



# Introduction to the Scottish Longitudinal Study

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# Scottish Longitudinal Study

- Joint project between National Records of Scotland (NRS) & University of Edinburgh
- Large-scale, anonymised linkage study designed to capture 5.5% of the Scottish population
- Actually contains information on a 5.3% sample
- Based on census data
- Selected using 20 semi-random birthdates
- ~270,000 traced SLS members and ~505,000 household members

SLS-DSU

# SLS Data

- Includes information from:
  - **Census** data (1991, 2001, 2011) – demographic, occupational, health, housing, family, social
  - **Vital events** – births, marriages, deaths, widowhood
  - **Education**: School census since 2007 – school meals, absences, exclusions, SQA attainment
  - **Migration** data
  - **NHS GP postcode history** since 2000
  - **Scottish Mental Survey 1947**
- Can also be linked to other data sources:
  - **NHS health data** with extra permissions – birth records, inpatient, cancer registration, prescription data
  - **Other** external data – deprivation, urban/rural, GIS (distance to hospital/green space), occupation scores, unemployment, house prices

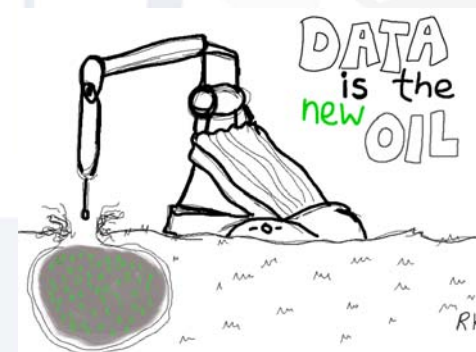


## SLS: data

- SLS is an anonymised individual-level dataset. Name, address and DOB not available to researchers
- Only limited number of staff know 20 DOBs
  - DOB available at month level to researchers
- Sensitive variables are restricted:
  - DOB month, datazone etc
  - Can be used to create derived variables but not reported directly in analyses

# Scottish Longitudinal Study

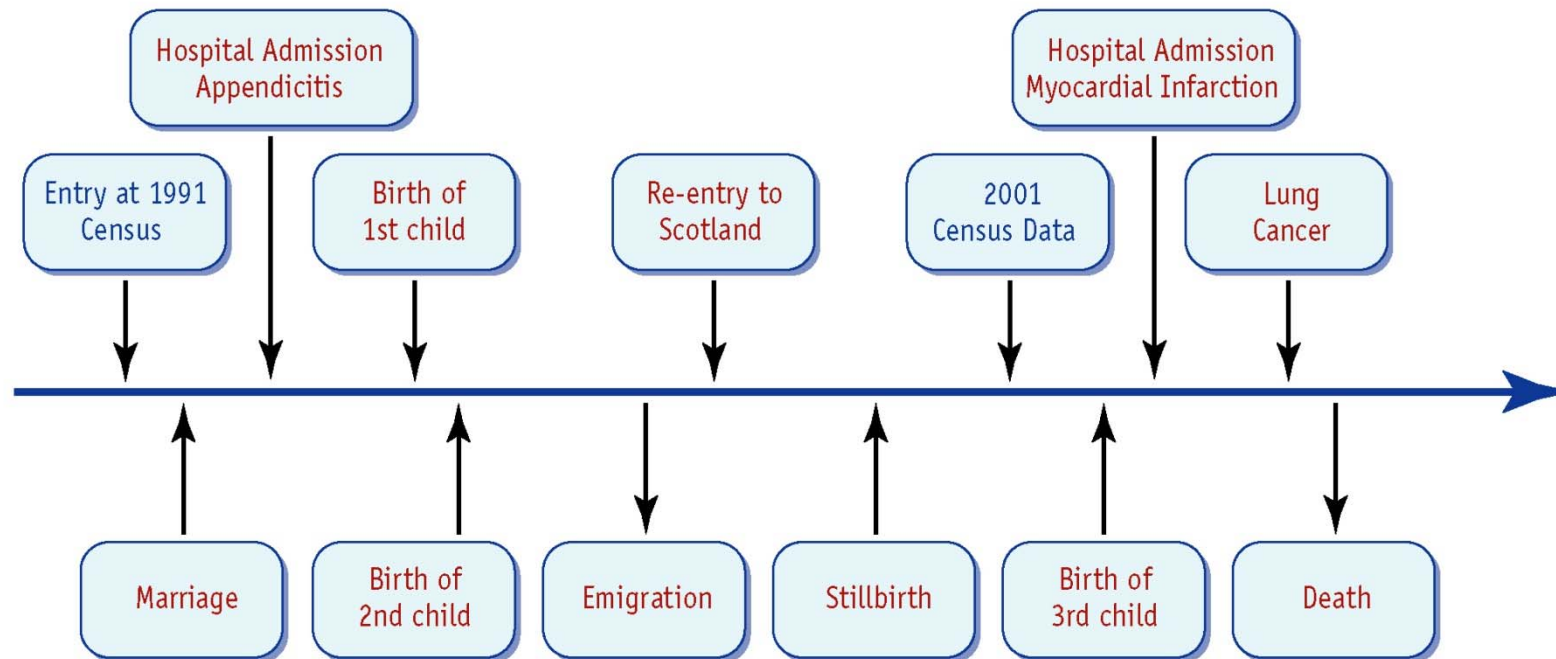
- Excellent longitudinal resource for analysing a range of socio-economic, demographic, migration, social mobility, education and health questions
- Future planned enhancements including linkages to:
  - Justice data
  - Scottish school leavers' destination survey
  - historical birth cohort linkages
- Investigating the possibility of linking to:
  - Educational attainment in private schools
  - Social security data
  - Scottish Diabetes Register
  - Care home data



# Strengths of SLS

- Over 25 years follow up from 1991
- Sister studies England & Wales (ONS LS) & Northern Ireland (NILS)
- Large representative sample – can analyse small groups of interest
- Low attrition rate
- High linkage rates
- Includes many fields of interest
- Longitudinal data helps to look at cause and effect

## Example Event History of a Female SLS Member aged 21 at 1991 Census





# SLS-DSU

- The Scottish Longitudinal Study Development & Support Unit (SLS-DSU) at the University of Edinburgh is responsible for:
  - Data management
  - Maintenance of SLS
  - Generating subsets of data for researchers
- Tracing records and conducting data linkage between censuses and other administrative data is done by a trusted third party (TTP)

SLS-DSU





# Who hosts and manages the SLS?

- Based in Ladywell House, National Records of Scotland (NRS)
- SLS Steering Committee responsible for data protection, confidentiality and security issues
  - includes representatives from the LSCS and data suppliers (NRS, Scottish Government, UK Office of National Statistics, National Health Service)
- SLS Research Board responsible for assessing all research proposals
- Funded by Economic and Social Research Council

# Aims and Scope

- Aims: To support researchers who wish to undertake projects with the SLS data
  - To provide free access to administrative data in controlled, safe environment
  - To provide web-based resources that help make use of the SLS easier
  - To provide training on the SLS and longitudinal data handling, analysis and modelling
- Scope:
  - Research into demographic, health and social questions in Scotland
  - Most users are academic researchers, but open to non-academic researchers for non-commercial use

# Why do we need the SLS?

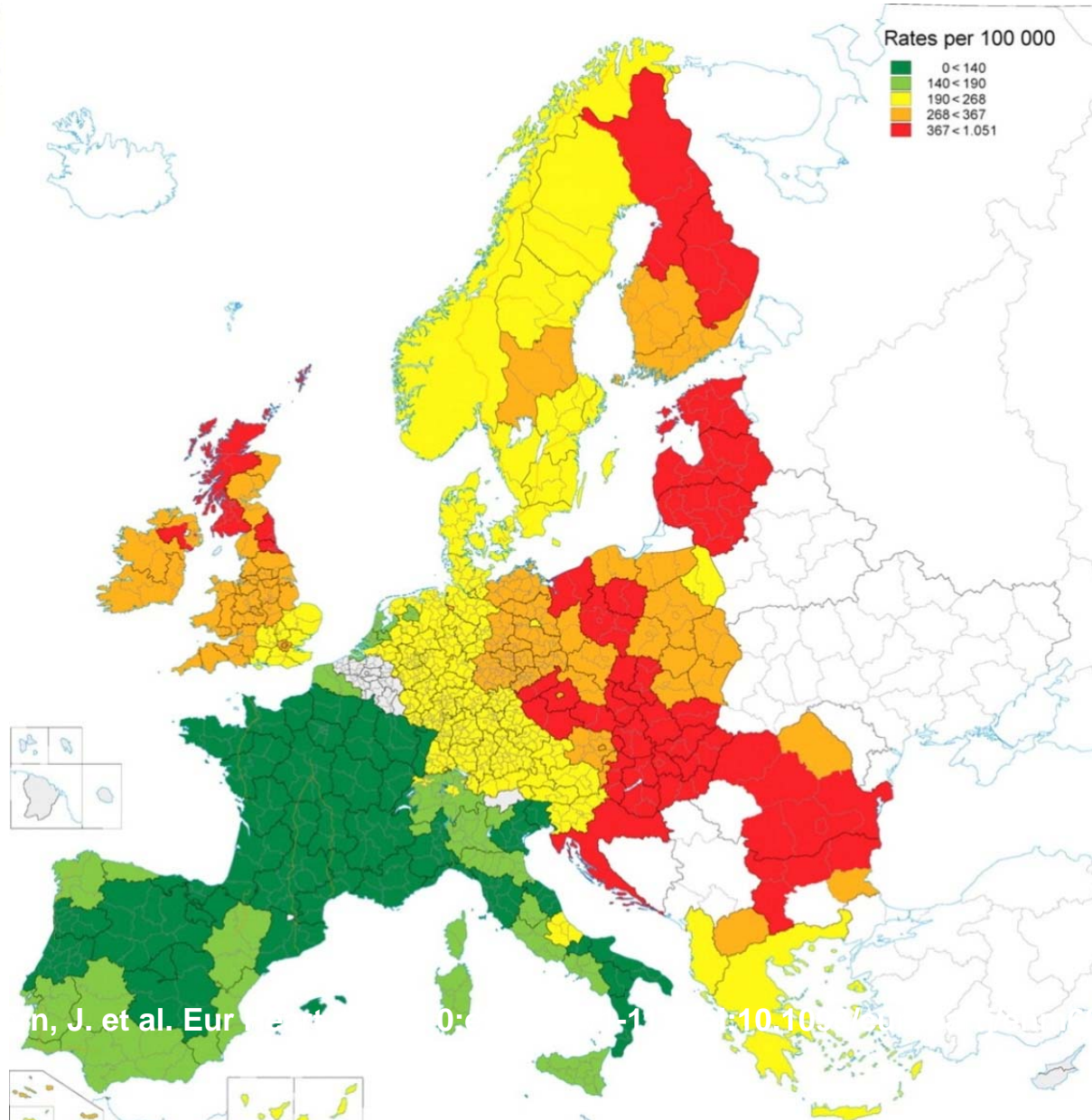
- Relative lack of longitudinal data compared to England
- Overall mortality rates in Scotland are higher than the rest of Britain
- Fertility rates are lower than the rest of Britain
- Population ageing is a significant problem for the future in Scotland
- Specific causes of death such as lung cancer and heart disease rank among the worst in Europe
- Rates of household deprivation are higher than in the rest of Britain

## 1991 Carstairs deprivation variables in Scotland compared to England & Wales



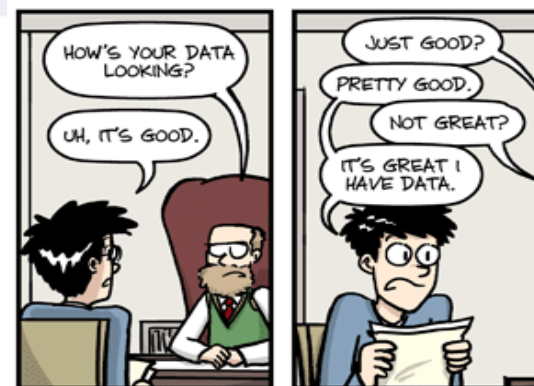
Source: P.Hanlon *et al* 'Why is mortality higher in Scotland than in England & Wales? Decreasing influence of socioeconomic deprivation between 1981 & 2001 supports the existence of a 'Scottish Effect'. JPH, Vol 27, No 2., 2005

## Age-standardized mortality from ischaemic heart disease in European regions (men; age group 45-74 years; year 2000)



# SLS: data access

- Access to data strongly controlled and supervised:
  - No microdata files publicly available
  - Dataset sits on a password-protected stand-alone network
  - All users have to become an Approved Researcher, and complete Safe Researcher Training
- Once project approved, subset of data generated, containing all relevant variables requested in advance
- Analysis conducted either:
  - In person at the safe setting
  - Remote access by providing syntax files



# SLS: data access

- Safe setting – locked room, keypad access
- Safe setting rules:
  - Use of electronic devices (e.g. mobile phone, laptop) forbidden
  - Only notebook provided by SLS to be used. Notebook securely stored in SLS-DSU
- Visitors signed in, escorted by SLS staff in building and have to wear pass at all times

# Outputs



- Preliminary and final results undergo Statistical Disclosure Control (SDC) before being released to researchers
- No outputs containing potentially-disclosive information can be released (e.g. cell counts under 10)
- SDC – 10 days for Intermediate, 20 day timescale for having final output cleared
  - Need to draft conference slides etc well in advance



# Five safes – accessing data



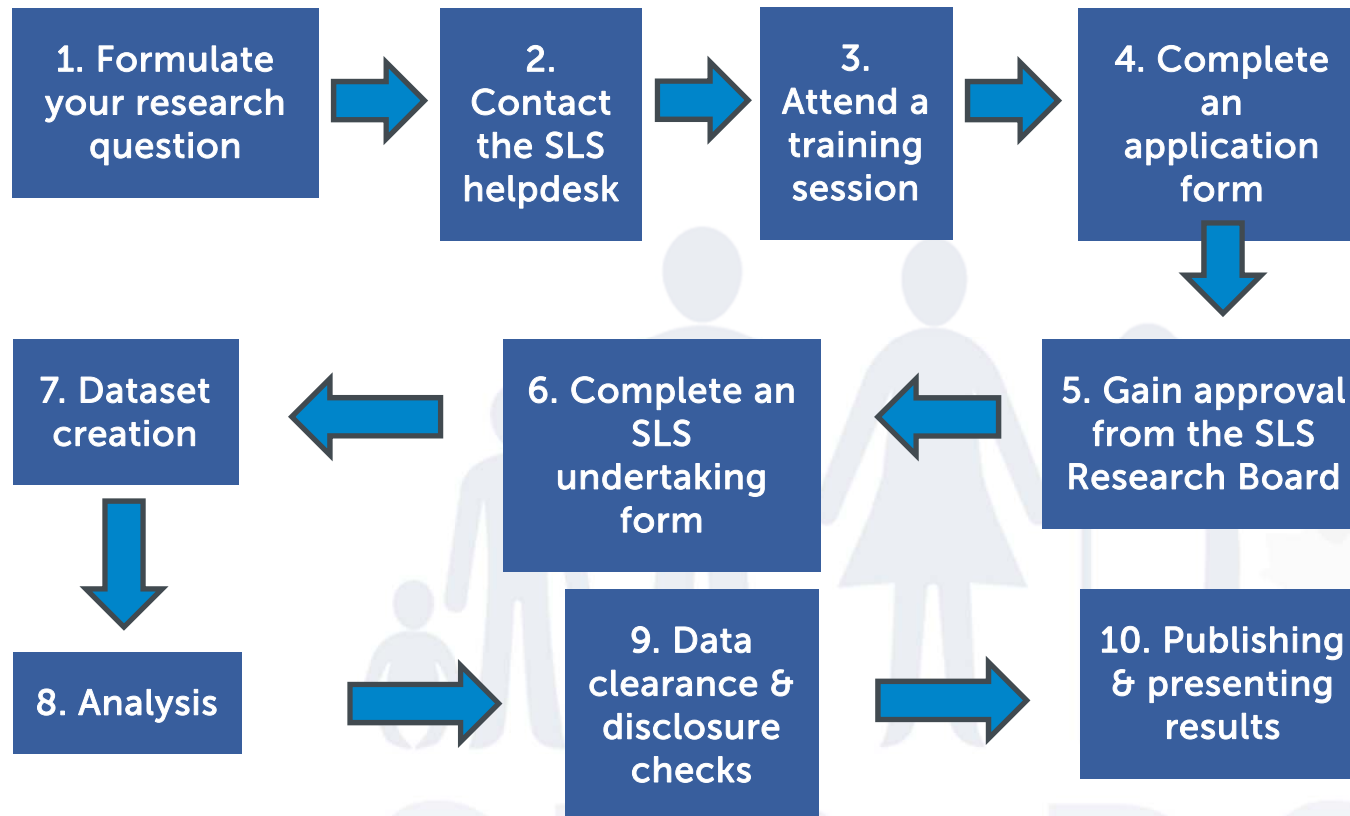
- Safe projects: **Is this an appropriate use of the data?  
Is it legal, ethical?**
- Safe people: **How trustworthy are the researchers?**
- Safe settings: **Does the environment prevent  
misuse?**
- Safe data: **Is the data detail appropriate?**
- Safe outputs: **Is there any confidentiality risk from  
publication?**



# Five safes – accessing data

- Safe projects: SLS Research Board: assess public benefit v privacy risks
- Safe people: training - a system of approving or accrediting researchers who meet the relevant criteria to work within safe havens
- Safe setting: 'safe havens' developed as an environment for research and statistical analysis, in which the risk of identifying individuals is minimized
- Safe data: individual-level data can be analysed as other 'safes' are high
- Safe outputs: Statistical Disclosure Control

## Step-by-step guide to accessing SLS data





# Example SLS Projects

SLS-DSU



# Narrowing the curriculum: Impact of the Scottish Curriculum for Excellence on subject choices and attainment of young people in Scotland

[http://sls.lscs.ac.uk/projects/view/2018\\_005/](http://sls.lscs.ac.uk/projects/view/2018_005/)

**Research team:** Marina Shapira, Mark Priestley; University of Stirling



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# Background

- CfE offers greater flexibility by allowing schools to decide how many subjects they offer to S3/S4 students
  - Previously 8 subjects were the norm
  - Many schools now offer as few as 5 or 6 subjects for the Nat 4/5 exams
- BUT may have unintended consequences:
  - Curricular narrowing
  - Reduction of choice in many schools under the new CfE
  - Disproportionally affecting students from low socio-economic background

Secondary pupils across Scotland are not being offered a fair choice under the SNP following a huge increase in schools restricting the number of subjects that can be studied in fourth year, it has been claimed.

Liz Smith, the Scottish Conservative education spokesman, said the dwindling number of subjects was hitting those who wanted to leave school early the hardest.

In a debate in Holyrood, she added that 57 per cent of schools now offer only six subjects to children in S4, leading to almost 144,000 fewer annual courses being passed. The figure has jumped from 28 per cent in 2013.

MSPs were told the situation was particularly affecting pupils in disadvantaged communities.



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## Scotland's Curriculum for Excellence: the betrayal of a whole generation?



Is the Curriculum for Excellence in Scotland working? If not, can it be changed? **Lindsay Paterson** explains the reasons behind the recent disquiet and writes that although it may be a plausible culprit for the decline in students' performance, the curriculum is so deeply embedded that removing it would cause enormous upheaval. And, since children get only one chance to learn, a whole generation will have been betrayed.

News

## Scottish pupils 'not being offered a fair choice' of subjects under the SNP



## Subject choice reduction a 'scandal' in Scotland's schools

17 May 2018

The dwindling number of subjects school pupils can choose from should trigger a parliamentary inquiry, the Scottish Conservatives have said.

Leader Ruth Davidson described the situation as a "scandal" at First Minister's Questions today, after it emerged the majority of schools only offer six choices to S4 pupils.

In addition, an inequalities gap has also been revealed.

In schools in wealthy parts of the country, children have a 70 per cent of being able to choose between 12 or more Advanced Highers.

However, just two schools in Scotland's most deprived zones have those same opportunities.



# Research questions

- Using data from 2001 and 2011 censuses + education data:
  - What are the trends in the impact of the number and configuration of subject choices, on students' attainment?
  - Does the relationship between the number and configuration of subject choices and attainment during the secondary phase of education vary by family characteristics and school characteristics?





# SLS-DSU

SCOTTISH LONGITUDINAL STUDY  
DEVELOPMENT & SUPPORT UNIT

## Sectarianism in Scotland

[http://sls.lscs.ac.uk/projects/view/2007\\_008/](http://sls.lscs.ac.uk/projects/view/2007_008/)

*Research team:* G Raab, C Holligan



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National  
Records of  
Scotland

SCOTLAND 23 AUGUST 2017

## The legacy of sectarianism is still poisoning the air of Scotland

### SPORT

## Scottish football accused of sweeping sectarianism under carpet



By Chris McLaughlin  
BBC Scotland

14 March 2018 | Scottish

Share



### SPORT

## Neil Lennon: Hibernian boss 'may reconsider position' after coin incident

2 November 2018 | Hibernian

Share



Neil Lennon says he "may reconsider" his position as Hibernian boss after being struck with a coin during Wednesday's goalless Edinburgh derby.

Lennon believes he suffers anti-Catholic "racism" in Scotland and says there was an effigy outside Tynecastle depicting him being hanged.

## HOLYROOD

SCOTLAND'S AWARD-WINNING CURRENT AFFAIRS MAGAZINE

## Sectarianism: still Scotlan

Written by Jenni Davidson on 25 June 2018 in Inside Politics

Is sectarianism still taken less seriously than other forms of bigotry in modern Scotland?



Orange march in Glasgow, 1 July 2017 - Image credit: Jane Barlow/PA Images

In 1896, on the eve of the new millennium, the Catholic composer James MacMillan suggested that "as a nation has to face up to the legacy of our

# Sectarianism – Myth or Social Reality?

- Does sectarianism exist in Scotland? A statistical examination of Catholic and Protestant intermarriage patterns
- Data from 111,627 SLS couples aged 16-64 in 2001 Census
- Proportion of inter-sectarian (Roman Catholic and Protestant) couples has increased steeply for youngest age groups
  - in West of Scotland, make up 25% of all couples
- BUT: Religious inter-marriage not necessarily indicative of demise in sectarianism
- Despite being in inter-marriages members of those couples may nevertheless continue to display sectarian attitudes in other contexts, such as football



# Mortality rates by occupation within the UK

[http://sls.lscs.ac.uk/projects/view/2013\\_015/](http://sls.lscs.ac.uk/projects/view/2013_015/)

*Research team:* V Katikireddi, A Leyland, D Stuckler, M McKee, K Ralston



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## Poorly-paid Scots have worst mortality rates in UK



Construction workers are among the occupational groups with the highest mortality rates. Picture: Getty

## Three-fold difference in mortality rates by occupation

24 October 2017

f Share



THINKSTOCK

A person's occupation can mean a three-fold difference in mortality rates, with the unemployed faring worst, researchers have found.

A Glasgow University study found people who work in factories and in construction have higher death rates than doctors and teachers.

Housekeepers and cleaners were also identified as at risk groups.

**The Herald**

24th October 2017

# Death rate higher among manual professions in Scotland

Headlines generated from SLS research study...

# Where are we now?

- Over 100 projects have used SLS data over the last 10 years, exploring a wide range of issues from birth to death, and examining the impacts of education, environment, and mobility on life outcomes
- Influenced public policy, presented at national conferences, published as papers and reports
- Innovative approaches: synthetic data, eDatashield, synthetic income estimate, residential histories at fine geographic and temporal detail

# Making working with SLS data easier

## Develop ways to work out-with main secure setting:

- Use of synthetic data to test analyses
- Use of empty data shell to develop code
- Safe pods – can use local safe setting

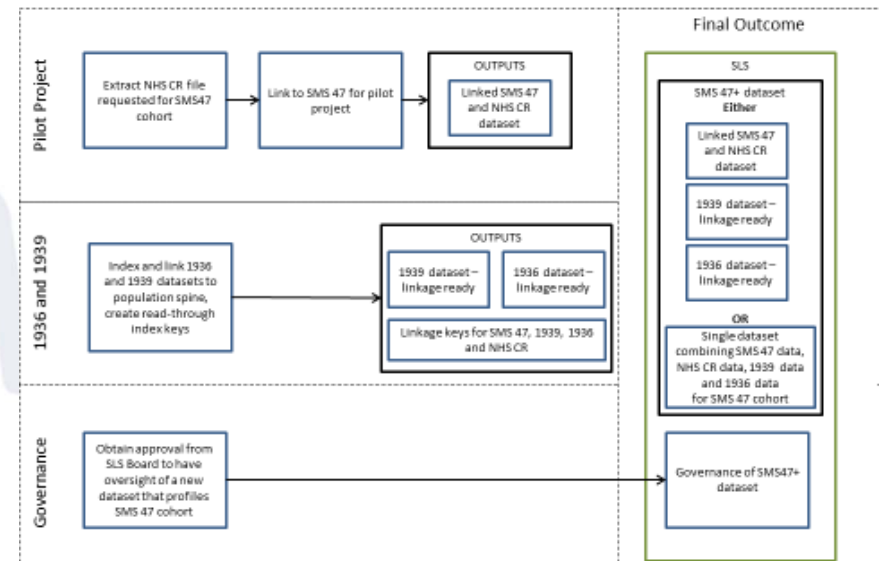
## Preventing release of disclosive data:

- SR training and test
- Induction to safe setting
- Detailed SDC output guidance documents given to all users
  - users better aware of what is allowed to be released – speeds up process

# Current/future dataset Developments

- Digitising Scotland
- SMS1947 dataset: develop standing dataset for Scottish Mental Survey 1947 (1936 birth cohort) –lifetime follow up
- SLS-health dataset: develop standing dataset of linked SLS and health data

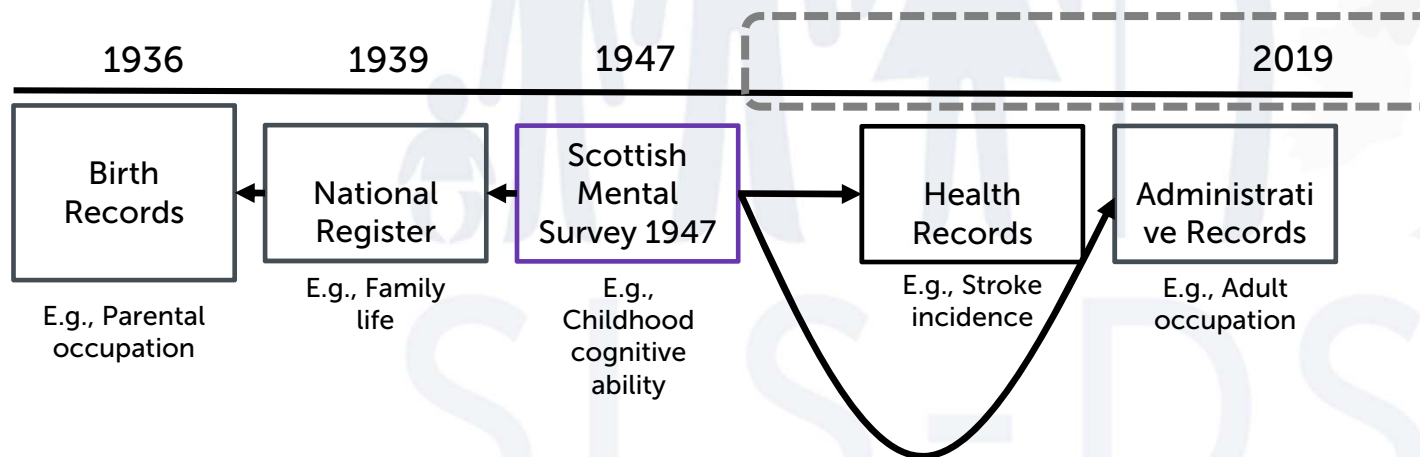
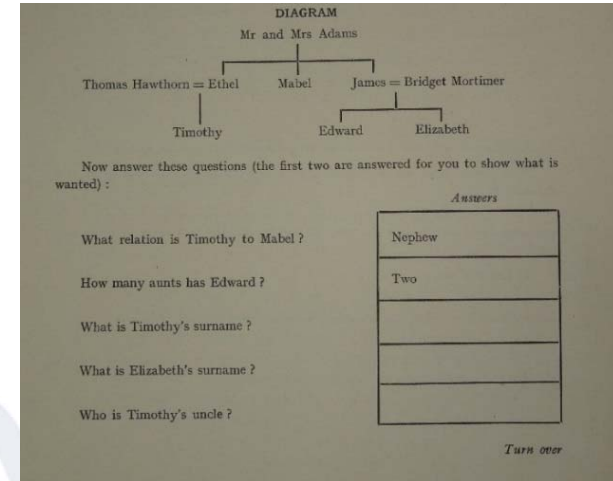
3 strand plan to create a dataset for the SMS47 cohort that can be held for research use





# Scottish Mental Survey 1947

- Cohort born in 1936
- Cognitive ability measured at age 11 in 1947 (n=70,805)
- Test of cognitive ability
  - following directions, same-opposites, word classification, analogies, practical items, reasoning, proverbs, arithmetic, spatial items, mixed sentences, cypher decoding

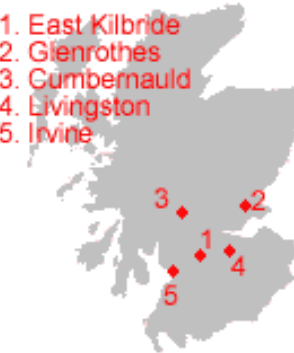


# ‘Migration to Scottish New Towns and the impact on premature mortality in Glasgow: analysis of Scottish Mental Survey 1947 data’

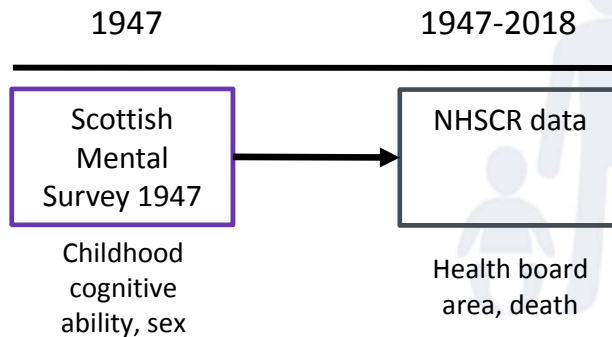
## ● Datasets:

- Scottish Mental Survey 1947 (cognitive ability)
- NHSCR data (health board area, death)

1. East Kilbride
2. Glenrothes
3. Cumbernauld
4. Livingston
5. Irvine



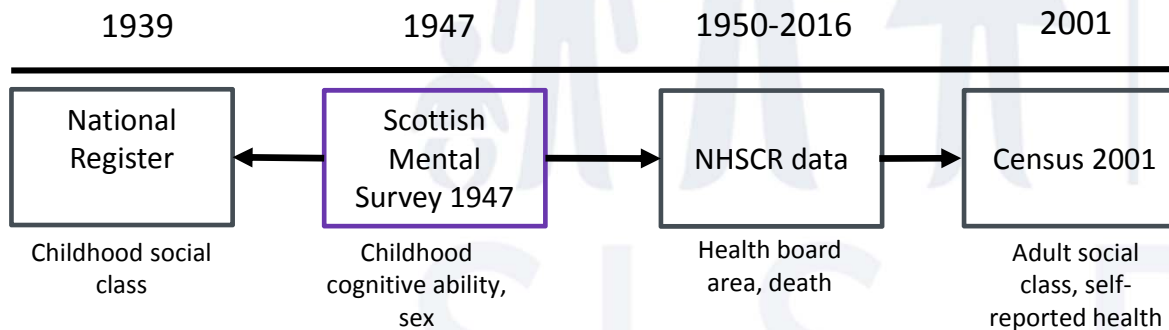
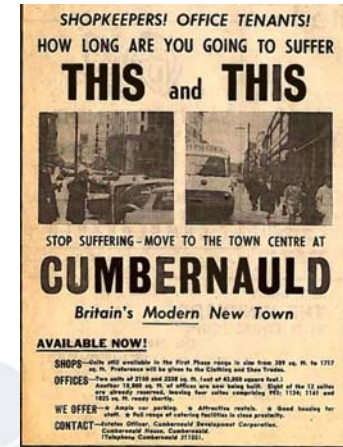
5 New Towns located in the following health board areas: Fife (2), Lanarkshire (1,3), Lothian (4) and Ayrshire (5)



# 'The impact of social mobility and migration to New Towns on health inequalities in Glasgow: analysis of Scottish Mental Survey 1947 data'

## ● Datasets:

- Scottish Mental Survey 1947 (cognitive ability)
- NHSCR data (health board area, death)
- 2001 census (occupation, education, self-reported general health)
- 1939 register (early life social class)



# Further Information

- Visit our website: <http://sls.lscs.ac.uk/>
- How the SLS was created
- What data are held
- Browse the data dictionary
- Existing and previous SLS projects
- Outputs and publications
- How you can apply to use the SLS



# Introduction to the SLS Training Seminar 2019

- **5th June 2019, 0930-1700**
- **Venue: The Institute of Geography (Old Infirmary) 1 Drummond Street Edinburgh EH8 9XP (Lecture Theatre 2.13)**
- Introducing the SLS and the main data sources that are linked, including Census data, Vital Events data (births, deaths, marriages) and Education data
- Examples of the types of studies that could be undertaken using the SLS
- Detailed information about how to access the SLS
- An overview of the possibilities to link the SLS to NHS health data (cancer registry and hospital admission data, etc)
- An introduction to the online Data Dictionary and a hands-on computer lab in SPSS
- The new SLS Birth Cohort of 1936 (SLSBC1936) and SLS future developments



# Introduction to Survival Analysis Training Course 2019

- **6th June 2019 - 9.45am**
- **Venue: The Institute of Geography (Old Infirmary), 1 Drummond Street, Edinburgh EH8 9XP (Computer Lab 1.26)**
- This is a one-day workshop on survival analysis for time to event data suitable for those with experience of statistical analyses but new to this type of analysis. This workshop will introduce methods to display and model time to event data, including Kaplan-Meier plots and Cox proportional hazards regression. The survival analysis theory will be complimented with hands-on practical sessions using either SPSS or Stata (R if sufficient interest is indicated) on training datasets. Presentations of real projects will also be given to demonstrate research potential.
- **Course programme:**
  - Features of survival data including censoring and truncation
  - Plotting survival data
  - Log-rank tests
  - Hazard rates
  - Cox proportional hazard models



# Acknowledgements:

“The help provided by staff of the Longitudinal Studies Centre – Scotland (LSCS) is acknowledged. The authors alone are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen’s Printer for Scotland.”

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