

A Spatial Analysis of Chronic Kidney Disease in Vavuniya

BY

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DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Dr. Shirantha Heenkenda and Mr. Prabath Malavige a report on this has not been submitted in whole or in part to any other institution for another Degree/ Diploma

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ABSTRACT

In Sri Lankan context Chronic Kidney Disease (CKD) is identified as non communicable disease. The severity of the CKD is identified in vavuniya after end of the civil war. There is an urgent need to study the spatial distribution of CKD in vavuniya. The aim of the study is used the geo spatial data by using Geographical Information System to analyse the aetiology factors which are influence to distribution of Chronic Kidney Disease associated with geographical aspects. To full the study mainly the patient's details retrived from the regional district of health service and 100 sample patients selected via the Grama Niladhari Division. Questionnaires used as primary data collection, while collecting patient's information that the locational information also gathered to find the spatial distribution. Particularly tested water quality result and spatial data used to identify the causative factors related to CKD.

The study analyzed based on hot spot analysis and weighted sum technique to identify the risk of CKD in vavuniya. When consider the CKD is not only related with the geographical aspect with other socio economic, human behavirial and medical factors. This was qualitatively analyzed through the field data collection. Cosequently Asikulam, Samalankulam, and Poovarasnkulam and Koomankulam area consided as high risk , Sekkadipulavu, Kalmadu, Pampaimadu, Echchankulam, Moonrumurippu , Marekkaranpalai,Thonikal, Thandikulam, Nelukulam and realted area considerd as moderate risk, Vavuniya town, Sasthirikoolankulam, Maharambaikulam, and Katharsinnakulam consired as low risk area as well as Palamoddaitai, Kallikulam, Samalankulam, Maruthamadhuand, Rajendrankulam, Nochchimoddai and related area probably considered as CKD risk free zone. Ultimately the risk area identified with geographical aspects however other social factors like rural dwelling, agriculture, education level, income, consumption pattern, and medical factors also influence to lead the CKD in Vavuniya. The Study could help to control and prevent the CKD distribution in future of vavuniya.

Key Words:

Chronic Kidney Disease, Geographical Information System, Spatial distribution

Chapter One

INTRODUCTION

1.1 Background of the study

Chronic kidney disease (CKD) has become a major public health issue in all around the world. According to the world kidney day, organizational statement that globally 10% of the population is affected by chronic kidney disease and millions die each year because they do not have access to affordable treatment. Generally prevalence of CKD can be identified in both developed and developing countries.

Over 2 million people worldwide currently receive treatment with dialysis or a kidney transplant to stay alive, yet this number may only represent 10% of people who actually need treatment to live. The majority are treated in only five countries – the United States, Japan, Germany, Brazil, and Italy. These five countries represent only 12% of the world population. Only 20% are treated in about 100 developing countries that make up over 50% of the world population. In middle-income countries, treatment with dialysis or kidney transplantation creates a huge financial burden for the majority of the people who need it. In another 112 countries, many people cannot afford treatment at all, resulting in the death of over 1 million people annually from untreated kidney failure (Couser et al., 2011).

According to the national kidney foundation's report that the CKD is a condition characterized by a gradual loss of kidney function over time. Chronic kidney disease includes conditions that damage kidneys and decrease their ability to keep healthy by doing the jobs listed. If kidney disease gets worse, wastes can build to high levels in blood and make feel sick. And develop complications like high blood pressure, anemia (low blood count), weak bones, poor nutritional health and nerve damage. Also, kidney disease increases the risk of having heart and blood vessel disease. These problems may happen slowly over a long period of time. When kidney disease is in progresses, it may eventually lead to kidney failure, which requires dialysis or a kidney transplant to maintain life.

When consider about the common causes of CKD include diabetes mellitus, hypertension, urological diseases and glomerulonephritis. Toxins, collagen vascular diseases and infections are rare causes of CKD. On the other hand early investigators had noticed high incidence of a new form of chronic kidney disease of unknown aetiology (CKDu) was not related to any of the known causes such a diabetes mellitus, hypertension and infection (Wanigasuriya et al.,2008). However in 2008, the World Health Organization(WHO) together with the Ministry of Healthcare(MOH) and Nutrition launched the National Research Programme for CKDu committed as histopathology of affected kidneys showed tubulo interstitial nephritis, which is suggestive of a toxic aetiology. Researchers who investigated the CKD disease proposed a number of risk factors including high level of fluoride in ground water, heavy metals such as cadmium, exposure to inorganic pesticides, use of aluminum containers for cooking.

Geographic “hot spots” of CKD have emerged in a number of countries, including El Salvador, Guatemala, Mexico, Nicaragua, Bulgaria, Croatia, Serbia, India, and Sri Lanka, with an estimated more than 50,000 patients diagnosed with late-stage kidney disease (Myles et al.,2014). CKD cases in Sri Lanka are concentrated in the North Central and North Western provinces and are also appearing in the Uva, Eastern, and Northern Provinces. Collectively, these five provinces have a resident population of over 2.5 million people. According to a news report following a December 2013 symposium on CKD organized by the National Academy of Sciences of Sri Lanka, experts at the symposium estimated that the number of CKDupatients in the endemic areas was 20,336, and that this number was likely to reach over 25,000 by the end of 2013(Alwis,2013).

Chronic kidney disease is a long-term health condition that in many cases is preventable. Many people do not know they have kidney disease, because up to 90% of kidney function can be lost before symptoms are evident. Fortunately, simple tests performed by a general practitioner can identify most cases of CKD when the disease is in its early stages, enabling treatment to prevent or slow progression (Australian Institute of Health and Welfare, 2009).

In Sri Lanka high incidence of chronic kidney disease has been identified from early ninteies in some part of dry zone in the country. The disease is characterized by a slow, progressive, asymptomatic development, frequently starting at a younger age group. A steady increase of this disease has been observed during the last twenty five years in Sri Lanka.

At present, in the local context burden of CKD is identified as severe health problem. Especially in North Central Province (NCP), namely Kabithigollawa, Medawachchiya, Medirigiriya, Nikawewa and Padaviya (Sunethra et al.,2014). On the other hand incidence of CKD is also recorded in Vavuniya district of Northern Province (NP) in recent past. Mainly the CKD is related with deprived economic burden on the patient, family, community as well as to the whole country.

Although many studies was carried out about CKD by different research groups in Sri Lanka in different dimensions, however a comprehensive epidemiological study has not yet been reported in Vavuniya district related to CKDu with the spatial analysis. When consider about the incidence of the CKD that might be seen in past history. However the burden of CKD gradually increases with some extent. Since due to internal war disturbances, people were not much concern with the cause of death and sufferings. At the same time there was a gap identified in collecting and maintain proper record about incidence of CKD however after the end of civil war there was a proper operation channels form to identify the diseases in Vavuniya. Accordingly impact of CKD is highly experienced as s health issues among the district.

In the real world Geographic information systems (GIS) is identified as a powerful tool to minimize and solve the problem in any sector as well as in the health sector. GIS consists of a special type of computer program capable of storing, editing, processing, and presenting geographic data and information as maps (Ramsey et al., 2007). “There has been an increasing interest in applying GIS into health and healthcare research in recent years” (Sanati and Sanati 2013). Geographic Information System (GIS) has ability to provide methodologies such as mapping and spatial analysis for researchers. There are two advantages offered by GIS for mapping and spatial analysis to exploring

the health data visually and investigating the spatial relationship between health outcomes and potential risk factors of CKD.

Although there were many studies undertaken by different researchers about prevalence and impact of CKD, currently there are few published research studies by health geographers which have focused on the spatial variability in the prevalence and impact of CKD. Furthermore, no such study has been carried out within Vavuniya. Therefore, the originality of this study lies in the spatial analysis of CKD using geographical information systems (GIS) to identify the distribution of CKD in Vavuniya. In addition to this the study would equally contribute to an understanding of the spatial impact of CKD in local settings as no published studies related to spatial distribution of CKD in Vavuniya. Therefore the study hoped to carried out with the help of GIS spatial analysis to find out geographical distribution of CKD in Vavuniya and it will contribute to the improve the awareness and help to manage the prevention of CKD within the study area.

1.2 Problem Statement

In Sri Lankan context non communicable disease (NCD) is identified as a threaten to the country. Kidney disease is considered as one of them. In local context occurrence of the CKD is increasing day by day. Mainly number of patients and disease related deaths have been increased. According to the ministry of health report that about 60,000 patients suffering from chronic kidney disease throughout the island. On the other hand from the ground view of 2015 that the government statistics indicate incidence of deaths over 2000 due to CKD. Due to the high cost involvement and the poor outcome that the prevalence of chronic kidney failures posing high burden to health sector in Sri Lanka. Currently in nation CKDu is identified as one of the most burning environment-related health issue.

Chronic kidney disease is ranked as 9th causative factor for mortality of the country. Primarily the severity of the disease and high incidence of CKD is identified in Anuradhapura district. Based on the available information, in the nation it is estimated

that the affected area covers approximately 17,000 km² with a population of approximately 2.5 million, in which, more than 95% live in rural areas. Each day approximately 13 middle aged male farmers are dying from Chronic Kidney Diseases in the North central Province. (Noble et al.,2014). Due to the impact of CKD human resources are losing from the country.

In this manner Regional District Health (RDH) reported that in recent past there are more than 2000 CKD cases identified in the district and still the screening process of CKD was undertaken by RDH of Vavuniya. Simultaneously under the leading cause of death category in district that CKD is identified as 2nd causative factor for mortality. Therefore in recent past that the burden of CKD is severely identified in study area. Normally incidence of CKD occurred due to the diabetic and hypertension. However causes of CKD of unknown origin are emerged to the society in recent past. But the burden of the disease was obviously recognized in Vavuniya after end of the civil war. Because in past there was poor identification of causative factors and lack of concentration in cause of deaths. However there is various research groups including scientists, biologists, geologists, chemists, geographers, medical experts are being under investigation about aetiology of CKDu. As a result of that each research studies conduct to focusing the causative factors of CKDu with in different perspective. However the distribution of CKD and root of the disease is still in question.

Consequently on the basis a major intervention is needed immediately to prevent premature deaths and to stop the separate of this disease. Consequently in some families there are no surviving adult men. Therefore this research is much needed to be done urgently to prevent from this health issue. There were many researchers undertaken to identify the factors which influence of CKD in Sri Lanka. At the same time some of the researches undertaken in study area to identify the distribution of CKD. However there is no any strong evidence to prove the distribution of CKD in Vavuniya. Mainly this research undertaken to analyze the spatial distribution of CKD within Vavuniya by using advanced mapping GIS & GPS technology.