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# Newcastle Allotments Lead Biomonitoring Study: an investigation into the relationship between allotment soil lead concentrations and the blood lead concentration of gardeners.

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## Abstract

In the UK, the current soil screening level for a ‘low level toxicological concern’ for lead in allotments is 80 mg/kg (DEFRA, 2014). This soil screening level is 10 times lower than that observed on many allotments across Newcastle, a city with a long industrial heritage in NE England. Detailed quantitative risk assessments have been previously carried out on Newcastle’s allotment gardens and Newcastle City Council concluded that, on balance, gardening activities and consumption of vegetables from these sites is a greater benefit than risk to health, however, there is considerable uncertainty in the exposure modelling, with the association between concentrations of lead in soil and blood remaining uncharacterised.

The aim of this study was to determine the relationship between concentrations of lead in garden soils and the blood lead concentration of gardeners to give confidence to regulators who must decide the suitability of a site. Study participants were recruited from three Newcastle allotment sites (BR, TS and MS). Pseudo-total soil lead (aqua-regia extraction) ranged from 62 – 840 mg/kg at BR (mean= 403 mg/kg; n=86), 92 – 810 at TS (mean= 360 mg/kg; n=96) and 58 – 1300 at MS (mean= 312 mg/kg; n=102). Gardeners (n=44) recruited non-allotment gardening neighbours as controls (n = 29). Participants provided blood and saliva samples and helped the team collect soil, vegetable and fruit samples from their plots. To account for confounders, participants provided tap water samples, home dust samples, atmospheric deposition samples and completed a questionnaire on potential exposure factors.

This paper presents the results of the blood Pb survey in conjunction with the questionnaire data to show that urban agriculture on sites containing lead from common urban sources, even at concentrations up to 10 times over the current soil screening value does not result in significantly raised blood lead.

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