

Road Safety Analysis – Resident Child Road Risk Report 2010

Explanation of adjustments made to casualty figures to allow for unreported casualty postcodes by Bruce Walton

Firstly, it is very important to bear in mind that this report examines casualties by where they live, NOT where they crashed. Across Britain as a whole under 62% of crash victims are injured in the local authority area where they live, so to equate "crashes on local roads" with "risk to local population" is a false premise. We set out to measure the latter, not the former.

In order to examine residency, we use reported casualty postcodes. About 23% of all STATS19 casualty records for the period 2004-8 do not contain postcodes. For casualties aged 0 to 15 this rises to nearly 28%, so postcode reporting is patchier for children than adults. There is also considerable variation between police forces: some forces report over 95% of postcodes, others only around 55%. Such reporting rates can be derived directly from MAST. Note that in MAST, and therefore also for the purposes of this report, 'Unknown' casualty postcodes include foreign and Northern Ireland residents; the consequences of this are considered in detail later.

The premise of our child risk report was to calculate resident risk by population, so it was absolutely necessary to correct for this regional variation in postcode reporting. If we did not, areas in force areas which are poor at reporting postcodes would have lower resident casualty figures and therefore better risk rates than they should, and forces which are meticulous at reporting would be penalised. This would be inaccurate, misleading and unfair.

We felt it was important to ensure that the total number of casualties attributed to every authority in the report added up exactly to the overall total. This ensures that local risk rates can be compared directly and meaningfully to the national rate. For this reason, the totals of columns D and G in the Analysis spreadsheet are exactly the same as casualty totals for Britain's roads published in RCGB. The figures in columns C and F are figures for known resident casualties taken directly from MAST, and exclude over 294,000 casualties with unknown postcodes. Of course, these figures cannot be expected to be identical to information derived from STATS19 returns about casualties on local roads, because they are measuring different things. The report differs from such data because it examines casualty residency for all crashes in Britain, and is not limited to only crashes occurring in a particular area.

We derived the adjusted authority resident casualty figures using these steps.

1. We extracted the following data from MAST for the period 2004-8:
 - a. Casualties with unknown postcodes reported by each force in Britain (for example: Thames Valley Police had 8,381 casualties where Casualty Home was 'Unknown')
 - b. Total casualties reported by each force in Britain, from which the number of postcodes successfully reported by each force was calculated (for example: Thames Valley Police reported 47,400 casualties altogether so they reported 39,019 casualty postcodes, which is 47,400 minus 8,381)
 - c. All casualties categorised by authority area of residency according to reported postcode, broken down by the force area in which the crash occurred (for example: there were a total of 4,882 casualties reported across Britain with an Ealing postcode, of which 183 were reported as injured in a crash in the Thames Valley force area)
2. For each home authority, we worked out the proportion of residents known to have crashed in each police force area (for example: 3.75% of Ealing resident casualties sustained their injury in Thames Valley, calculated as 183 divided by 4,882)
3. For each combination of home authority and police force area of crash, we worked out the proportion of all casualties in that police force area who were known to live in the authority in question (for example: 0.47% of all postcodes reported by Thames Valley Police are Ealing ones, calculated as 183 divided by 39,019)
4. We calculated how many of the unknown casualties reported by each force would have come from each authority, assuming that unknown casualties follow the same distribution as the known ones (for example: about 39.3 of Thames Valley's unknown casualties were assigned to Ealing, calculated as 0.47% of 8,381)
5. We worked out an adjusted casualty total for each combination of home authority and police force area of crash (for example: about 222.3 Ealing residents were included in the total casualties reported by Thames Valley Police, 183 with known postcodes plus an assumed 39.3 from casualties with unknown postcodes)

6. For each combination of home authority and police force area of crash, we worked out the 'correction factor' by which one would have to multiply reported resident casualties in order to arrive at the actual total (for example: to arrive at a total of 222.3, multiply 183 by a factor of about 1.2148)
7. For each combination of home authority and police force area of crash, we multiplied this correction factor by the percentage of residents who crashed in that police force area in order to allocate it proportionately across resident casualties as a whole (for example: the element of the correction factor for Ealing residents as a whole which can be derived from those crashing in Thames Valley is about 0.0455, 3.75% of 1.2148)
8. We totalled these elements from each force area for every authority, in order to arrive at a single overall authority correction factor (for example: Ealing's overall factor is 1.3464, which is made up of 0.0455 derived from Ealing residents crashing in Thames Valley, plus 1.1867 from Ealing residents crashing in the Met force area, plus all the similar elements for Ealing casualties reported by every other force in Britain)
9. We checked these calculations by multiplying the total number of casualties known to live in each authority by that authority's correction factor, correcting for rounding error and adding up the adjusted totals for all authorities. The result is exactly equivalent to the actual casualty total (this is why the adjusted figures in columns D and G of the spreadsheet add up respectively to 1,288,946 and 130,452, the actual totals for all recorded casualties and all child casualties as published in RCGB)
10. We repeated exactly the same process using child casualty figures only, to derive a distinct set of correction factors for child casualties (for example: Thames Valley Police reported 3,924 child casualties in the force area including 919 missing postcodes, and 5 Ealing resident children were known to have suffered injury in Thames Valley out of a total of 291 known Ealing resident child casualties altogether)

This algorithm makes certain assumptions, which may affect the results to some degree. These assumptions and their possible consequences are made explicit below.

- a. **Missing casualty postcodes arise mainly because of internal reporting practices within each police force which differ from place to place**, so all STATS19 postcode reporting by any given force is probably affected to about the same extent by this issue regardless of where each individual casualty resides. If this assumption was incorrect, and forces were in fact significantly more likely to report recognised local postcodes than less familiar ones, then the report might slightly overestimate resident casualty figures for authorities where there are unusually high concentrations of local casualties (often those in more rural or remote areas), and conversely slightly underestimate for authorities with unusually high concentrations of non resident casualties (often those in urban areas or containing long stretches of trunk routes).
- b. The reporting of foreign resident casualties in STATS19 appears to be unreliable. In principle, foreign residents should be reported with the special code '2', but in practice only 2,230 instances of this code were returned between 2004 and 2008. At face value, this seems to mean that only 1 casualty for every 578 on Britain's roads is a foreign resident and that less than 0.8% of all casualties reported without a postcode actually live abroad. However, anecdotal evidence suggests there could be significant under-reporting of foreign resident casualties. It is also probable that there are significant inconsistencies between forces in how foreign residents are recorded; for example, Kent Police did not report any casualty postcodes with '2' at all over the entire five year period. Therefore, we take the view that there is insufficient data to represent foreign resident casualties in a robust and reliable manner, so the most consistent and least misleading course of action possible was to **distribute all casualties with unknown postcodes as if they were British residents, including those records containing the foreign resident STATS19 code**. This assumption increases all adjusted resident casualty figures to a small but unquantifiable extent, and may disproportionately affect authorities where an unusually high number of casualties reported in the local force area could in fact be foreign residents (often those containing heavily used points of entry to Britain).
- c. In MAST, postcodes in Northern Ireland are currently reported as 'Unknown'. This is because casualty figures on Northern Ireland's roads do not fall in the scope of STATS19 reporting and therefore are not yet included in MAST. Consequently, the considerations explained above concerning authorities with unusually high foreign resident casualty rates may also apply to any authorities where an unusually high number of casualties reported in the local force area could in fact be residents of Northern Ireland.