

## Risk factors for endemic chronic kidney disease of unknown etiology in Sri Lanka: Retrospect of water security in the dry zone



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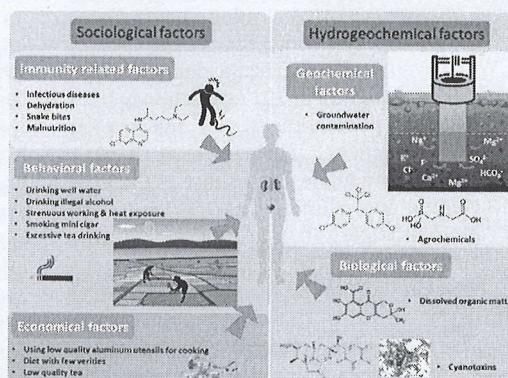
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### HIGHLIGHTS

- Hydrogeochemical, behavioral and sociological risk factors related to CKDu are reviewed.
- More than 98% of CKDu patients consumed groundwater as their primary water source.
- High  $F^-$ ,  $HCO_3^-$  and total dissolved solids are unique in the CKDu endemic areas.
- Evaporation signal is prominent groundwater in the CKDu areas than non-CKDu areas.
- Water-rock interaction in CKDu prevailing areas is gaining considerable attention.

### GRAPHICAL ABSTRACT



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### ABSTRACT

The prevalence of chronic kidney disease of unknown etiology (CKDu) is receiving considerable attention due to the serious threat to human health throughout the world. However, the roles of geo-socio-environmental factors in the prevalence of the CKDu endemic areas are still unknown. Sri Lanka is one of the countries most seriously affected by CKDu, where 10 out of 25 districts have been identified as the areas with the high prevalence of CKDu (10–20%). This review summarizes the geographical distribution of CKDu and its probable geochemical, behavioral, sociological, and environmental risk factors based on research related to hydrogeochemical influences on CKDu in Sri Lanka. More than 98% of CKDu patients have consumed groundwater as their primary water source in daily life, indicating the interactions of geogenic contaminants (such as  $F^-$ , total dissolved solids, Hofmeister ions) in groundwater is responsible for the disease. Apart from the hydrogeochemical factors, mycotoxins, cyanotoxins, use of some herbal medicines, dehydration, and exposure to agrochemicals were alleged as risk factors. Sociological factors, including poverty, living habits and anthropogenic activities, may also provoke the emergence of CKDu. Therefore, the interaction of geo-socio environmental risk factors should be sociologically and scientifically considered to prevent the prevalence of CKDu. Future in-depth studies are required to reveal the individual role of each of the postulated etiological factors, possibly using machine learning and advanced statistics.

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