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An Assessment of the Effectiveness of Drinking Water Purification Systems Used in a CKDu Prone Area: A Case Study from Madawachchiya

Rasanjalee A.A.M.D., Jayasinghe U.A.D., Maithreepala R.A.*

Department of Limnology and Water Technology, Faculty of Fisheries and Marine Sciences and Technology, University of Ruhuna, Wellamadama, Matara
**ramathree@yahoo.com*

Abstract

Chronic Kidney Disease of unknown aetiology (CKDu) has become a severe health problem in Sri Lanka during the last three decades. Madawachchiya is one of the high CKDu prevalent areas in North Central Province of Sri Lanka. Due to lack of safe drinking water, people have to use water purification systems (WPS) at both household and community levels. However, the efficiency of different WPS used by the community is not well documented, therefore, as a case study, this investigation aimed to assess the efficiencies of WPS available in Madawachchiya area. A social survey was conducted initially to collect primary data on sources of drinking water, methods and usage of WPS, from randomly selected 50 houses. Sampling sites for measuring water quality were selected on the basis of available type of WPS which having same age, volume capacity that can be treated. Water samples were collected from both inputs and outputs of selected WPS weekly for a period of six weeks. In situ measurements were taken for temperature, pH, total dissolved solids (TDS) and conductivity of water. Alkalinity, hardness, fluoride, cadmium and arsenic concentrations were measured in the laboratory following standard methods. Results indicated that 12% of houses used household filter systems, and the rest of the houses fulfilled their drinking water requirements by using community level WPS. There were five types of commercially available WPS with different technologies. The ground water source of selected area had comparatively higher pH, hardness, alkalinity, fluoride and TDS than the desirable levels accepted in Sri Lanka. There were different removal efficiencies for each water quality parameter for different WPS ($p < 0.05$). Those efficiencies significantly varied within the same WPS with time. Filter systems with low-improved technologies have lower efficiencies compared to the others. WPS with improved technologies also were unable to produce desired drinking water standards. Therefore, it is recommended to introduce WPS devices, which are able to produce safe drinking water, to people in CKDu affected areas like Madawachchiya.

Keywords: Chronic Kidney Disease (CKDu), Water purification systems, Purification efficiency