1200 are hardly representative of 80 million homes or 220 million people!!

The Nielsen system for TV ratings in U.S.A.

(Excerpt from article on "Pollsters" from an airline magazine)

"...Nielsen uses a device that, at one minute intervals, checks to see if the TV set is on or off and to which channel it is tuned. That information is periodically retrieved via a special telephone line and fed into the Nielsen computer center in Dunedin, Florida.

With these two samplings, Nielsen can provide a statistical estimate of the number of homes tuned in to a given program. A rating of 20, for instance, means that 20 percent, or 16 million of the 80 million households, were tuned in.
To answer the criticism that 1,200 or 1,500 are hardly representative of 80 million homes or 220 million people, Nielsen offers this analogy:

Mix together 70,000 white beans and 30,000 red beans and then scoop out a sample of 1000. the mathematical odds are that the number of red beans will be between 270 and 330 or 27 to 33 percent of the sample, which translates to a "rating" of 30, plus or minus three, with a 20-to-1 assurance of statistical reliability. The basic statistical law wouldn't change even if the sampling came from 80 million beans rather than just 100,000." ...

Why, if the U.S. has a 10 times bigger population than Canada, do pollsters use the same size samples of approximately 1,000 in both countries?

Answer : it depends on WHAT IS IT THAT IS BEING ESTIMATED.

With n=1,000, the SE or uncertainty of an estimated **PROPORTION** 0.30 is indeed 0.03 or 3 percentage points.

However, if interested in the NUMBER of households tuned in to a given program, the best estimate is 0.3N, where N is the number of units in the population (N=80 million in the U.S. or N=8 million in Canada). The uncertainty in the '**blown up**' estimate of the **TOTAL NUMBER** tuned in is blown up accordingly, so that e.g. the estimated NUMBER of households is

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U.S.A. 80,000,000[0.3 ± 0.03] = 24,000,000 ± 2,400,000
Canada. 8,000,000[0.3 ± 0.03] =  2,400,000 ±   240,000
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2.4 million is a 10 times bigger absolute uncertainty than 240,000. Our intuition about needing a bigger sample for a bigger universe probably stems from absolute errors rather than relative ones (which in our case remain at 0.03 in 0.3 or 240,000 in 2.4 million or 2.4million in 24 million i.e. at 10% irrespective of the size of the universe. It may help to think of why we do not take bigger blood samples from bigger persons: the reason is that we are usually interested in **concentrations** rather than in absolute amounts and that concentrations are like proportions.