SOUTH EAST WALES STRATEGIC PLANNING GROUP (SEWSPG)
REVIEW OF THE WELSH ASSEMBLY GOVERNMENT LOCAL AUTHORITY POPULATION
AND HOUSEHOLD PROJECTIONS (2006 BASED)

Purpose of the paper

To report on the Welsh Assembly Governments local authority population and household projections (2006 based) and to discuss the sub-regional implications.

1.   Limitations of Trend Based Projections

1.1   Projections are only an indication of what may happen if the trend used in the assumptions materialises. Trend based projections do not make allowances for the effects of local or central government policies or socio-economic factors on household formation rates or future population levels. As the process of demographic change is cumulative, projections become increasingly uncertain the further ahead they predict.

Rationale of the 2003 – 2006 Projections

2.   2003-based National and Sub-National Population Projections for Wales

2.1   The Office for National Statistics (ONS) was commissioned by the Welsh Assembly Government (WAG) to produce the 2003-based sub-national population projections for the 22 local authority (LA) areas in Wales using the same model as the equivalent sub-national projections for England.

2.2   The UK projections traditionally used a "top down" approach – the total population for a region and disseminated it to regional areas. These projections were essentially derived by applying patterns of mortality, fertility and migration by areas averaged over the previous 5 years (to mid-2003) to the figures for Wales resulting from the trend based assumptions made in the 2003 based Government Actuary's Department (GAD) National Projections.

2.3   The 2003-based national and sub-national population projections used a "top-down" approach, the methodology essentially breaking down the main data into compositional sub-data sets. This meant that for each year projected forward, the local fertility and mortality rates were scaled, so that the national rates and the projected number of births and deaths were consistent with the national projections. The overall projections were also scaled to the national projections. Models using this methodology are commonly referred to as "black boxes". Chelmer, a well respected modelling programme, is an illustration of the type of software that uses the "top down" methodology (see appendices for further details).

2.4   WAG carried out consultations with local authorities and their policy colleagues regarding the results of the sub-national population projections and a decision was taken to publish the projections at a regional level, as it became apparent that the model did not produce consistently meaningful projections at local authority level. This is primarily due to their inherent demographic characteristics, wide variations in population size and migration trends in some areas. Those local factors may not necessarily have been reflected in all areas using the "top-down" approach.

3.   2003-based Household Projections

3.1   In conjunction with the sub-national population projections the Office of National Statistics produced the 2003-based household projections. Household projections are produced by applying projected household rates to a projection of the private household population disaggregated by age, sex and marital cohabitation status.

3.2   As per the population projections, separate household projections are made independently for each area, which gives rise to inconsistencies, in the sense that the projected number of households in a given area is not normally equal to the sum of the household projections for its constituent sub areas.   ONS required a regional controlling procedure to adjust the household projections so consistency was achieved. To accomplish this, the "top down" approach was used and separate projections were produced for England and Wales to regional levels.

4.   Regional Household Apportionment

4.1   National planning guidance requires local authorities within each region to work collaboratively and with relevant stakeholders to either apportion the Assembly's projections or agree their own regional projections. Accordingly, SEWSPG previously apportioned the 2003 based household projections which indicated that the number of households in South East Wales would increase by 18.6% (108 900) over the period 2003 to 2021.

4.2   It should be noted that the regional apportionment process reflected the capacity assessments and policy aspirations of each local authority. For example, those local authorities that had previously experienced population and household decline sought to reverse the trend. Conversely, those that had gained population wanted to control the rate of future growth in line with the Wales Spatial Plan to give a better balance of development and avoid overheating in the coastal zone. Following a stakeholder seminar in January 2007, the regional apportionment figures were agreed by SEWSPG as a working hypothesis and subsequently endorsed by individual local authorities.

5.   Local Authority Population Projections (2006-based)

5.1   It was already the local authority's responsibility as part of the LDP process and for other policy matters to produce their own population projections. They were normally based on a combination of recent trends, assumptions about the effects of local and national policies and the local authority's aims and objectives. As the local factors varied, the resulting projections did not aggregate to the all-Wales projection.

5.2   During WAG's consultations with local authorities and their policy colleagues the desirability and practicalities of establishing a new model for projecting at local authority level (which would be purely trend-based) was discussed.   In close collaboration with local authorities and key users in Wales, it was agreed that WAG would produce the first local authority trend-based projections, which were published on 30th June 2008. Consequently the Wales sub-national population working group (WASPP) was formed and the "bottom up" approach was agreed as the methodology for the local authority population projections.

5.3   The "bottom up" methodology means using local data and local trends, but not forcing the local authority projections to sum to the national Wales level total projection. In effect, such a model would simply aim to reflect recent local trends – irrespective of what had influenced them – as an indication of how local populations would develop in the absence of any new factors or policies, at a national or local level. The use of ONS data to produce the 5-year local trend assumptions projects each LA's data for fertility, mortality, and migration for the projection period. Under the new methodology, the WAG does not force the local authority projections to sum to the national level population projections.

5.4   Essentially during this process WAG made some key decisions on consistency of the data and recognised that data should be calculated as follows:
        • Mid-Year to Mid-Year
        • To deal with data volatility a 5-year average for Age Specific rates and those rates adjusted to local authority levels for 2005-2006,
        • Differentials calculated from the Wales national population projections.

5.5   Models using the "bottom up" methodology are often quite flexible and "Popgroup" (see appendices for further details) used by WAG is just one piece of software that can use this approach.

5.6   The 2006 mid-year estimates of population were used as the basis for the 2006-based local authority projections. The population estimates (and thus the projections) are based on the usually resident population. Usual residents away from home temporarily are included, but visitors are excluded. Students are counted at their term-time address. Assumptions for fertility, mortality and migration were based on local trends in the five most recent years (mid-year to mid-year). Further details of the assumptions can be found in the appendices, and full details of the methodology can be found on the WAG's website via the following link: - http://wales.gov.uk/topics/statistics/headlines/pop2009/hdw20090324/?lang=en

        The data used for the fertility, mortality and migration assumptions, together with data on special populations, have been made available upon request to local authorities in Wales.

6.   2006-based Household Projections

6.1   Subsequently, the WAG published the first local authority household projections on 11th June 2009. Household projections are not forecasts of dwellings or houses; instead they provide an indication of the future number of households based on trends and assumptions about future population growth, household composition and size.

6.2   Again, these projections were developed in close collaboration with local authorities and key stakeholders in Wales. As a result, the Wales sub-national household projection working group (WASHP) was formed and following regular technical discussions developed the new "Membership" approach, which was agreed as the methodology for the local authority household projections.

6.3   The 2006-based population projections were used as the base for the household projections; as a result they are dependent to some extent on the core assumptions

about future fertility, mortality and migration which are part of those population projections.

6.4 A broad overview of the methodology WAG used to calculate the household projections were:

- Using population projections to calculate the projected number of people living in private households;
- Using historical data to calculate projected household membership rates;
- Multiplying the projected number of people living in private households by the projected household membership rates;
- Dividing the results out by household size and aggregating by age, gender and household type to give the projected total number of households.

6.5 The software used for these projections was "Housegroup Wales". This software is part of the same family of software as "Popgroup" and was developed by the Centre for Census & Survey Research (CCSR) at Manchester University for WAG using the "Membership" methodology.

6.6 WAG has made copies of the "Housegroup Wales" model available on request to LAs together with their assumptions data for the membership rates and number of people living in communal establishments. It is understood that full details of the methodology will be published by WAG later this year.

7. Conclusions

7.1 The 2006-based local authority projections are considered to be a positive step forward, not only in terms of projections but also in the availability of information at a local level. However, the production of the individual local authority projections does now raise the subject of the requirement by SEWSPG to apportion the household projections.

7.2 WAG projections state "*they do not make allowances for the effects of change*" and "*projections become increasingly uncertain the further they are carried forward*". Consequently all those that use the projections, should recognise that they are trend based assumptions which have limitations and they are only an indication of what may happen should the trends materialise. This issue can be demonstrated by the proposals by ONS to revise the 2002-2008 MYEs on 27th May 2010. These revisions are due to the introduction of improved methodology for migration, including the use of new data sets such as Higher Education data. Therefore the WAG projections will only be a reflection of information available at the time they are prepared. WAG does not intend to revise its 2006-based population projections, but its 2008-based population projections will be based upon the revised data due for publication by ONS in May 2010.

7.3 An illustration would be the comparison between the 2008 MYE and the 2006-based projected population for 2008 (see appendices); which illustrates that some local authorities are under estimated and others over estimated e.g. Cardiff has the largest under estimation and Rhondda Cynon Taf has the highest over estimation. Currently the percentages are insignificant (e.g. Cardiff and RCT less than 1%). However, if the projections were not re-evaluated before the end of the projection period and if the

differences between the MYE and the projections for 2007/8 were to continue, then the shortfall and over estimation could be considerable.

7.4   It should be noted that the 2006-based local authority projections are a starting point for local authorities to produce their own projections. The onus is therefore on each local authority to demonstrate that they have considered these in a policy context and clearly justify any departure from these, prior to the LDP Examination. For instance the WAG projections may indicate that some local authorities experienced exceptionally high growth over the 5 year period used for the projections (2001/2 – 2005/6) and therefore in some circumstances this period may be too short for credible projections.

8.   Recommendations

It is recommended that:

1.   SEWSPG should monitor each individual local authority's figures in their LDPs in order to examine the wider regional implications.
2.   SEWSPG endorse the "bottom up" (local data) methodology used by WAG in calculating the 2006-based projections.
3.   SEWSPG recognise that the projections are only trend based and may only materialise if the trend-base assumptions remain valid.
4.   SEWSPG should ask WAG to extend the 5 year trend assumption period to a 10 year trend at the same time as data becomes available therefore incorporating demographic changes in recent trends.
5.   SEWSPG should ask WAG to set up "local authority" and "other users" feedback sessions on the 2006-based projections before undertaking the 2008-based projections.

Appendices

Chelmer

Popgroup, Housegroup and Housegroup Wales.

Underlying Assumptions behind the 2006-based local authority population projections.

MYE – Comparison

1.   **Chelmer**

1.1   Chelmer is a long established five year demographic population and household forecasting model, which is now maintained by Cambridge Econometrics. Chelmer uses ONS and GAD national data for fertility, mortality, household formation, vacancy and sharing rates together with MYE and components of change (births, deaths, natural change and migration).

1.2   Chelmer routinely produces reports and spreadsheets on standard projections, demographic population, households by gender and composite participation. It should be noted that these can be saved as text files or Excel spreadsheets.

1.3   Although it is possible to revise the base data, it is a complex process requiring any changes to be converted to binary format before importing them into Chelmer. However, "black box" models make it easier to manipulate data by means of a "What if" procedure, although it may not be detailed enough to realistically validate the model.

2.   **Popgroup, Housegroup and Housegroup Wales**

2.1   Both Popgroup and Housegroup Wales are maintained by the Centre for Census & Survey Research (CCSR) at Manchester University and are new forecasting models to Wales. Unlike Chelmer, the Popgroup/Housegroup software is Excel based and is flexible. Popgroup is designed to use mid-year to mid-year (i.e. 1st July to 30th June) data contained within various input files to forecast; these files contain data on

- Population base - Mid Year Estimate (MYE).
- Fertility – ONS/GAD and/or Locally calculated Standard Age Specific Fertility Rates (ASFRs), Births by Age, Totals and Trends or differentials.
- Mortality - ONS/GAD and/or Locally calculated Standard Age Specific Mortality Rates (ASMRs),Standard or Local Rates, Deaths by Age, Totals and Trends or differentials and
- Migration (In and Out, Internal and Overseas) – Standard or Local Rates, Age Specific Migration Rates (ASMigRs) Migrants by Age, Totals, Trends, Differentials and Standardised Migration Rates.

WAG has also shared, upon request, copies of the base data and assumptions data used in the production of the 2006-based population projections.

2.2   Popgroup users must setup the input files by importing the rates from ONS/GAD and if available any locally calculated rates. Once each file has been validated, Popgroup produces a Graph of the rate e.g. Fertility. Following setting up the input files, different scenarios can be run; Popgroup will create standard spreadsheets for the - Forecast Summary, Components of Change, Age Breakdown and a Report Generator spreadsheet where you can produce standard reports and graphs by age, gender, years and population groups.

2.3   Housegroup is part of the CCSR forecasting software family and uses the "headship" methodology. Housegroup Wales was created by CCSR for the WAG projections and

both can use the outputs from Popgroup. Housegroup Wales provided WAG a means to estimating the number and types of households using the WAG population projections and the new membership methodology.

3.   Underlying Assumptions behind the 2006-based local authority population projections.

3.1   Fertility – WAG produced Age Specific Fertility Rates (ASFRs) for each local authority by analysing ASFR trends for the most recent 5 years. WAG also obtained historic births data from ONS by age of mother for each local authority.

3.1.1   Age Specific Fertility Rates (ASFRs) were calculated for each local authority from females aged 15 to 49 by single year of age by "*dividing the number of live births to females aged x by the total number of females aged x and multiplying by 1,000".*

3.1.2   Local authority fertility rate assumptions were calculated and aligned to –
- 2005/06 birth levels, then
- distributing the total birth levels to the age groups (in order to calculate ASFRs) using the 5 year average
- applying ONS fertility differentials calculated from the Wales national population projections to take account of fertility changes over time

3.2   Mortality – WAG produced Age Specific Mortality Rates (ASFRs) for each local authority by analysing ASMR trends for the most recent 5 years. WAG also obtained historic deaths data from ONS by gender and age for each local authority

3.2.1   Age Specific Mortality Rates (ASMRs) were calculated for each local authority from males and females aged newborn to 90+ by singe year of by "*dividing the number of deaths for age x and gender Y by the population for age x gender Y and multiplying by 1,000".*

3.2.2   Local authority mortality rate assumptions were calculated and aligned to –
- 2005/06 death levels, then
- distributing the total deaths levels to the age groups (in order to calculate ASFRs) using the 5 year average;
- Applying ONS mortality differentials calculated from the Wales national population projections to take account of mortality changes over time.

3.3   Migration – Internal migration refers to moves from one local authority in the (UK) to another, although it does not include moves within the local authority.   International migration refers to moves between local authorities in Wales and overseas (outside the UK) and does not include moves within the UK.

3.3.1   A long-term migrant is a person that intends to migrate for a period of 12 months or more, less than 12 months would be classified as short-term, although adjustments are made every year for those that change their length of stay.

3.3.2   In order to project migration assumptions for each local authority WAG analysed age and gender specific migration trends for the most recent 5 years. WAG also obtained historic internal migration estimates based on data from the Patient Register Data

System (PRDS). Evidence suggests that some groups (e.g. young men) are slower at re-registering with GP's than other groups (e.g. the elderly). Although single year of age and gender breakdown is available from 1999 onwards for confidentiality the data must be aggregated to a minimum of 3 years. International migration estimates are based on data from the International Passenger Survey (IPS) together with information from other sources (e.g. Asylum Seekers, etc)

3.3.3 WAG considered 3 different options for calculating migration assumptions, they were –
- Propensity to migrate for inflow and outflow assumptions.
- 5-year average of historic data projected forward (static migration flows for inflows and outflows).
- A propensity model for either inflow and outflow and static migration assumption for the other (a combination of both).

3.3.4 Due to the volatility relating to migration figures and after considering each option, it was decided to use the second option, based on the last 5 years of data, this gives a static level of migration assumptions into each LA for each year of the projection. WAG indicated that "using the 5-year average helps to smooth this volatility, producing a stable long term assumption" although it does not make any allowances for predicted changes in the UK population.

3.4 **Special Population** – are a sub-set of the population that have specific age structures, which remain fairly constant, such population is know as "static population". Special population groups are not usually captured within migration estimates.

3.4.1 As these groups have a fairly static age structures, the projections model of ageing-on would not be appropriate. To avoid this process they are removed from the population at the beginning of the projection method then re-applying them at the end of the model.

3.4.2 To maintain consistency with the MYE WAG considered - Home Armed Forces, Prisoners and School Boarders to be special populations and have included them in the local authorities' projection.

3.4.3 Data was collected from the Defence Analytical Services Agency (DASA) for the home armed forces and their dependants living in barracks and army quarters. Prisoner data was supplied to ONS by the Home office and School Boarders data was obtained from the Welsh Assembly Government school census.

3.4.4 All data collected was for the period 2005-06 and was projected forward as static counts. Data had been allocated to LAs based on the postcode of the institute and aggregated by single year of age and gender.

3.4.5 WAG also considered whether students could be regarded as a special population in the projections, however, this option was not considered feasible because – it is not possible to identify at which university students were attending or to identify in which local authority students were living and it was not possible to remove students (and subsequently graduates) from the migration estimates.

4. MYE - Comparison

	2006MYE/Proj	2007				2008			
		MYE	Projection	Proj Diff		MYE	Projection	Proj Diff	
Cardiff	317523	321000	319783	-1217	-0.4%	324821	322178	-2643	-0.8%
Bridgend	132584	133917	133374	-543	-0.4%	134794	134191	-603	-0.4%
Wrexham	130990	131911	131765	-146	-0.1%	132851	132556	-295	-0.2%
Merthyr Tydfil	55530	55619	55497	-122	-0.2%	55735	55473	-262	-0.5%
Flintshire	150077	150537	150458	-79	-0.1%	150967	150846	-121	-0.1%
Pembrokeshire	117280	117921	118004	83	0.1%	118807	118740	-67	-0.1%
Denbighshire	96089	97009	96806	-203	-0.2%	97573	97533	-40	0.0%
Swansea	227079	228086	228104	18	0.0%	229091	229197	106	0.0%
Caerphilly	171349	171824	171917	93	0.1%	172398	172504	106	0.1%
Ceredigion	77160	77777	77682	-95	-0.1%	78047	78218	171	0.2%
Carmarthenshire	178043	179539	179366	-173	-0.1%	180529	180710	181	0.1%
Isle of Anglesey	68884	69003	69037	34	0.0%	69012	69196	184	0.3%
The Vale of Glamorgan	123275	124017	124184	167	0.1%	124869	125115	246	0.2%
Torfaen	91022	91086	91204	118	0.1%	91097	91390	293	0.3%
Blaenau Gwent	69341	69170	69381	211	0.3%	69097	69438	341	0.5%
Conwy	111273	111709	111849	140	0.1%	112032	112432	400	0.4%
Powys	131141	131963	132140	177	0.1%	132598	133130	532	0.4%
Monmouthshire	87882	88200	88449	249	0.3%	88445	89011	566	0.6%
Newport	140125	140203	140726	523	0.4%	140714	141361	647	0.5%
Gwynedd	118250	118374	118763	389	0.3%	118207	119290	1083	0.9%
Neath Port Talbot	137052	137376	137876	500	0.4%	137645	138730	1085	0.8%
Rhondda, Cynon, Taf	233936	233734	234715	981	0.4%	234097	235545	1448	0.6%

SEWSPG - Local Authorities shaded Green.

Source: National Statistics & WAG
Note: 2002 - 2008 MYEs are subject to revision to be published 27-05-2010