

# A Summary of Recent Studies Published by DIU Researchers



**SUSTAINABLE  
DEVELOPMENT  
GOALS**



**Daffodil**  
*International*  
**University**

The researchers of Daffodil International University (Faculty, Students, Alumni) have conducted a number of research projects related to SDG 3 (Good Health & Wellbeing) and results of the projects have also been published as research papers in various international reputed peer reviewed and Scopus indexed journals. The summary of the research publications related to SDG 3 are given below:

### **1. Diabetes among adults in Bangladesh: changes in prevalence and risk factors between two cross-sectional surveys**

1. Muhammad Abdul Baker Chowdhury, Department of Neurosurgery, University of Florida, Gainesville, Florida, USA
2. Mirajul Islam, Department of Statistics, University of Dhaka, Dhaka, Bangladesh
3. Jakia Rahman, Department of Mathematics and Natural Sciences, BRAC University, Dhaka, Bangladesh
4. Md Jamal Uddin, Department of Statistics, Shahjalal University of Science and Technology, Sylhet, Bangladesh & Department of General Educational Development (GED), Daffodil International University, Dhaka, Bangladesh
5. Md. Rabiul Haque, Department of Population Sciences, University of Dhaka, Dhaka, Dhaka District, Bangladesh

### **Abstract**

#### **Objective/research question:**

To investigate the change in the prevalence and risk factors of diabetes among adults in Bangladesh between 2011 and 2018.

#### **Design:**

The study used two waves of nationally representative cross-sectional data extracted from the Bangladesh Demographic and Health Surveys in 2011 and 2017–2018.

#### **Setting:**

Bangladesh.

**Participants:**

14 376 adults aged  $\geq 35$  years.

**Primary outcome:**

Diabetes mellitus (type 2 diabetes).

**Results**

From 2011 to 2018, the diabetes prevalence among adults aged  $\geq 35$  years increased from 10.95% (880) to 13.75% (922) ( $p < 0.001$ ), with the largest relative increase (90%) among obese individuals. Multivariable logistic regression analysis identified age and body mass index (BMI) were the key risk factors for diabetes. Adults who were overweight or obese were 1.54 times (adjusted OR (AOR): 1.54, 95% CI: 1.20 to 1.97) more likely to develop diabetes than normal-weight individuals in 2011, and 1.22 times (AOR: 1.22, 95% CI: 1.00 to 1.50) and 1.44 times (AOR: 1.44, 95% CI: 1.13 to 1.84) more prone to develop diabetes in 2018. Other significant risk factors for diabetes were marital status, education, geographical region, wealth index and hypertension status in both survey years.

**Conclusion**

A high prevalence of diabetes was observed and it has been steadily increasing over time. To enhance diabetes detection and prevention among adults in Bangladesh, population-level interventions focusing on health education, including a healthy diet and lifestyle, are required.

**Data availability statement**

Data are available upon reasonable request. All data presented here in the manuscript is freely available at [dhsprogram.com](http://dhsprogram.com).

<http://creativecommons.org/licenses/by-nc/4.0/>

## 2. Diabetes Complication Prediction using Deep Learning-Based Analytics

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### **Abstract:**

The high levels of blood sugar (or glucose) that occur in diabetes can damage organs such as the heart, blood vessels, eyes, kidneys, and nerves in time. Type 2 diabetes typically affects adults and is most prevalent in adults due to an insufficient supply of insulin. On the other hand, Diabetes type 1, also known as juvenile diabetes or insulin-dependent diabetes, is a chronic disease in which the body cannot produce insulin on its own. Diabetes prevalence has increased over the past three decades at every income level. Affordable treatment is vital for those with diabetes. Several cost-effective interventions can improve patient outcomes. However, a diagnosis of this disease can be costly and difficult. The aim of this research is, therefore, to demonstrate a comparative analysis and improved performance using deep learning to classify diabetic and non-diabetic patients that will provide a feasible way to diagnose this chronic disease. In this work, we used a neural network model with very low variance applying the synthetic minority oversampling technique to augment and improve the variety of data. By removing imbalances and classifying diabetes based on different features, our model achieved an accuracy of approximately 99 % for training and 98 % for validation.

### **Keywords**

- [Diabetes](#) ,
- [Deep-Learning](#) ,
- [Comparative-Analysis](#) ,
- [TensorFlow](#) ,
- [ROC](#)

### **3. Understanding the omicron variant (B.1.1.529) of SARS-CoV-2: Mutational impacts, concerns, and the possible solutions**

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## Highlights

- In South Africa, WHO designated the first cases of the SARS-CoV-2 Omicron variant (B.1.1.529).
- This variation is notable for having an extremely high number of spike protein mutations.
- Omicron has about 50 mutations, particularly 32 spike protein mutations.
- Omicron considers the most common variant in South Africa as an alternative to Delta.

## Abstract

Despite many nations' best efforts to contain the so-called COVID-19 [pandemic](#), the emergence of the SARS-CoV-2 Omicron strain (B.1.1.529) has been identified as a serious concern. After more than two years of COVID-19 pandemic and more than a year of worldwide vaccination efforts, the globe will not be free of COVID-19 variants such as Delta and Omicron variants. According to current statistics, the Omicron variant has more than 30 mutations when contrasted to other VOCs such as Alpha (B.1.1.7), Beta (B.1.351), and Delta (B.1.617.2). High numbers of changes, particularly in the spike protein (S-Protein), raise worries about the virus's capacity to resist pre-existing immunity acquired by vaccination or spontaneous infection and antibody-based therapy. The Omicron variant raised international concerns, resuming travel bans and coming up with many questions about its severity, transmissibility, testing, detection, and vaccines efficiency against it. Additionally, inadequate health care infrastructures and many immunocompromised individuals increase the infection susceptibility. The current status of low vaccination rates will play a significant role in omicron spreading and create a fertile ground for producing new variants. As a result,

this article emphasizes the mutational changes and their consequences. In addition, the potential preventing measures have been examined in detail.

### **Keywords**

- Variant of concern (VOC)
- Omicron variant (B.1.1.529)
- SARS-CoV-2
- COVID-19

## **4. Machine Learning Approaches to Predict Breast Cancer: Bangladesh Perspective**

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Part of the [Smart Innovation, Systems and Technologies](#) book series (SIST, volume 302)

### **Abstract**

Nowadays, Breast cancer has risen to become one of the most prominent causes of death in recent years. Among all malignancies, this is the most frequent and the major cause of death for women globally. Manually diagnosing this disease

requires a good amount of time and expertise. Breast cancer detection is time-consuming, and the spread of the disease can be reduced by developing machine-based breast cancer predictions. In Machine learning, the system can learn from prior instances and find hard-to-detect patterns from noisy or complicated data sets using various statistical, probabilistic, and optimization approaches. This work compares several machine learning algorithms' classification accuracy, precision, sensitivity, and specificity on a newly collected dataset. In this work Decision tree, Random Forest, Logistic Regression, Naïve Bayes, and XGBoost, these five machine learning approaches have been implemented to get the best performance on our dataset. This study focuses on finding the best algorithm that can forecast breast cancer with maximum accuracy in terms of its classes. This work evaluated the quality of each algorithm's data classification in terms of efficiency and effectiveness. And also compared with other published work on this domain. After implementing the model, this study achieved the best model accuracy, 94% on Random Forest and XGBoost.

### **Keywords**

- Breast cancer prediction
- Machine learning algorithms
- Random forest
- XGBoost

## **5. Predicting the mental health of rural Bangladeshi children in coronavirus disease 2019**

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International Journal of Electrical and Computer Engineering, Vol. 12(5)

### **Abstract**

The novel coronavirus disease 2019 (COVID-19) current pandemic is a worldwide health emergency like no other. It is not the only COVID-19 infection in infants, children, and adolescents that is causing concern among their families and professionals; there are also other serious issues that must be carefully detected and addressed. Major things are identified due to COVID-19, some elements are affecting children's healthcare in direct or indirect ways, affecting them not just from a medical standpoint but also from social, psychological, economic, and educational perspectives. All these factors may have affected children's mental development, particularly in rural settings. As Bangladesh faces a major challenge such as a lack of public mental health facilities, especially in rural areas. So, we discovered a method to predict the mental development condition of rural children that they are facing at this time of COVID-19 using machine learning technology. This research work can predict whether a rural child is mentally developed or mentally hampered in Bangladesh and this prediction gives nice feedback.

### **Keywords**

accuracy rate; coronavirus disease 2019; machine learning; mental health of rural children; support vector machine;