Fallout radionuclides 137Cs and 210Pb have been widely used to determine the relative contribution of hillslope erosion to instream sediment loads. In most studies the number of samples collected and analysed to characterise the range of concentrations of these radionuclides in the sediment derived from hillslopes are limited due to the cost of the analyses. Often studies rely on less than 20 samples. Here we examine the distribution of 210Pb and 137Cs in hillslope derived sediments from both tropical and temperate areas of Australia. We show that the distribution are strongly asymmetric and are best approximated as a gamma distribution. These distributions are then related to the known latitudinal variations in fallout and suggestions are made in terms of the appropriate number of samples required to characterise the distribution of concentrations in hillslope derived sediments.