



Analysis and assessment of human lead exposure from drinking water and the influencing factors associated with lead

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ABSTRACT

Lead exposure via drinking water is still a major public health concern, mainly in older buildings serviced by lead pipes. Lead concentration can vary widely both in space and time even within a building, however, generally applied monitoring schemes fail to capture the full extent of this variability. The objective of this study was to identify highest risk points within a 4-storey public building and gain better understanding of the drivers of in-building variations in lead concentration. First draw (RDT) and 1 min flushed (F) samples were taken at each tap ($n = 56$) in the building in two sampling periods (summer–spring). In total, 220 samples were analyzed. Lead concentration exceeded the regulatory limit value (10 µg/L) in 62% and 32% of the RDT and F samples respectively. Non-compliant samples were found in every storey of the building, indicating the extensive presence of lead pipes. However, lead concentrations were significantly higher on the upper floors flushing reduced lead concentration in the majority of the cases, but was often insufficient for reaching compliance. Other water quality parameters varied in a narrow range and had limited impact on lead leaching. Results confirmed that in-building variability of lead in drinking water can exceed two orders of magnitude. Representative sampling point in large buildings for single-sample monitoring schemes should be designated at a regularly used tap on the upper levels of the building. Sampling in the warmer months, and collecting pairs of first draw and flushed samples also assist reliable estimation of lead exposure via drinking water.

Keywords: Lead; Drinking water; Water safety; Health risk

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