POPGROUP

Frequently Asked Questions

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Part One: Starting Out

1. Thinking of purchasing POPGROUP?

The current prices are £1500 for each of POPGROUP and Derived Forecasts. All Data Modules, support and upgrades are available for an all-in annual service fee of £450, or priced separately. Separate fees apply for commercial use. Details of pricing are to be found at http://www.ccsr.ac.uk/popgroup/about/documents/POPGROUP-Pricing-May2011.pdf

Orders for either software or manuals should be sent to:

Ms Alexandra Marshall
Programme Support Officer
Research and Information and esd-tool kit
Local Government Association
Local Government House
Smith Square
London
SW1P 3HZ

To enquire about orders, telephone Alexandra on +44 (0) 207 664 3135 or email:

alexandra.marshall@local.gov.uk

2. Is there any limit on the number of users per licence?

For local authority licensees there is no limit on the number of users who can use the POPGROUP suite of models once purchased.

3. What user support is available to me?

Technical support is available from Edge Analytics using the following contact details:

Peter Boden & Richard Culf
Edge Analytics Ltd
Leeds Innovations Centre
103, Clarendon Road
Leeds, LS2 9DF
Tel: 0113 3846087
Email: popgroup@edgeanalytics.co.uk

POPGROUP users are encouraged to use the email network to share thoughts and raise queries regarding the application of the POPGROUP suite of models. To register with the network and/or to use it if already registered: **User Group network**.

Reference Manuals are provided for each of POPGROUP, HOUSEGROUP, LABGROUP and Derived Forecast plus a supplementary User Guide for POPGROUP. These can be accessed from the following link: **Reference Manuals**

4. Are training courses available?

There are a variety of ways learning the software and the demographic concepts that are useful, which are discussed at: http://www.ccsr.ac.uk/popgroup/training.html

However, there is a number of training courses run on an annual basis and currently held at the University of Manchester. Courses scheduled for 2012 are as follows:

- **Demographic Concepts and Methods:** http://www.ccsr.ac.uk/courses/dcm.htm

- **Practical Estimating and Forecasting:** http://www.ccsr.ac.uk/courses/pef.htm
  Methods course. Experience of Microsoft Excel is essential.

- **Demographic Forecasting with POPGROUP:** http://www.ccsr.ac.uk/courses/dfp.htm

An online booking service for all courses is available as follows:

http://www.ccsr.ac.uk/courses/booking/

Additional courses can be provided at users' request. All enquiries should be forwarded to the **Technical Support team:**

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5. Is POPGROUP compatible with MSExcel 2007 and MSExcel 2010?

POPGROUP, Derived Forecast, HOUSEGROUP and LABGROUP are compatible with MSExcel 2003, MSExcel 2007 and MSExcel 2010 and fully supported for them. To run them, Excel macro security is best set to low so that each time a POPGROUP file is opened the user can allow the macros to operate. The boxes in the same menu dialogue box that allow trusted publishers should also be ticked. Detailed instructions on how to change the macro settings in MSExcel 2003 and MSExcel

2007 can be found in Appendix 1 to the **POPGROUP Installation Guide.** There are no other requirements to run the software.

6. How do I install POPGROUP?

POPGROUP and Derived Forecast are each installed from a CD.

By default, all software and data will be installed to the 'C:\Forecast' folder on your PC. If this folder does not exist, the extraction routine will create it. If you wish, you may select an alternative drive/folder combination prior to extraction.

To install the system, place the CD in your disk drive. If a dialogue box does not appear automatically, use Windows Explorer to go to the CD drive and double click on the 'POPGROUP Installation.exe' file.

A dialogue box will ask you to confirm the directory in which the program should reside.

Installation will create three folders: '1. POPGROUP v3.1 DF Compatible', '2. DF' and '3. Data Modules'.

In addition to placing the PG 'Model-Setup' workbook in the chosen directory, installation will create a sub-directory 'SysFiles' (and equivalents of those for Derived Forecast). The user will never directly access any workbook in the 'SysFiles' directory. The '3. Data Modules' folder contains a set of the relevant to the user data modules with model setup files, data folders and reference manuals.

No other files from the CD are needed for installation.

7. What to do when Run-time error occurs following installation?

On your initial run of the 'Model_Setup' workbook, you may get the following error message:

'Run-time error '9' Subscript out of range'

The cause of this problem is an MSExcel setting which needs to be set before the POPGROUP software will work correctly. MSExcel must have the configuration setting 'Trust access to Visual Basic Project' enabled. To do this, on the MSExcel 2003 menu click on *Tools - Macro - Security* and tick the 'Trust Access to Visual Basic Project' box. This will enable subsequent runs of the

'Model_Setup' workbook (more details, including the setup in MSExcel 2007, can be found in Appendix 1 to the **POPGROUP Installation Guide**).

Many users can have objections against changing the macro security settings in case viruses gain control over their machines. As a reassurance, POPGROUP software is developed in a secure environment and delivered after full virus checking. It is, therefore, safe to use POPGROUP with the low security setting. However, users can revert back to the original settings for other Excel files where their origin is more uncertain.

Part Two: Methodology

1. Could you briefly describe POPGROUP's methodology?

POPGROUP incorporates a **cohort component** methodology for its population projection model. This is a standard approach to population projection that is applied by most national statistical agencies. A population in a base period (typically within single year age bands) is projected forward (typically one year) taking account of the impact of births, deaths and migration (internal migration and international migration). Assumptions about future fertility, mortality and migration trends are typically derived from recent historical evidence, combined with intelligence on likely changes in policy or health outcomes, for example.

The **headship rate** methodology is the current standard for producing household projections. This approach is used by CLG, GROS, NISRA and WAG for its household projections and is replicated in the POPGROUP-HOUSEGROUP / POPGROUP-Derived Forecast methodology.

Headship rates measure the proportions of household residents in an age/sex group that 'represent' a household of a particular type (couple, lone-parent, other multi-person, one-person, for example). The forecast number of households is calculated as the product of the population resident in households multiplied by the headship rate (for each age, sex, household type combination).

The POPGROUP-LABGROUP / POPGROUP-Derived Forecast methodology operates in a similar way to the headship rate model, except that **economic activity rates** provide the multiplier by which population forecasts are converted to forecasts of the size of the labour force.

A more detailed description of the population and household projection methodologies is available from the User Guide and Reference Manual on the POPGROUP website. The mathematical calculations for each method are documented at the end of each of the manuals.

 Reference Manuals.

2. What is 'Natural Change'?

Natural change is the difference (in any given time-period) between the number of births and the number of deaths. To understand the drivers of population growth and decline, it is necessary to understand the relative importance of the 'natural change' and 'net migration' components. POPGROUP output files provide summary and detailed statistics on these key components of

population change for each area being considered and for each year of the designated projection period.

A 'natural change projection' is one that ignores migration and shows the future population when only births and deaths affect it.

3. What is a 'Headship Rate'?

A Headship Rate identifies the percentage of an age-specific population category that represents a type of household. For example 15% of those aged 20-24 in Dudley 'head' or represent couple households without children. Headship rates are applied to the population by age and sex to derive a total number of households of each household type. Headship Rates and Household Representative Rates are inter-changeable terminology and you will find both used in the literature: we use 'headship' because it is widely understood, but do not imply that the representative heads the household in any social or financial way.

Communities and Local Government (CLG), for example, has derived a set of Headship Rates by household type for each local authority district which underpin the 2008-33 household forecasts in England. The figure for Dudley comes from this projection, for the year 2012.

Household Membership Rates are an alternative measure of population residing within households and are used in WAG's household projections for Wales local authority areas. A Household Membership Rate identifies the percentage of an age-specific population category that lives in a type of household. For example 30% of those aged 20-24 in Dudley live in couple households without children. The membership rate includes all people in the household, not just the 'head', and so is identified for children as well as adults.

See also: **2. Can I get the number of children in each type of household from Derived Forecast/HOUSEGROUP?**

Part Three: Data issues

1. Where do I get my data from?

Data will typically be sourced from a variety of different locations but primarily from datasets available from national statistical agencies (ONS, GROS, WAG and NISRA in the UK). These datasets will provide inputs for population, households, births, deaths and migration plus additional intelligence on fertility, mortality, migration age-schedules, headship rates and economic activity rates.

To assist with the initial sourcing of datasets to populate POPGROUP model files a Data Guidelines document has been compiled which provides a description of data inputs and relevant datasets and a link to availability where appropriate. Users should refer to this document for more information.

Data Guidelines

2. What should I use as my base year?

You should use a year for which you have a good estimate of the population for each single year of age 0 to 89 and 90+, for males and females separately.

Some users make the base year the most recent year for which a good estimate is available. But there are good reasons for using a base year from some years before. The work of entering past data is worthwhile because it provides a context for the forecasts which helps interpretation and POPGROUP uses the extra data to provide good estimates of past migration and demographic rates. For further information see the Guidance Note 'What should I use as my base year.doc'?
FAQ - Guidance Note 1

3. What if I don't have a base population all the way up to age 90+

POPGROUP requires a base population of single years of age from 0, 1, … 88, 89, and all aged 90 or over ('90+'). If the data available are only available to a lower age, for example stopping at 75+, or 85+, then the user must find a plausible way of dividing the top age group into single years of age and 90+.

The usual method is to apply the distribution of elderly up to 90+ from a similar area, for example a larger area containing the area of interest. The file 'engl91age85plus.xls' demonstrates how to do this, using the example of using the England elderly age structure to distribute a local area's total elderly in 1991. The file is contained in the online training materials at **Online Training Material**: once downloaded, look in the folder \Training Materials\Forecast\FluteshireRawData\.

4. Can I use net migration rates or counts in POPGROUP?

Yes, but it involves some simple extra work. POPGROUP requires gross flows: at least one in-flow and out-flow for each area. With net figures (rates or counts, and whether for all ages or by age and sex), you can either:

(a) put the positives in the IN file and the negatives in the OUT file, leaving the other flows as zero,

<div align="center">or</div>

(b) estimate gross flows that are consistent with the net flows that you have. For example, take some sensible gross flows for the OUT file (perhaps from the Census), then add the net figure to them to give figures for the IN file. A positive net figure will make the IN file more than the OUT file, while a negative net figure will make the IN file less than the OUT.

5. What are 'Special Populations'?

Special populations are a sub-set of the population who might exhibit distinctly different characteristics to the main resident population. A large Armed Forces base in a locality for example. A good description is provided in Part **5** of the POPGROUP User Guide.

Special populations are deducted from the population at the start of each year of the forecast. The population is not 'aged' and is not subject to the assumptions on fertility, mortality and migration during the year. The population is added again (optionally a different number) at the end of each year's forecast.

More information is provided in Part 5 of the POPGROUP User Guide.

6. What is a constraint?

A constraint is sometimes called a 'control' and provides forecast information about the population size or other development from an independent source. A POPGROUP forecast is

made consistent with an independent source by adjusting the migration flows until the constraints are met. In any year of the forecast a constraint could take a number of forms:

- <u>Population</u> constraint: total population or population by sex and age

- <u>Housing</u> constraint: change in total households or change in total dwellings

- <u>Labour force</u> constraint: change in total labour force or change in total employment

More information is provided in Part 5 of the POPGROUP User Guide and Section 5.8 of the Derived Forecasts Reference Manual.

7. What is 'Population not in households'?

Population not in households is a count of those people living in 'communal establishments', often derived from Census table CAS001. Some users have good information with which to update the figures for years since the census, or planning information to project future numbers of people not in households. When projecting households with Derived Forecasts, the population not in households can be defined as a percentage rather than a count. Then the size of the population not in households changes in line with the population's changing age structure. This population is excluded from the application of Headship Rates in the POPGROUP-HOUSEGROUP / POPGROUP-Derived Forecast model.

8. What is a dwelling-household conversion?

A conversion between households and dwellings is necessary to ensure that vacancy rates, shared dwellings and holiday accommodation are correctly accounted for when evaluating dwelling-led forecasts.

The conversion from households to dwellings (and vice versa) is achieved using a households/dwellings ratio. This is derived as the ratio between occupied household spaces and total dwellings (derived from Census table CAS048). Unoccupied household spaces include second residences, holiday accommodation and vacant premises.

Users should refer to the POPGROUP Reference Manual section 3.5 and the Derived Forecasts Reference Manual section 9.3 for a more formal definition of the conversion factor.

9. What are fertility differentials?

A fertility differential provides a 'weighting' factor to account for differences between standard (e.g. national) age-specific fertility and local trends. To produce a local forecast of births, the POPGROUP model applies the standard age-specific fertility profile for females aged 15-49 to the female population aged 15-49. The age-specific profile is weighted according to any standard-local age-specific factors – differentials. Differentials can be provided as a total figure or by age and/or sex.

See section 3.2 of POPGROUP Reference Manual for a description of the rules governing the use of counts, rates and differentials in the Fertility, Mortality and Migration input files.

10. What are mortality differentials?

A mortality differential provides a 'weighting' factor to account for differences between standard (e.g. national) age-specific mortality and local trends. To produce a local forecast of deaths, the POPGROUP model applies the standard age-specific mortality profile to the population for each single year of age and sex. The age-specific profile is weighted according to any standard-local age-specific factor – differential. Differentials can be provided as a total figure or by age and/or sex.

See section 3.2 of POPGROUP Reference Manual for a description of the rules governing the use of counts, rates and differentials in the Fertility, Mortality and Migration input files.

11. Input files show differentials, but where are the actual rates held?

Rates will be calculated by the model as a combination of the standard rate schedule multiplied by any differentials which have been defined. The results are not stored in the input files, but the output files produced by POPGROUP provide full access to both rates and the birth and deaths counts.

12. What does the 'trend' option do?

The trend option can be chosen for an individual year if a value has been provided for a previous year. If a value is also provided for a future year, the value for the year for which the trend option is chosen is linearly interpolated between the two values. If no future year is provided the last

provided value (before the trend year) is used. Trending is available for each of the model input components.

The on-sheet notes on each of the relevant workbooks explain how the trending works and the rules by which it may be applied.   There is also more detail on how trending works in the POPGROUP Reference Manual (Section 3.2.4).

Part Four: Using the models

1. Can I use POPGROUP files prepared elsewhere?

Yes, but you will probably need to use the routines in 'Update_ModelFolder.xls'.

You have to modify POPGROUP (and Derived Forecast and HOUSEGROUP and LABGROUP) files to tell them where the programs are kept on your computer.

You will need to do this when you get files from another user, or when you move your work from one computer or server to another. You will not need to do this only if the paths to the program 'Sysfiles' directories are the same for the new files as for your own computer.

The 'Update_ModelFolder.xls' file can be found in both '1. POPGROUP v3.1 DF Compatible' and '2. DF' folders.

2. Can I get the number of children in each type of household from Derived Forecast/HOUSEGROUP?

Derived Forecast/HOUSEGROUP uses a 'headship' approach, as do CLG and GRO(S) for areas in England and Scotland respectively, and many other countries' statistical agencies. Sometimes the term 'representative' is used instead of 'headship'. Only the proportions of the household population at each age-sex who are HEADS of each type of household are needed. Only these are estimated and projected. So there is no information in Derived Forecast/HOUSEGROUP about the division of the population of each age into types of household.

The Derived Forecast additionally allows a 'household membership' approach (as used by WAG and NISRA for areas in Wales and N Ireland). This estimates and projects the proportions of the household population at each age-sex who are MEMBERS of each type of household, whether heads or not. This will give the number of people of particular ages who are in each type of household.

See also: **3. What is a 'Headship Rate'?**

3. Why do no additional dwellings lead to a decrease in population?

A constraint of no extra dwellings implies a stable number of households, at least if the dwelling/household conversion is constant over time which is usual. However, most projections

expect increased headship rates in the future (i.e. smaller households on average). Additionally, in most areas the changing age structure, in particular an increase in the number of elderly, also implies more small households. For both these reasons the same number of dwellings will house fewer people - a decrease in population.

The assumption is that without more housing some extra people will be forced to move away, or fewer move in. A planner may also wish to consider the possibility that there will be crowding – i.e. that the expected reduction in household size will not in fact occur if insufficient housing is built. This consideration is usually made outside the software; it could be entered in the software by lowering the headship rates.

4. Can I link a population forecast to the number of jobs in an area?

Yes. You can use POPGROUP with Derived Forecast/LABGROUP to find the implications for labour force and employment, *or* to find the population change implied by a particular increase or decrease in number of jobs. This is described briefly in the **POPGROUP Reference Manual** at sections 3.4 and 3.6.

It is described more fully in the Guidance Note 'Employment implications and jobs-led forecastsFeb2012.doc' **FAQ - Guidance Note 2**

5. Should I put the same differential in each Group sheets, or put it just once in the All-Groups sheet?

It makes no difference to the forecast.

There is a very slight difference in the calculation, after the forecast, of the TFR for the All-Groups. It involves the fertility differentials on the All-Groups sheet (see **POPGROUP Reference Manual**, section 6.2.1). The difference will be very small. However, the preference is to put the differential in the All-Groups sheet rather than to repeat it in each sheet. There are no differences when computing mortality or migration summary measures.

6. How are new dwellings populated in a dwelling-led model?

A <u>migration led</u> scenario will estimate a population for each year of the forecast, by age and sex. The number of households will subsequently be derived by applying Headship Rates to this age-sex population profile.

In a <u>dwelling-led</u> scenario, the estimated number of households is compared to the designated number of dwellings (using a 2001 Census household-dwellings conversion factor).

The dwelling totals act as a constraint so, if there are too many households for the defined number of dwellings, then 'net out-migration' must result. Similarly if projected population growth is insufficient to fill the designated number of new dwellings with households then the model will generate increased net in-migration (some more in-migration and some less out-migration).

The model makes no assumptions about who will go into the new dwellings, either migrants or population from existing stock.

7. Why do small area projections not sum to my single aggregated projection total?

This is to be expected. Think of two wards, one has grown 10% in a year, the other has reduced 10% in a year, and starting with the same population. Projecting this forward as a whole, there's no change. But projecting the two wards, the growing ward comes to dominate the change and there will be growth in the county: Area 1 increases by 10% from say 1000 to 1100 to 1210 to 1331 and so on, while the smaller Area 2 reduces by 10% from 1000 to 900 to 810 to 729; the total has risen from 2000 to 2060 in just 3 years.

Areas with different rates will continue to diverge and the growing ones will come to contribute more to population growth.

There are those that suggest that constraining to a projection for larger populations is not advisable and that the bottom-up approach should be more accurate. On the other hand, the information for smaller populations is usually less reliable, and there are often social reasons for thinking that a local system of groups (areas, or ethnic groups) won't continue to diverge with constant rates, i.e. that some equilibrium will reduce the divergence. Those counter-arguments suggest that the forecast for a single larger group might be more accurate. And for this reason migration flows are often projected as numbers rather than rates. This remains a continuing discussion, always judged locally.

8. What is the explanation for recent fertility trends?

Fertility rates have risen steadily since 2001 but appear to have peaked in 2008. ONS has compiled its own series of FAQ which relate directly to the interpretation of fertility trends and provides an excellent overview of the issues involved. Users should consult this fur further guidance:

ONS: Births & Fertility FAQ

9. Can I get results as whole numbers?

Future populations are calculated by multiplying past population by demographic rates, so that the results usually have fractions of a person such as 96.3456…. When using POPGROUP reporter (fore_# - reports.xls) you can make sure every population output is rounded to the nearest whole number by choosing the option 'Round numbers to the nearest:' and type a '1'. This option is also useful if you wish to round to the nearest 50 or 100 to reflect uncertainty in the results.

However, although the results for each age group will be reported as whole numbers, they may not add up to the figure given for the Total population which will also have been rounded to the nearest whole number. Some projectionists and some users prefer this to be the case.

One way to make sure the population for every age-sex group is a whole number, and adds up to the total, has been suggested and used by Jan Freeke in Glasgow. Run your projection again with a Constraints file in which the single-year age-sex results from your projection have been entered as integers. The migration will be adjusted by a fraction of a person at each age to ensure that the results are whole numbers. The total will be the exact sum of the population at each age and sex.

10. Can I use dwelling and population constraints for same years?

No, but… The constraints change the migration flows so that the population will produce the target figure that the user has provided as the constraint. The is usually the past population, or a future planned number of dwellings. POPGROUP can't change the migration to meet two different figures in the same year.

However, a user sometimes has both population and dwellings for a recent year. If these are both correct and still produce different results when each is used as a constraint, then one of the following factors must be wrong in the model: household headship rates, or the conversion

between households and dwellings (including vacancy rates and second homes). The user can study and change these, to ensure that the population and dwelling data are consistent for that year.

11. Can I use migration and deaths for single years of age if I have it?

No. POPGROUP is restricted to a specific age breakdown for counts of migrants and deaths in each year, on its input sheets. This allows for 5-year age groups for males and females separately. It distributes these counts to single years of age, using the migration and mortality schedules. The mathematics is described in the manual's section 6.3. It is possible that the distribution of migrants or deaths at single years of age within a particular five-year group changes over time, away from the schedules. POPGROUP does not use such fine detail in its calculations.

However, if the schedule does not reflect the user's areas well at all, at single years of age, then the user can calculate a schedule from local data for single year of age. This is rarely necessary for mortality. It may be useful for migration in areas with high student migration.

12. How can I check the quality of my forecast?

When you have completed a forecast, these are ways to validate it. They will help you to become confident that the forecast will stand scrutiny from those who will use it or maybe challenge it.

- Are the assumptions well documented and convincing?
- Are the results plausible – for example are the population age profile, sex ratio and each demographic component changing slowly rather than suddenly, and in plausible ways?
- Are the results consistent with other evidence – can you explain why they differ from past forecasts or from government forecasts?
- How sensitive are the results to plausible alternative assumptions?

Forecasting is an iterative process – the producer will often develop and refine the assumptions several times before arriving at a forecast that is released for use. When new data become available then the quality of a previous forecast decreases, which leads to new and better forecasts.

For further information see the Guidance Note 'How can I check the quality of my forecast.doc'.

FAQ - Guidance Note 3