

Model for estimating the prevalence of Chronic Obstructive Pulmonary Disease (COPD)

The Public Health Intelligence Unit developed the COPD prevalence model to support Doncaster's PCTs development of the Quality and Outcomes Framework (QOF). The Model uses a three-stage process to estimate the prevalence of COPD within practice populations.

Stage 1 predicts the number of people with COPD within the practice, taking account of the demographic distribution of the population. Halbert *et al*¹ undertook a systematic review of 32 COPD prevalence studies from across the world, most based in the US or Europe. The prevalence rates varied enormously, between 1% and 18%. Soriano *et al*² has produced some overall prevalence rates based on data from the General Practice Research Database. While these prevalence rates are at the lower end of the scale in Halbert's work (Males; 1.7%, Females: 1.4%), Soriano considers that they are a reasonably good indicator of levels of *physician diagnosed* COPD in the UK. Soriano has provided prevalence rates for men and women from the GPRD but do not provide any rates for age groups. The paper does suggest the age distribution is broadly in line with the data in the Morbidity Statistics from General Practice (MSGP4) report³. The model used the age specific prevalence rates from MSGP4 but increased them in-line with Soriano's reported overall prevalence rates.

National Percentage Prevalence by Age and Sex

	0-4	5-15	16-24	25-44	45-64	65-74	75-84	85+
Men	1.1	0.2	0.3	0.4	2.0	6.7	8.8	10.9
Women	0.9	0.2	0.3	0.5	1.8	3.6	4.5	4.6

Stage 2 takes account of the health inequalities between different local authorities in England. In the absence of sufficiently precise published data on the relationship between deprivation and COPD prevalence, the model makes the assumption that areas with higher COPD mortality rates have comparably higher prevalence of COPD. For example, Doncaster's 2002-04 standardised mortality ratio (SMR) for COPD in people of all ages was 143.3 (95% CI: 131.7, 155.6)⁴, so the model increases the predicted prevalence in each of Doncaster's practices by 43.3%.

Stage 3 takes account of inequalities between practices within the local authority area. Using data for all local authorities in England, a linear relationship between 2001-04 SMRs for COPD and a deprivation score (UV67) derived from the 2001 Census Classification of Deprivation, was calculated:

$$\text{COPD SMR} = (4.389 \times \text{UV67}) - 26.04$$

Using UV67 scores⁵ calculated for each practice, the above formula gives a multiplying factor for each practice. For example, a practice with a UV67 score of 40% (very deprived) has a multiplying factor of 1.5. However, in stage 2 the prevalence was adjusted for COPD SMR, and much of this difference can be attributed to deprivation. The model uses the formula above to give a predicted COPD SMR for the local authority area. For example, Doncaster's UV67 score of 32.9% would predict an SMR of 118.6, compared with the actual SMR for 2002-04 of 143.3. Hence the expected prevalence produced by stage 2 is divided by the predicted SMR before the practice's multiplying factor is applied, to avoid 'double-counting' the effect of deprivation on the practice's CHD prevalence.

¹ Halbert RJ, Isonaka A, George, D, Iqbal A, Interpreting COPD prevalence estimates: What is the true burden of disease?, *Chest*, **2003**, 123: 1684-1692

² Soriano JB, Maier WC, Egger P, Visick G, Thakrar B, Sykes J, Pride NB, Recent trends in physician diagnosed COPD in women and men in the UK, *Thorax*, **2000**, 55: 789-794.

³ OPCS, **1995**, Morbidity statistics from General Practice: Fourth national study 1991-1992, HMSO.

⁴ National Clinical and Health Outcomes Database, **2005**, Special data request.