

**Title:** Chronic renal failure among farm families in cascade irrigation systems in Sri Lanka associated with elevated dietary cadmium levels in rice and fresh water fish (*Tilapia*) , (Sri Lanka 2007)

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**Abstract:** Chronic renal failure (CRF), in the main agricultural region under reservoir based cascade irrigation in Sri Lanka has reached crisis proportion. Over 5,000 patients in the region are under treatment for CRF. The objective of this study is to establish the etiology of the CRF. Concentrations of nine heavy metals were determined in sediments, soils of reservoir peripheries, water and *Nelumbo nucifera* (lotus) grown in five major reservoirs that supply irrigation water. All five reservoirs carried higher levels of dissolved cadmium (Cd), iron (Fe) and lead (Pb). Dissolved Cd in reservoir water ranged from 0.03 to 0.06 mg/l. Sediment Cd concentration was 1.78–2.45 mg/kg. No arsenic (As) was detected. Cd content in lotus rhizomes was 253.82 mg/kg. The Provisional Tolerable Weekly Intake (PTWI) of Cd based on extreme exposure of rice is 8.702–15.927 µg/kg body weight (BW) for different age groups, 5–50 years. The PTWI of Cd due to extreme exposure of fish is 6.773–12.469 µg/kg BW. The PTWI on a rice staple with fish is 15.475–28.396 µg/kg BW. The mean urinary cadmium (UCd) concentration in CRF patients of age group 40–60 years was 7.58 µg Cd/g creatinine and in asymptomatic persons UCd was 11.62 µg Cd/g creatinine, indicating a chronic exposure to Cd. The possible source of Cd in reservoir sediments and water is Cd-contaminated agrochemicals. The CRF prevalent in north central Sri Lanka is a result of chronic dietary intake of Cd, supported by high natural levels of fluoride in drinking water, coupled with neglecting of routine de-silting of reservoirs for the past 20 years.

**Keywords:** Agrochemicals - Cadmium - Cd in *Tilapia* - Chronic renal failure - Reservoir sediments cadmium - Rice grain cadmium