

A Study on Remote Healthcare System Consumers in Developing Countries

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論 文 内 容 の 要 旨

New methods and tools in the healthcare sector are growing gradually through the continuing innovation in medicine and technologies. Along with the scarcity of medical infrastructure and the speedy advancement in Information and Communication Technology (ICT), remote healthcare systems, such as eHealth, mHealth, telemedicine, and telemonitoring, are receiving paramount consideration worldwide. According to the World Health Organization (WHO), more than one-quarter of the world's countries including Bangladesh have a critical healthcare workforce shortage. Henceforth, eHealth is an important way to solve the scarcity of current medical facilities.

Because of the potential benefits and various eHealth initiatives in place, many studies have been conducted to determine the acceptance of eHealth technology. However, most were conducted in developed countries, such as European countries, the United States, Canada, and Australia. Although the deployment of eHealth technology is essential for developing countries where access to quality healthcare is hindered by poor governmental policies, political crises, and lack of a healthcare infrastructure, very few studies were conducted. Despite the potential benefits, the adoption rate of eHealth technology by citizens in Bangladesh is still low. Yet, no study focused on the use of eHealth technology by urban corporate people in Bangladesh.

Therefore, the goal is set to understand the consumer behavior of eHealth among the urban corporate people of Bangladesh for better management of NCDs by ensuring a time and cost-effective healthcare service. To gain this overall goal, the study has identified several specific objectives stated below:

1. To identify the factors that affect consumers' acceptance of eHealth to propose a modified eHealth technology acceptance model for urban corporate people.
2. To predict blood uric acid value through machine learning approaches.
3. To redesign the PHC architecture for tackling the emergency situation, like COVID-19.

Data were collected from a sample of 271 employees of Grameen Bank Complex, Dhaka, Bangladesh. A simple random sampling method was used to collect data from the respondents. Four types of data were collected such as socio-demographic, dietary habits, psychological factors to use eHealth technology, and clinical measurements. Various statistical tools including descriptive statistics, factor analysis, reliability test, structural equation model, correlation and multinomial logistic regression models and machine learning algorithms were used to analyze the data. The major

findings and contributions of this research are listed below:

First, the study identified the key factors that can contribute in increasing the future use of a PHC system. The key to promoting the future use of a PHC system lies in the three most important factors: perceived usefulness (0.659), intention to use (0.454), and health awareness (0.447). These factors have a positive and direct influence on use. The findings offer proactively important and practical guidelines to service providers, implementers, and policymakers to promote the use of eHealth technology for regular health checkups.

Second, the study predicted the blood uric acid through machine learning approaches. The mean of uric acid measurement was 6.63 mg/dL. That means the uric acid of most of the people is close to the borderline (6.63 mg/dL whereas the normal range <7.0 mg/dL). Therefore, they need to check uric acid regularly. This study evaluated five machine learning approaches such as Boosted Decision Tree Regression, Decision Forest Regression, Bayesian Linear Regression, and Linear Regression. The Boosted Decision Tree Regression model showed the best performance among other models based on the Root Mean Squared Error (RMSE) 0.03, this RMSE is better than any reported in the literature.

Third, this study used the WHO guidelines and Design Science Research (DSR) framework to redesign the Portable Health Clinic (PHC), an RHS, for the containment of the spread of COVID-19 as well as proposed corona logic (C-Logic) for the main symptoms of COVID-19. This system is applied among 1116 people in Bangladesh. The logic classified them into five classes. It saved pressure on hotline 27%, and saved PCR test 73%. The consumer behavior of this new system is not analyzed yet.

The findings of this research are expected to offer proactively important and practical guidelines to service providers, implementers, and policymakers to promote the use of eHealth technology for regular health checkups. The findings can also contribute to the establishment of combined actions to improve NCDs management in the context of limited resources. Finally, the machine learning prediction model will assist for improving awareness among high-risk subjects. Theoretically, this study contributes to design science research (DSR) by introducing a modified healthcare providing model.

This study is limited by geographical scaling as the survey was conducted in one country and focused on only 18 institutions. Thus, the results may raise a concern over the generalizability of the findings, and scope exists to make the findings more generalized by examining additional countries and institutions. Given the cross-sectional design, the present study cannot determine the actual use, hence, a future study should consider a longitudinal approach.