

Geochemical Relationship between Surface and Subsurface Soils and the Chronic Kidney Disease the North Central Province of Sri Lanka

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Chronic kidney disease (CKD) in the North Central Province (NCP) of Sri Lanka is becoming a major cause of national burden with high human mortality and morbidity. An attempt was made to understand the effect of soil towards the disease. Surface (n=25) and subsurface (n=25, 50 cm depth) soil was collected from Horowpatana (HWP; n=50), Kebithigollawa (KBG; n=50), Medawachchiya (MWC; n=50) and Padawiya (PDW; n=50) area of the NCP where highest number of patients are recorded. The soil samples were analyzed using X-Ray Fluorescence for 22 major and trace elements. All four areas show similar pattern with UCC normalization except a few deviations. However, the Fluoride (F) in MWC and PDW remained in surface soil, HWP in subsurface soil and for KGB in both surface and subsurface soils. The provenance is similar in both surface and subsurface but varies between Dacite and Ryolie starting from PDW, MWC, and KBG to HWP, where some samples of HWP showed high heavy metal contents. However, the provenance for mafic elements showed a different composition for surface and subsurface soils where some KBG subsurface soils were close to ultrabasic composition. Arsenic (As) and zinc (Zn) were highly variable between surface and subsurface soils indicating that they are not only retained in the surface soils. Lead (Pb) retained in the surface soils of all most all the samples for all areas, except PDW that retained Pb in the subsurface soil. Almost all elements showed a high variation in the PDW surface and subsurface soils. The highest CKD patients have been recorded in the Padaviya area where the highest mobility was shown between surface and subsurface soils. Easy mobility of elements into the groundwater of the area could be related to the number of CKD patients recorded.

Key words: Chronic kidney disease, North Central Province, soils, surface, subsurface