

Application of Systems Thinking to CKD in India

Executive Summary

Chronic Kidney Disease (CKD) poses a huge healthcare and financial burden in developing countries such as India where the population is tremendous and the percentage of people with limited access to quality healthcare services is huge. This report intends to critically analyze the implementation of systems thinking in the management of CKD in India by involving key stakeholders, identifying potential barriers, and determining appropriate interventions to overcome them. The objectives here are to consider the challenges in implementing a systems thinking approach and proposing ways by which these challenges can be overcome.

The implementation of a systems thinking approach involves three important stages – intervention structuring, causal loop modeling, and implementation planning. As a first step, it is important to identify stakeholders belonging to various sectors and asking them to list the problems faced in management of CKD in India. Once this is done, specific interventions can be proposed to overcome these problems and causal loop diagrams can be created for obtaining feedback from the system.

Introduction

A systems thinking approach in public health refers to an integrated involvement of different healthcare and non-healthcare associated systems to address a common health issue that is plaguing key stakeholders in these systems. In this approach, the inter-relationships between the different aspects of each system are considered and their contribution to the prevalence of a particular disease is challenged. It is based on the saying that “the whole (of the system) is more than the sum of its parts”. The constituents of a system, if considered separately, cannot give in-depth insights regarding a public health issue. Therefore, an integrated approach to viewing all systems in tandem can give deeper insights regarding system dynamics in healthcare (Chughtai and Blanchet, 2017). This report analyzes the implementation of the systems thinking approach to one such chronic condition in India – Chronic Kidney Disease (CKD).

Chronic Kidney Disease in India: An Overview

With the increase in human life expectancies, the number and diversity of chronic conditions in the human body have also increased. In developing countries such as India, chronic conditions are predicted to account for almost 66% of deaths in 2020 (World Health Organization, 2005). In recent years, most public health awareness programs have focused on diabetes, cardiovascular diseases, and hypertension; however, the global financial burden of chronic kidney disease is on the rise and this has highlighted the need for taking immediate steps to prevent and manage this condition in both developed and developing countries (Agarwal and Srivastava, 2009).

The high prevalence of CKD in India may be attributed to several direct and indirect factors such as low birth weight, hypervitaminosis A, small kidney volumes, and low estimated Glomerular Filtration

Rate (eGFR). Congenital kidney diseases can manifest as serious kidney function problems in adults, and these usually occur due to poverty, overcrowding, poor sanitation, and constant exposure to nephrotoxins. Additionally, the two important risk factors for CKD, diabetes and hypertension, have increased in numbers tremendously and these predispose individuals to CKD in later life. Currently, India lacks screening programs for CKD, sufficient dialysis units, sufficient numbers of nephrologists, and an organized systems thinking approach to tackle this health issue (Varughese and Abraham, 2018).

Roles of Stakeholders in Addressing CKD in India

It is quite evident that India doesn't have the managerial or financial resources required to address CKD. Some of the people who are actively involved in managing this condition include physicians, nurses, nephrologists, community health workers, and social health activists; however, they lack the training and resources needed to effectively address CKD in different strata of the Indian population. These stakeholders fall within the field of healthcare and it is their major responsibility to acquire information and the necessary resources to address the risk factors and complications of CKD in Indian patients (Jafar et al., 2020).

The government is an important stakeholder too, and several state governments have initiated schemes such as the Employees State Insurance Scheme and the Chief Minister's Comprehensive Health Scheme. However, these schemes are not accessible by all and most of them don't cover complications of CKD. Finally, the patients who are suffering from or who have a strong predisposition for CKD are the most important stakeholders as they bear the major brunt in terms of health as well as financial resources. They need to acquire information regarding their health status and predisposition to CKD and undertake measures to prevent or delay its onset (Jafar et al., 2020).

Obstacles to Applying Systems Thinking in Management of CKD

System thinking approach is often applied to healthcare systems to understand their functioning over time by making use of causal linkages between the various system components. The central premise of this approach is that the structure of the system is directly translated into its observed behaviour (Dutta et al., 2018). Despite the many proven benefits of the application of systems thinking to the area of public health, there are several challenges in its implementation. The most important of these is a lack of extensive and in-depth planning and evaluation systems in India that are continuous, adaptive, and can give constant feedback (Trochim et al., 2006). As this approach makes accountable different people belonging to different sectors, it becomes challenging to ensure honesty and accuracy in the end result. It requires a strong balance between the biological system, organizational system, and political system, and harmony between these three systems is essential for the implementation of systems thinking in healthcare (Leischow and Milstein, 2006).

Application of Systems Thinking in the Management of CKD

A system for the management of CKD is composed of several participants including patients, healthcare providers, political organizational members, and policy makers. The interaction between these participants is dynamic and so, a linear approach is not sufficient to describe the interplay and

complexity of such a system. Therefore, it is essential to use a non-linear feedback system to describe and analyze the relationships between the key stakeholders for CKD (Kang et al., 2017).

In general, systems thinking approach for CKD needs to be implemented in three stages. The first stage should be intervention structuring where problems should be identified in the current system on the basis of interviews with stakeholders and appropriate interventions should be noted for each problem. In the second stage, causal loop modeling should be done where the main variables of the system are identified such as costs for CKD care, insurance status of patients, and government policies surrounding CKD. Once this is done, a causal loop diagram should be created that can pictorially represent the causal links between these variables. The third stage should be implementation planning wherein the interventions listed previously are prioritized based on the situational context, and the selected interventions are implemented under proper guidance of the authorities (Kang et al., 2017).

Conclusion

CKD is one of those non-communicable diseases that hasn't received sufficient attention in terms of healthcare services, and prevention and management measures. In developing countries like India, the burden of CKD is tremendous and the number of people at risk for this disease is huge. The application of a systems thinking approach to the management of CKD in India can bring together all the key stakeholders belonging to different sectors and hold them accountable for CKD care services. It can also help identify barriers to winning the fight against CKD at the systems level and address these barriers individually.

Recommendations

- The risk factors for CKD in different urban and rural regions of India need to be identified and monitored.
- Key stakeholders of CKD need to be identified and involved in decision-making processes regarding CKD.
- Systems thinking experts need to be consulted to set up accurate causal loop diagrams to generate causal links for better feedback control.

References

- Agarwal, S., & Srivastava, R. (2009). Chronic Kidney Disease in India: Challenges and Solutions. *Nephron Clinical Practice*, 111(3), C197-C203. doi:10.1159/000199460
- Chughtai, S., & Blanchet, K. (2017). Systems thinking in public health: A bibliographic contribution to a meta-narrative review. *Health Policy and Planning*. doi:10.1093/heapol/czw159
- Dutta, A., Roy, R., Abraham, B. P., & Seetharaman, P. (2018). *Public Health System Performance Challenges in India: A Systems Thinking Approach* (pp. 1-29, George Mason University School of Business Research Paper No. 18-4). doi:10.2139/ssrn.3108755
- Jafar, T. H., Ramakrishnan, C., John, O., Tewari, A., Cobb, B., Legido-Quigley, H., . . . Jha, V. (2020). Access to CKD Care in Rural Communities of India: A qualitative study exploring the barriers and potential facilitators. *BMC Nephrology*, 21(1). doi:10.1186/s12882-020-1702-6
- Kang, H., Nembhard, H. B., Curry, W., Ghahramani, N., & Hwang, W. (2017). A systems thinking approach to prospective planning of interventions for chronic kidney disease care. *Health Systems*, 6(2), 130-147. doi:10.1057/hs.2015.17
- Leischow, S. J., & Milstein, B. (2006). Systems Thinking and Modeling for Public Health Practice. *American Journal of Public Health*, 96(3), 403-405. doi:10.2105/ajph.2005.082842
- Trochim, W. M., Cabrera, D. A., Milstein, B., Gallagher, R. S., & Leischow, S. J. (2006). Practical Challenges of Systems Thinking and Modeling in Public Health. *American Journal of Public Health*, 96(3), 538-546. doi:10.2105/ajph.2005.066001
- Varughese, S., & Abraham, G. (2018). Chronic Kidney Disease in India. *Clinical Journal of the American Society of Nephrology*, 13(5), 802-804. doi:10.2215/cjn.09180817
- World Health Organization. (2005). *Preventing Chronic Disease: A Vital Investment* (Rep.). Geneva: WHO.