



Guide on use of population data for health intelligence in Wales

Key messages

- Population figures are not exact, but an approximation and can differ according to source and method
- Populations vary continuously through births, deaths and migration known as population change
- Different sources of population data are used for different purposes
- Population data are used to inform decision making for funding, representation and resourcing.

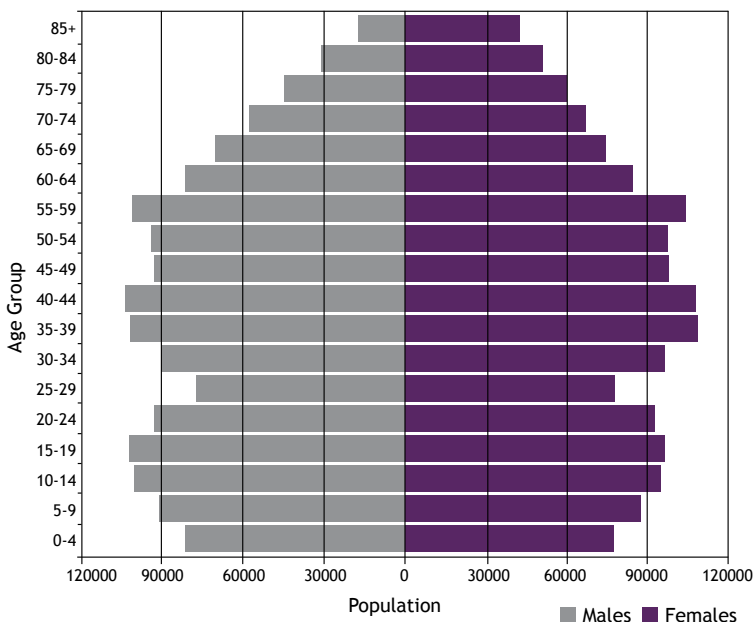
- The choice between using registered or resident populations
- The difference between estimates of current population and projections of population change.

1.1 Wales population structure

The population figures for Wales can be broken down into five year age bands and into male and female population as shown in Fig.1 below.

Fig. 1 Wales population structure

Source: ONS MYE 2004



1. Introduction

Counting the number of people in a location is not an easy task. Populations vary continuously through births, deaths and migration, usually described as population change. Population movement, registration and non-registration with official sources and the way that bureaucracies are organised and record information all mean that there are many different ways to count or estimate the number of people in an area. The size and age of populations matter as they are used to inform decision making for funding, representation and resourcing. Population data are used as the basis to calculate or compare rates, ratios and percentages between groups of people or geographical areas.

The purpose of this paper is to examine:

- The importance of population structure and population change
- The strengths and weaknesses of different population data



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1.2 Geographies and administrative areas in Wales

Population data are available at various geographical levels, both administrative and, more recently, statistical. Table 1 shows a summary of the available geographies of Wales.

1.2.1 Administrative geography

There are 881 electoral divisions (formerly known as wards) in Wales. Electoral divisions (EDivs) are the small areas represented by local councillors. The Boundary Commission for Wales makes changes to EDiv geography to maintain democratic representation. As electoral divisions are constantly changing, data are usually presented for particular 'frozen' geographies. At present, most EDiv data are presented using the Census 2001 EDiv geography. Some of the more detailed Census data, however, are presented at a slightly different geography (868 EDivs) due to the need to suppress data for 13 of the smallest EDivs and combine their data with a neighbouring EDiv.

EDivs nest into the 22 unitary authorities which were formed in 1996. Welsh unitary authorities are coterminous with local health boards which are similar to Primary Care Trusts (PCTs) in England.

1.2.2 Statistical geography

A recent development by the Office for National Statistics (ONS) has been the creation of a set of statistical geographies called Super Output Areas (SOAs). The building blocks for these are output areas which are the base units for the collection and reporting of 2001 Census data. There are just under 10,000 output areas in Wales. There are three levels of Super Output Areas: lower, middle and upper, forming a nested hierarchy. SOAs also nest into the 22 unitary authorities.

There were two drivers behind the creation of this new statistical geography:

- The existing small area geography, consisting of EDivs, is unstable due to changes made by the boundary commission. This makes comparison over time difficult and sometimes impossible.
- The population of EDivs varies greatly making the comparison of data between areas potentially misleading.

Therefore two principles have informed the development of SOAs:

- Stability: the ONS have stated that the geography will be fixed for the next 10 years
- Homogeneity in terms of population size with fixed minimums.

Table 1: Summary of the administrative and statistical geography of Wales

Geography	Number of units	Mean population †	Population range †
Wales	1	NA	NA
Unitary authorities / Local Health Boards	22	132,300	56,200 to 310,100
Electoral divisions (none combined)	881 (868)	3,300	500 to 16,800
Upper super output area	Not yet determined		Minimum of 25,000
Middle super output area	413	7,000	5,000 to 11,200
Lower super output area	1896	1,500	1,000 to 3,500
Output area (Census 2001)	9769	300	100 to 2,500

† 2001 Census data rounded to the nearest 100 persons

2. Types of population data for Wales

2.1 Census

A Census is a survey of all people and households in the country¹. For England and Wales the Census is planned and carried out every 10 years by the ONS. The last Census was carried out in April 2001.

Undercounting has been a problem with the 1991 Census. To avoid this in the 2001 Census, a new methodology was employed (One Number Census) which combined the results of the Census 2001 and a follow-up survey of a sample (Census Coverage survey)².

Census population data are available for all administrative and statistical geographies (see Table 1).

2.2 Population estimates

The ONS produces annual estimates of the resident population of Wales as at 30 June for the years between censuses at national and unitary authority level³. These mid-year estimates (MYE) are published around 14 months after the reference dates and the most recent estimates are available for mid-2005.

The starting point for the estimate is the previous mid-year resident population figure and the population change is taken into account by adding births and removing deaths occurred during the year and allowing for migration to and from the area³. Adjustments are also made for special population groups not captured by migration estimates such as the armed forces³.

These data are made available to all via the ONS website by five year age bands and sex, rounded to the nearest 100 persons at UA level. Data are also available by single year of age and sex for Welsh UAs on the National Assembly for Wales website.

Recently, the ONS have produced population estimates for small areas. Currently data are available for 2001 and 2002 for EDIVs and 2001 to 2003 for LSOAs and MSOAs. At present these data are labelled 'experimental' because they are still undergoing evaluation.

2.3 NHS Administrative Register (NHSAR)

The NHSAR is a real-time database administered by Health Solutions Wales (HSW) and contains the details of every person registered with a Welsh GP Practice. Every June a frozen file is created containing the population of every electoral division in Wales broken down into five year age bands and by sex. Data are available upon request to NHS staff for all administrative and statistical geographies, but not to the public. An NHSAR extract constrained to ONS Mid-2004 estimates is publicly available on the NHS (England) Information Centre website⁸.

2.4 National Community Child Health Database (NCCHD)

The NCCHD is held by HSW and consists of anonymised records for all children born after 1987 and resident or treated in Wales. The data source for NCCHD is the Community Child Health system (CCH2000). These data are held by NHS Trusts who use them to administer child immunisation and health surveillance programmes⁶. As children get older they usually have less contact with the NHS and records tend to become less accurate and complete.

2.5 Population projections

The Government Actuary's Department (GAD) produces national population projections for the UK and its constituent countries³. The projections by age and sex are normally produced every second year. The latest projections are based on 2004 data and the responsibility for the calculation of future projections has been transferred to the ONS.

The principal population projection by GAD is based on assumptions from analysis of recent demographic trends and may not reflect reality⁴. High and low variants are prepared for each of the three components of population change: fertility, life expectancy and net migration⁴.

3. Appropriate uses of population data

3.1 Census

The Census population data are the most comprehensive and robust source of population data for Wales. Uses include any census data analysis so that the numerator and denominator are of the same time period and geography. As the census is still relatively recent, these

data can be used as denominators for small area analysis, for example in the calculation of mortality rates. However, the latest advice from the ONS is that the new small area population estimates are more accurate (see section 3.2).

Strengths of the Census:	Weaknesses of the Census:
Official and robust data	Only available every ten years and most useful in the early years after the Census
Available at all geographies - statistical and administrative	Data appear to be incomplete for some areas, notably those with transient populations and high proportions of households with multiple occupations. This problem affected parts of Cardiff. The ONS has since revised its population estimates to account for this, however, it was not possible to revise the original Census data. Not all Census data are available for statistical geographies.
Additional age bands	Suppression of data and random small cell adjustment limit the utility of some data at sub unitary authority level.

3.2 Population estimates

3.2.1 National and unitary authority level

Mid-year population estimates currently have a wide variety of uses within central government, as well as being used by local authorities, public and health related bodies, commercial companies and individuals in the private and academic sector. These uses can be categorised into two broad groups:

- Those where the absolute numbers are of key importance. This may be in terms of allocating financial resources from central government, planning services or grossing up survey results.

Some of the main central government uses are concerned with resource allocation. These are carried out by the Office of the Deputy Prime Minister, and by the Welsh Assembly Government.

- Those where the population figures are used as denominators in the calculation of rates and ratios, for example hospital utilisation, mortality, births and cancer incidence statistics.

Strengths of population estimates:	Weaknesses of population estimates:
Available every year	They are estimates, not a count of the current population
The official source of population estimates calculated by the ONS who have considerable resource and expertise in this field	The migration component of population change is sourced from survey data
	There is a 14 month delay in the release of the data (for example data for 30 June 2006 will be published in August 2007)
	Problems with Census 2001 data on which the estimates are based have required a series of revisions to be made

3.2.2 Small area population estimates

The ONS intend to produce annual estimates for lower and middle SOAs by five year age band and sex. As stated in section 2.2, these data are currently undergoing evaluation. The latest advice from the ONS is that the data are fit for use in rate calculation at EDiv, LSOA and MSOA level. Furthermore, ONS have advised that the estimates are an improvement on

Census data since they include adjustments made to counter problems of undercounting and missing data. This applies in particular to the Isle of Anglesey and Cardiff. In addition to the strengths and weaknesses listed for the national and unitary authority level estimates, the following apply to the small area estimates:

Strengths of small area population estimates:	Weaknesses of small area population estimates:
Nationally consistent across England and Wales	No benchmark or gold-standard exists with which to compare the estimates
	Difficulties associated with the production of national and unitary authority estimates are magnified at small area level

3.3 Projections

These data are used to try and estimate future need. This is particularly important at present due to the necessity to plan for increased need associated with the projected rise in the elderly population.

Data at sub national level for the four Welsh Assembly Government regions are available, and the Welsh Assembly Government plan to develop sub national population projections for release in late 2007.

Strengths of projections:	Weaknesses of projections:
Indication of future population trend	Based on assumptions on fertility and migration and may not reflect reality
	Data only currently available for Welsh Assembly Government regions

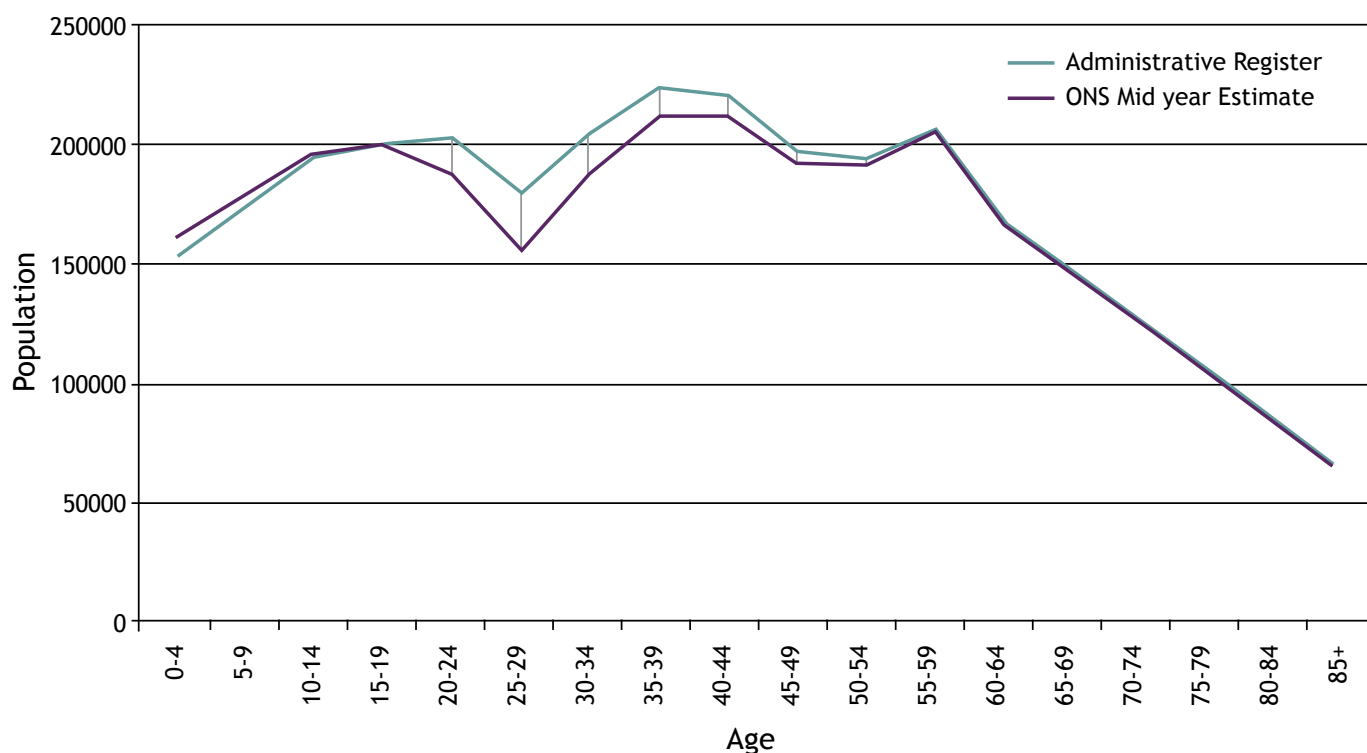
3.4 NHS Administrative Register

The NHSAR is a computer system which holds details about people, places and organisations relevant to the NHS and is used to increase data consistency and accuracy. The NHSAR is seen as a key tool for commissioning authorities in defining their population for health needs purposes. Health Service organisations across Wales use the NHSAR to trace current and historic data relating to addresses, GP registrations, and NHS numbers where appropriate. Since the NHSAR contains the details of all persons registered with a GP in Wales it can be used as an

alternative source of population estimates, but since the data are not official estimates it is recommended that ONS data be the first choice. NHSAR population data are required for all rate calculation using primary care data where the reporting unit is the GP practice (or groups of GP practices) rather than the place of residence. The availability of primary care data is increasing with the advent of the new Quality and Outcomes Framework (QOF⁷) and work is underway to plan the development of a new primary care morbidity database.

Strengths of NHSAR:	Weaknesses of NHSAR:
GP practice-based analysis possible	Likely to overestimate the population, particularly in students. Overall, NHSAR figures at unitary authority level tend to be higher than ONS estimates (see Fig.2)
Data also available at all administrative and statistical geographies	Underestimates the <1 population due to a lag in the registration of babies.

Fig.2 Comparison between NHSAR and ONS MYE 2004



3.5 National Community Child Health Database (NCCHD)

Completeness and data quality of the items held on NCCHD vary depending on the extent to which Trusts use the items for administrative purposes. Releases using NCCHD are usually classed as “experimental statistics”.

Data tend to be of higher quality and completeness for younger children age 0-2 years. Hence these data are of use in validating other sources for this age group.

4. Table overview of population data sources for Wales

4.1 WAG

Area	Source type	Year/frequency	Age/sex	Further details
Wales	Census enumerated	1871, 1901, 1931, 1961, 1971, 1981, 1991, 2001	Quinary* M, F, P	http://www.statswales.wales.gov.uk/ReportFolders/ReportFolders.aspx
Wales, LHB	Mid year estimate (MYE)	1981 - 2005 (annual)	Single year M, F, P	As above
Four WAG regions	Projections 2003-based	2003 - 2028	Quinary* M, F, P	As above
Wales	Projections 2004-based	2004 - 2029	Quinary* M, F, P	As above

* Quinary describes five year age-bands

4.2 ONS

Area	Source type	Year/frequency	Age/sex	Further details
Wales, Ward	Census	2001 (every 10 years)	Single year or 0-4, 5-7, 8-9, 10-14, 15, 16-17, 18-19, then quinary*, M,F,P	ONS website: http://www.statistics.gov.uk/census2001/product_ks_las.asp
Wales, LHB	Mid year estimate (MYE)	Mid-2005	<1, 1-4, then quinary*, M, F, P	http://www.statistics.gov.uk/statbase/explorer.asp?CTG=3&SL=&E=4819#4819 (Mid-2005)
Ward	(experimental statistics)	Mid-2001 and mid-2002	Quinary*	http://www.statistics.gov.uk
LSOA	Lower super output area estimate (experimental statistics)	2001, 2002, 2003	Broad age groups - Persons: 0-15, 16-29, 30-44, 45-64 Males, 45-59 Females, 65+ Males, 60+ Females	ONS website http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14357
MSOA	Middle super output area estimate (experimental statistics)	2001, 2002, 2003	Quinary*, M,F,P	As above

* Quinary describes five year age-bands

4.3 Government Actuary's Department (GAD) - future projections by ONS

Area	Source type	Year/frequency	Age/sex	Further details
Wales	Population projections based on 2004 MYE	2004-2029	Quinary, persons	http://www.gad.gov.uk/Population/index.asp?v=Principal&y=2004&subYear=Continue

4.4 Department of Health

Area	Source type	Year/ frequency	Age/sex	Further details
LHB	Extract from Family Health Service (FHS) registers - GP Membership Populations	April 2003	Under 1, quinary, M, F	http://www.dh.gov.uk/assetRoot/04/11/36/62/04113662.xls

4.5 Health Solutions Wales

Area	Source type	Year/ frequency	Age/sex	Further details
All geographies	NHSAR	Continuous, extracts on request for NHS staff	Quinary, M, F	Health Solutions Wales (http://www.wales.nhs.uk/sites3/page.cfm?orgid=166&pid=4267)
All geographies	NHSAR 2004 (constrained to MYE 2004)	2004, publicly available	Quinary, M, F	The Information Centre for health and social care, http://www.ic.nhs.uk/pubs/gpregpopulations2005
All geographies	National Community Child Health Database (NCCHD)	Continuous, extracts on request for NHS staff		Health Solutions Wales (http://howis.wales.nhs.uk/microsite/home.cfm?ORGID=472)

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