Epidemiologic research during the past 10-20 years has confirmed the adverse effects of air pollution on public health, and subsequent cost-benefit analysis has become critical in policy decision-making. Since air quality models are among the main tools available to evaluate the impacts of changes in emissions, either due to growth or resulting from the implementation of source-control strategies, these approaches play a vital role in air accountability studies. In this study we present an air-quality system, AQM.cat, to quantify the impact of air pollution on public health. This modelling system is based on coupling different Eulerian models: a meteorological model, WRF or MM5; an emission model MNEQA; and the photochemical model CMAQ. In this contribution we consider two ways to characterize health effects using AQM.cat: (i) using it to obtain the statistical parameters needed by the exposure models to estimate the temporal and spatial variability of different pollutants; and (ii) linking AQM.cat to concentration-response functions derived from relationships between ambient concentrations and health effects. In the first case, one year of simulation is considered to evaluate statistical parameters such as the mean, median and 90^{th} percentile for the eight 3-hourly time diurnal time intervals, illustrating the temporal variability of several pollutants: ozone, PM10 and nitrogen dioxide. In the second case, we link AQM.cat with concentration-response functions and with spatially disaggregated population data. Changes in health effects due to changes in the emission of each pollutant have been quantified by comparing the baseline case with different scenarios corresponding to different reductions of emissions. Both methods have been applied to north-eastern Spain (Catalonia), showing the capacity of an integrated air quality modelling and assessment system to evaluate damage caused by pollutants, and emission control strategies.