

## **Chronic Kidney Disease of Unknown Aetiology: A Review of Literature on the Socio-economic Aspects**

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### **Introduction**

The global burden of Chronic Kidney Disease (CKD) continues to increase not only because of its higher prevalence of traditional causes, such as diabetes and hypertension, but also CKD resulting from infections and unknown aetiology. Endemic occurrence of Chronic Kidney Disease of unknown etiology (CKDu) is reported in Sri Lanka, Bangladesh, India, Nicaragua and El Salvador. It has been a prevalent environment-related national health issue for two decades in Sri Lanka. As the term CKD in Agricultural Communities (CINAC) reveals, a close relationship is drawn between agriculture and the particular socio economic status of the farmer and CKDu. It is the eighth factor for mortality in Sri Lanka and reportedly was the cause of 13.8 % of mortality in 2017.

Research in this area claims tentative causes for CKDu which include high fluoride contents in groundwater, presence of toxins produced by cyanobacteria in surface waters, particularly in freshwater reservoirs, excessive use of agrochemicals, consumption of contaminated (heavy metal pollutants from agro-chemicals) and consumption of water-based plants such as nelum and kohila, and Tank fish. Some studies have hypothesized that high concentrations of Cadmium, Arsenic, smoking tobacco, excessive dehydration in the work environment of farmers, and genetic predisposition are factors

contributing to the prevalence of Chronic Kidney Disease of unknown aetiology. Numerous studies have been conducted by a range of institutions and researchers in relation to the problem. However, there is yet to be more research done in relation to this area, more specifically, the lack of identifying definite causes hampers its diagnosis. Moreover much research is to be conducted in exploring the terrain of the socio-economic aspects of the disease. This paper aims at reviewing existing literature in this area.

## **Objective**

Given this background this study is attempting to review available literature on the socio-economic aspects of CKDu in Sri Lanka as well as other countries in the world.

## **Methodology**

Information for this review is congregated using journal articles as well as book chapters from Medical, Science, Environmental and Economics sources.

## **Results and Discussion**

*Main studies conducted in Sri Lanka:* Weerasekara (2017) observes, in a study conducted in Kabithigollewa, indicants of CKDu being, male farmers, who have high risk of CKDu, with a mean age of 60 years. Majority of patients have earned a monthly wage of Rs. 10,000/= and are observed to have scarcely completed education from grade 1 to 5. The studies reveal a pattern where poverty endemic areas connected with the agrarian practices and lifestyle, have a close relationship to CKDu. The author emphasizes educational level, awareness and occupation as factors for the predisposition of CKDu. Ranasinghe et al. (2011) give a detailed analysis of the process and cost of hemodialysis in Sri Lanka and give a proper framework for modeling financial audits. Senanayake (2018) discusses physical suffering and has validated the Chronic Kidney Disease Symptom Index – Sri Lanka, which attempted a quantification of symptom burden compounded through the prevalence and perceived severity of the disease. It also discusses psychological suffering due to effects of the illness, changes in family dynamics functional restrictions etc; social suffering, suffering of family, economic suffering, hospital admissions costs, household costs of dialysis patients and perceptions regarding kidney transplant within the CKDu affected community. Cooray et al. (2019)

investigate water quality of groundwater in North Central Province and its suitability for drinking purposes in the dry zone of Sri Lanka. This study introduces Water Quality Index (WQI) and reveals that only 3.8% in the wet season and 2.6% in the dry season are categorized as excellent WQI. Wijewickrama et al. (2019) try to determine a multilevel clinical case definition that is simple and easy to apply in a resource poor setting and allow participants, CKDu experts, nephrology specialists, experts on primary care, to diagnose CKDu at different levels of specificity. The definition is based on international clinical standards and laboratory criteria and thus can be used to detect CKDu across communities and regions.

*Main studies conducted in other countries:* Johnson and Sanchez - Lozada (2013) provide new findings from first renal biopsies of patients with Mesoamerican nephropathy; exposure to agro-chemicals, heavy metals, silicate, intake of fructose-rich soft drinks, use of non-steroidal anti-inflammatory drug (NSAIDs), tobacco use, and nutritional factors as suspected causes. These causes are repetitive for most CKDu affected areas in the world and is endemic to a certain socio-economic praxis. Hossain et al (2009) discuss how poverty and social deprivation are known to affect the predisposition, diagnosis and management of CKD. He states that that the poor and socially deprived have greater prevalence for end stage renal disease and lesser access to renal care, dialysis and transplantation. López-Marín et al. (2014) characterize the histopathology of CKDu of patients in Salvadoran agricultural communities. It identifies morphological changes in different stages in the evolution of CKDu irrelevant of age, sex and occupation. Abraham et al. (2016) discuss hotspots of CKDu in Sri Lanka and India and draws race and environment as factors for CKDu. There is an emphasis in the discussion of Nephrology care provided in Bangladesh, India, Pakistan, Nepal, Bhutan and Sri Lanka. Orantes-Navarro (2017) discuss hypotheses of CINAC aetiology, the toxic exposure in agrarian societies and heat stress due to regular episodes of dehydration, contaminated environment, and the absence of CINAC in hotter northern Sri Lanka, Myanmar, Cuba where agro-chemicals are scantily used. Ramirez-Rubio et al. (2013) give epidemiological, astrological and public health dimensions of CKD while Caplin et al. (2018) presents a framework for the collection of data to allow CKDu detection to be reproducible and for new studies. The study observes two issues at present, firstly, the scarce and poor quality data collection in many CKDu endemic

areas and secondly, the difficulty in differentiating whether the recorded kidney disease is due to CKDu, where a CKDu biopsy has already provided a diagnosis.

## **Conclusion**

Definite causes for CKDu is constantly debated on by researchers and professionals and the causes are, to date, stipulated causes. Counter- research shows there is yet to be more substantial evidence to prove that agro-chemicals have a strong relationship with CKDu. Most studies support the argument of the relationship between CKDu and water quality or agrochemical usage. However, available literature are only incorporating medical or scientific reasons to identify the causes of it. In this context, more studies are required after incorporating socio-economic, historical, psychological and cultural variables to identify real causes of CKDu in the country. Moreover certain researches, such as Jayasumana (2017) are adamant to prove one factor, such as agro-chemicals, as pivotal for CKDu while not debating the possibility of the multifactorial origin of CKDu. Specially, there is still a need of more research on the case of CKDu and positive steps such as collaborative research among different researchers, institutions and stockholders.

## **References**

- Cooray, T., Wei, Y., Zhong, H., Zheng, L., Weragoda, S. & Weerasooriya, R. (2019). Assessment of groundwater quality in CKDu affected areas of Sri Lanka: Implications for drinking water treatment. *Int. J. Environ. Res. Public Health*, 16(10), 1-16.
- Hossain, P., Goyder, E., Rigby, J. & Nahas, M. (2009). CKD and poverty: A growing global challenge. *American Journal of Kidney Diseases*, 53(1), 166-174.
- López-Marín, L., Chávez, Y., García, X., Flores, W., García, Y., Herrera, R., Almaguer, M., Orantes, C., Calero, D., Bayarre, H., Magaña, J. & Serpas, P. (2014). Histopathology of chronic kidney disease of unknown etiology in Salvadoran agricultural communities. *MEDICC Review* 16 (2), 49 - 54

- Orantes-Navarro, C., Herrera-Valdés, R., Almaguer-López, M., López-Marín, L., Vela-Parada, X., Hernandez-Cuchillas, M., Barba, L. (2017). Toward a comprehensive hypothesis of chronic interstitial Nephritis in agricultural communities. *Advances in Chronic Kidney Disease*, 24(2), 101-106.
- Wijewickrama, E., Gunawardena, N., Jayasinghe, S. & Herath, C. (2019). CKD of unknown etiology (CKDu) in Sri Lanka: A multilevel clinical case definition for surveillance and epidemiological studies. *International Society of Nephrology*, 4(6), 781-785