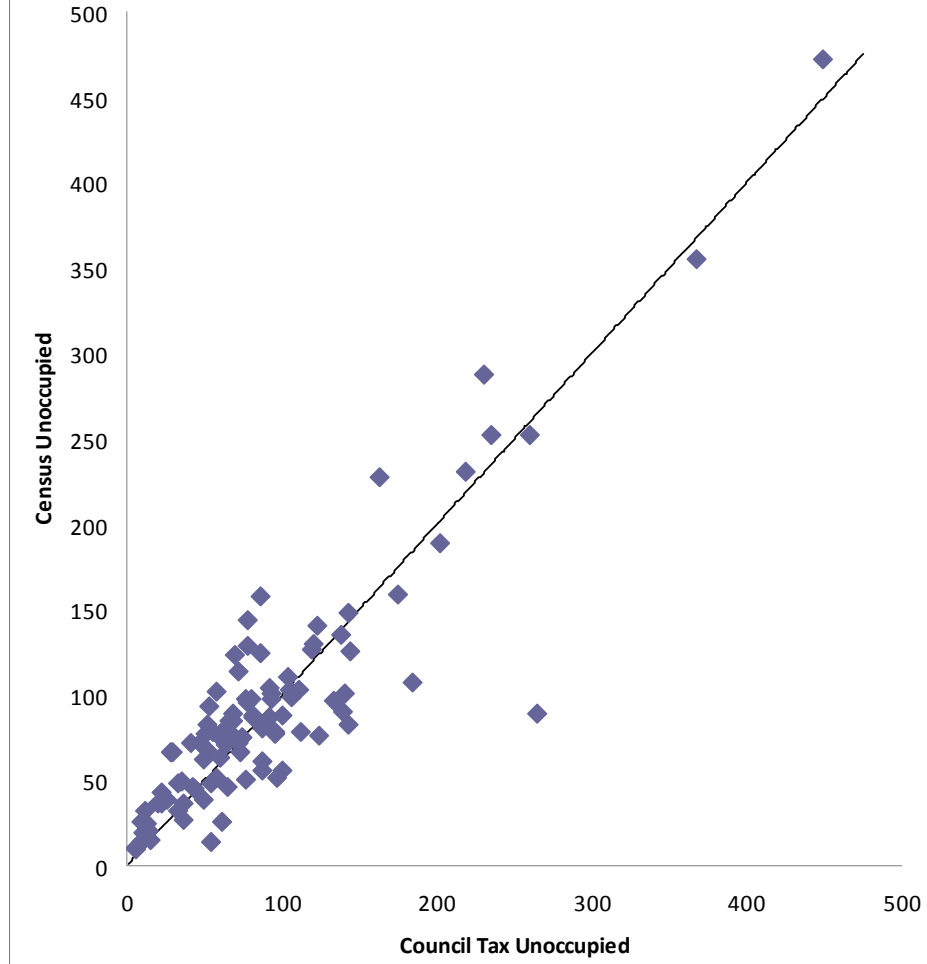
Summary

Real example: Low level check

CT vs Census Occupied



CT vs Census Unoccupied

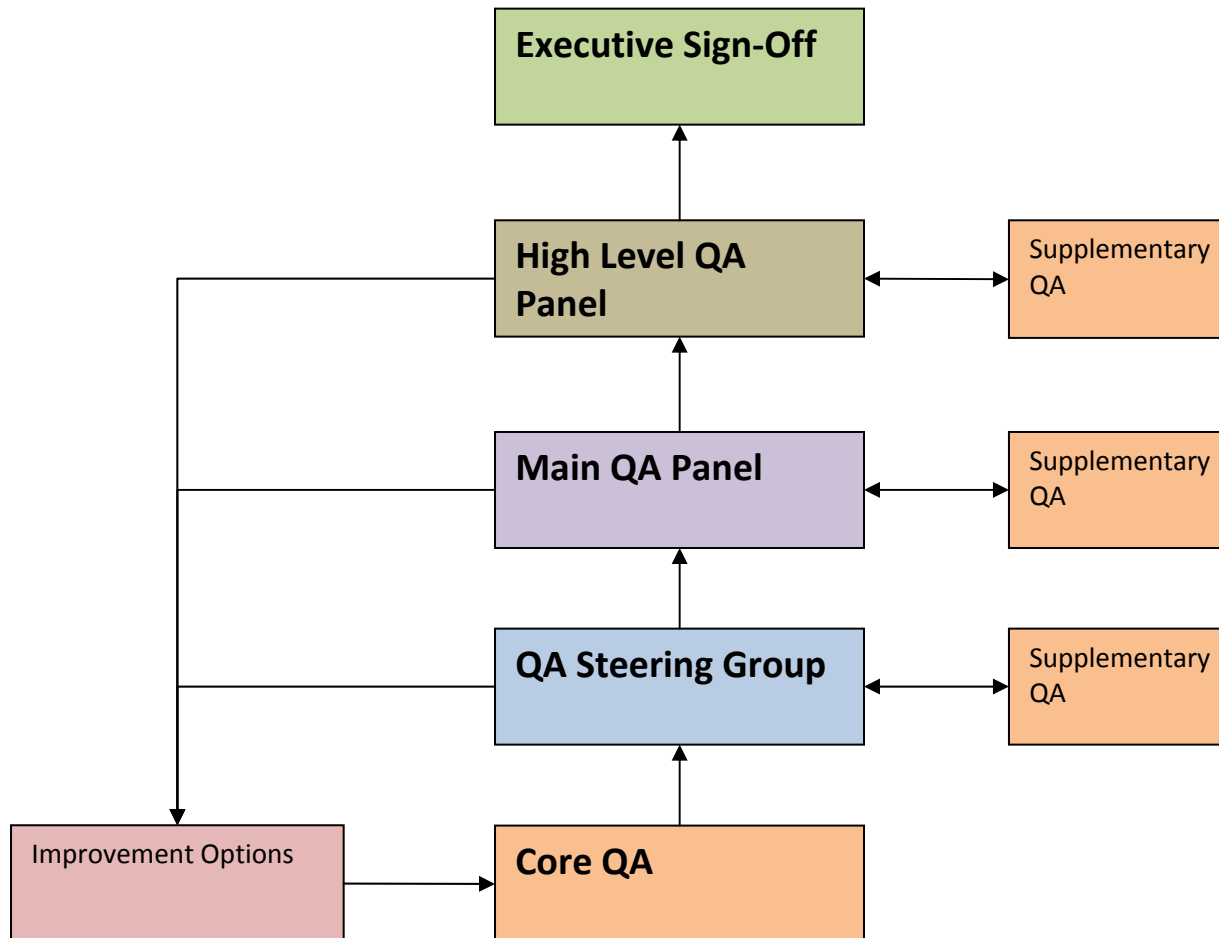


* Provisional counts (pre-estimation)

Agreeing Census Population Estimates

- Internal QA steering group
 - Gateway to main QA panel
 - Small working level group reviewing the detail
- Main QA panel
 - Review each Local Authority census population estimate and evidence
 - Expertise from across ONS
- High level QA panel
 - Review emerging national and regional estimates
 - Independent academic and user insights
 - Assess Local Authorities referred from main QA panel

QA Panel Process



Making improvements to the estimates

- Any of the panels can request an improvement to the estimate
 - If there is evidence that an estimate requires adjustment
 - Some of the improvements are built into the process
- There are a number of ways in which improvements can be made
 - Some of which were available in 2001
 - The methods used post-2001 are also included
 - Matching studies
 - Localised adjustments
 - Improvements can be local, regional or national

Improvements to the estimates

- For example:
 - Collapsing age-sex or Hard to Count groups
 - Adjustments for overcount
 - Adjusting for pockets of extreme non-response
 - Calibration to an external source (e.g. School Census)
 - Using the Longitudinal Study as a national check
 - National sex ratio comparisons
- Have published how national adjustments will be cascaded down to LA level

Estimating the Population – Further Detail

- Detail covered in published information on ONS website

- Coverage Estimation:

<http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/statistical-methodology/index.html>

- Quality Assurance

<http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/processing-the-information/data-quality-assurance/index.html>

- Independent Review

<http://www.ons.gov.uk/ons/guide-method/census/2011/the-2011-census/the-2011-census-project/independent-assessments/independent-review-of-coverage-assessment--adjustment-and-quality-assurance/index.html>

Estimating the population – the census design

- Today has covered all of the key part of the census design
- It is designed to consistently produce similar high quality estimates for all LAs
- But it also focuses resource on those populations we know are difficult to count, through:
 - Address Register
 - Field resource allocation
 - Follow up operation inc reminder letters
 - Community Liaison
 - LA Liaison
 - CCS sample design
 - QA strategy

Estimating the population – the census design

- All of these are brought together to produce the LA by age sex estimates
 - Inter-related operations and processes
- The QA process evaluates how well all of these things have worked together
- If there is evidence that something has not worked, then we have processes in place to identify this and make adjustments
 - Locally
 - Regionally
 - Nationally

Estimating the Population - Summary

- Aim is to get best LA by age-sex estimates
 - With similar quality across LAs
- No single step in the process will do all the work
- But the combination of steps will deliver the quality required
- The LA total, and the key characteristics within, will be of sufficient quality for resource allocation