

# Appendix 3

## POPULATION AND HOUSEHOLD FORECASTS - TECHNICAL NOTE

### Population

The population projections were created using a standard cohort technique. National census information was used to determine the population in each of the seven Counties, for each sex, in each year age cohort. Thus, for example, a single cohort would be Wicklow females aged 30. This census provided information for the years 1991 and 1996, though only the latter is used in the population calculations.

Detailed fertility and mortality rates are also available from published sources. Mortality rates are disaggregated by age and sex, and fertility rates (for females only) by County and age. These rates are assumed to remain unchanged throughout the modelling period, as is common practice in population forecasting. It is likely that both future birth rates and future mortality rates will decrease and, therefore, these two effects will counter-balance each other. The births, deaths and populations within each cohort are not large enough to obtain reliable trends in the rates between 1991 and 1996. Any forecast based on trended, rather than fixed, rates would therefore be liable to greater uncertainty.

The cohort model is run sequentially for each future year, with summary years 2001, 2006 and 2011 being output. The population in each cohort moves up one band and, for example, 30 year olds become 31 year olds in the following model period. The population is reduced by the mortality for that cohort. Each of the female cohorts has a fertility rate and the number of new infants is calculated from the female population in that cohort. The fertility rates also divide these new infants into males and females. Two additional cohorts (male and female) are created for the new infants and are placed in the 0-1 year age range. Seven counties, over 100 age bands and two genders result in over 1400 cohorts. There is assumed to be no population movement between Counties

The population by County and model year is shown in Table A3.1. It should be noted that these figures assume no net migration into or out of the model area.

Table A3.1 Population by County - net nil migration

	1991	1996	2001	2006	2011
Dun Laoghaire-Rathdown	185,410	189,999	196,566	201,648	204,704
Fingal	152,766	167,683	178,208	187,213	194,957
South Dublin	208,739	218,728	228,072	235,992	242,424
Dublin CB	478,389	481,856	497,255	509,655	514,857
Meath	105,370	109,732	113,185	116,192	119,140
Kildare	122,656	134,992	143,379	150,772	157,346
Wicklow	97,265	102,653	106,304	109,337	111,988
Total	1,350,595	1,405,671	1,462,969	1,510,809	1,545,416

## HOUSEHOLDS

Average household size in the Greater Dublin Area has been decreasing throughout the last 30 years and this downward trend is clearly illustrated in Table A3.2. It should be noted that these household sizes refer to private housing and do not include the 2% (approx.) of the population who are resident in various forms of institutional housing. The full housing information, on which the future projections have been based, is only available for the later years of 1991 and 1996.

Table A3.2 Household Size by Year in Study Area

Year	Average Private Household Size in Study Area
1966	4.1
1971	4.0
1981	3.6
1986	3.5
1991	3.3
1996	3.1

The information on the proportion of the population which are head of household has been used as the basis for future household size projections. This information is not available at such a detailed level as population, being disaggregated into 5 year bands (with the first from 0-20 years and the last above 65 years) by sex and County. This was used as the basis for the calculation of the number of households, and hence the average household size. However, it was observed that the headship rates in corresponding cohorts varied dramatically between 1991 and 1996, probably as a result of localised demographic changes. This did not provide a firm enough basis for the household calculations and so more aggregate cohorts were selected without the differentiation by County or sex. These broader bands generally provide greater consistency and eleven cohorts were used in the analysis process.

The ratio of the headship rates for the two periods (1991 and 1996) was used to determine an annual change in headship using a geometric formulation. This choice of formulation was based on the observed changes in overall headship rates from 1986-1991 and 1991-1996 following a geometric pattern. Revised headship rates for each of the future years 2001, 2006 and 2011 were calculated using the 1996 rate and the annual change.

It was noted that the headship rate in three of the cohorts (25-30, 30-35 and 60-65) dropped slightly between 1991 and 1996. This was felt to be counter-intuitive and not fully representative of likely future changes. Therefore, it was decided to leave the headship unchanged, though the difference between this and the households implied by the decreasing rate was small. In the absence of strong reasons for preferring one of these years it was decided to use the later 1996 value. It is anticipated that the next census in 2001 will show falling headship rates in these cohorts.

These rates were applied to the cohort populations, aggregated as necessary, to determine the number of households. Summation of these households by sex and age provided a total of households for each year, and hence an average household size.

It was clear from the 1991 and 1996 demographic information that household size varies between the seven Counties and it was necessary to determine a separate value

for each County in each model year. These values were determined by the consultants, within the following constraints and criteria:

- The weighted average of the sizes in each model year should meet the overall household size as determined above.
- The spread of household sizes (between 2.99 and 3.80 in 1991) would decrease in future years as the population in the model area becomes more homogenous.
- Dublin County Borough would continue to have lower than average household sizes as will Dun Laoghaire-Rathdown. The suburban Counties (South Dublin and Fingal) would have intermediate sizes and the more rural Counties (Meath, Kildare and Wicklow) would have higher sizes.
- The rate of decrease in household size would be reasonably smooth between successive model periods.

The resultant set of household sizes, disaggregated by County and model year, are shown in Table A3.3 below:

Table A3.3 Household Sizes					
	1991	1996	2001	2006	2011
Dun Laoghaire-Rathdown	3.28	3.09	2.93	2.74	2.54
Fingal	3.75	3.51	3.28	2.99	2.67
South Dublin	3.80	3.54	3.31	3.01	2.69
Dublin County Borough	2.99	2.78	2.65	2.51	2.37
Meath	3.65	3.44	3.25	3.01	2.73
Kildare	3.71	3.46	3.25	3.00	2.73
Wicklow	3.45	3.28	3.13	2.93	2.70
Average	3.36	3.15	2.98	2.78	2.56

These household sizes were applied to the disaggregated populations and the resultant household values are shown in table A3.4 below:

Table A3.4 Number of Households					
Household	1991	1996	2001	2006	2011
Dun Laoghaire-Rathdown	56,531	61,469	67,103	73,555	80,629
Fingal	40,777	47,721	54,279	62,566	73,104
South Dublin	54,875	61,809	69,007	78,301	90,188
Dublin County Borough	159,775	173,085	187,581	203,408	217,513
Meath	28,868	31,863	34,815	38,599	43,592
Kildare	33,067	39,041	44,079	50,223	57,741
Wicklow	28,187	31,263	33,936	37,345	41,534
Average	402,080	446,251	490,800	543,997	604,302

## MIGRATION

It has already been noted that this work has been undertaken on the basis of no migration into or out of the model area. The Strategic Planning Guidelines are being formulated on the basis of a High Migration scenario, with an additional 6.8% (105,000 people) entering the study area by 2011. The allocation of the future population to each County, particularly the immigrants, depends on the form of the recommended scenario. It should also be noted that the higher migration options marginally reduce the overall

household size since the migrant population has different characteristics from the overall population.

The projected population and households for the various migration options are presented in Table A3.5 below.

Migration Option	Year	Population	Households	Household Size
Observed	1991	1,350,595	402,080	3.36
	1996	1,405,671	446,251	3.15
No Migration	2001	1,462,969	490,800	2.98
	2006	1,510,809	543,997	2.78
	2011	1,545,416	604,302	2.56
Low Migration	2001	1,471,085	495,336	2.97
	2006	1,529,611	554,231	2.76
	2011	1,577,900	622,106	2.54
Medium Migration	2001	1,481,230	501,006	2.96
	2006	1,551,827	566,262	2.74
	2011	1,611,059	640,004	2.52
High Migration	2001	1,491,375	506,676	2.94
	2006	1,575,072	578,902	2.72
	2011	1,650,175	661,388	2.50

## SENSITIVITY OF FORECASTS

The Strategic Planning Guidelines are heavily dependent on the accuracy of the population and household forecasts and it is appropriate to consider the sensitivity of the predictions to the various input assumptions:

- The methodology used to derive the future populations is standard and the associated coefficients are taken from accurate historic data. The method assumes a continuation of observed historic trends into the future.
- The number of immigrants in the High Migration scenario has been estimated at 105,000 between 1996 and 2011.
- The procedure for estimating the future household sizes is also based on a sound methodological approach and assumes a continuation of current trends.

These various assumptions are felt to be reasonable over the period to 2011 but, as with any forecast, might thereafter become progressively less accurate. The forecasts should be compared with observed information from the 2001 Census as soon as it becomes available.

The predicted decrease in average household size (to 2.50 by year 2011) is conservative when compared to 1991 averages in the UK and other European countries, see table A3.6.

**Table A3.6 Average Household Size in other European Countries**

Country	Average 1991 Household Size
Ireland	3.4
Spain	3.3
Portugal	3.2
Greece	3.0
Italy	2.9
France	2.6
Luxembourg	2.6
Austria	2.6
Belgium	2.5
Netherlands	2.5
UK	2.5
Germany	2.4
Switzerland	2.4
Norway	2.4
Finland	2.4
Denmark	2.2
Sweden	2.1

A general downward trend in household sizes in western European countries has been observed during the last 30 years and census reports suggest that this is a continuing process. The historic changes in household size in the UK are illustrated in Table A3.7.

**Table A3.7 Average UK Household Size**

Year	Average UK Household Size
1961	3.1
1971	2.9
1981	2.7
1991	2.5
1996	2.4