



Bi-monthly sampling of heavy-metals in foodcrops eaten by two Zambian families during 2006

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This paper investigates heavy-metal contamination of foodcrops consumed by two families in Chunga, NW Lusaka, the capital of Zambia. Urban agriculture using potentially heavy metal contaminated wastewater is practised extensively providing up to 60% of vegetables consumed in the Chunga locale. The food basket study consisted of fortnightly visits to the Mwanza and Phiri households: two families representative of the study area. During each visit a 24-hour diet recall was conducted for each member of the family and a duplicate sample of the food consumed taken, noting the source of the food. The duplicate sample of food consumed was examined for concentrations of Al, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Cd, Ba, Hg, Tl, Pb, U. The potential health risk of heavy metal contamination can be quantified using the Target Hazard Quotient (THQ), which were developed by the United States Environmental Protection Agency to quantify potential health risk from exposure to both carcinogenic and non-carcinogenic substances. The calculation of THQ include (i) frequency of exposure (number of days per year the food is consumed), (ii) length of exposure (a person's life expectancy), (iii) average body weight, (iv) the mass of food consumed per day, (v) the metal concentration found in the food compared to a reference dose, and (vi) for non-carcinogens an average exposure time. A THQ > 1.0 indicates a potential concern for health. We calculate THQ values for the two families based on (i) heavy-metal concentrations from bi-monthly food basket samples, (ii) the quantities eaten by members of the two families of food crops as estimated using 24-hour diet recall surveys, and (iii) average body mass of people in the region. The foodcrops consumed

include green vegetables (cabbage, Chinese cabbage, pumpkin leaves, rape and sweet potato leaves) and tomatoes. Food crops are grown year round, with Winter (October to February) being the wet season, and the rest of the year (March to September) the dry season. Preliminary THQ values as measured for adults and children, and for individual metals, were found to range during the wet season from 0.010 (Cr) to 173 (Tl), and during the dry season from 0.010 (Cr) to 88.5 (Tl). THQ values for individual metals are additive in the human body, giving total THQs in the hundreds for children and between 40 and 82 for adults, both for the wet and dry seasons. There is no significant difference in the concentration of heavy metals in food grown on urban agriculture plots by the families and food brought from the local market. The results of this food basket study indicate a potential strong concern for health for the population in this representative 'sample' site in Lusaka, Zambia.