Chapter 9
Using Data Mining Techniques to Predict Obstetric Fistula in Tanzania:
A Case of CCBRT

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ABSTRACT

DM practices in medical sciences have brought about improved performance in analysis of large and complex datasets. DM facilitates evidence-based medical hypotheses. Nowadays, health diseases, especially obstetric fistula, are increasing. CCBRT reports, approximately 3,000 women suffer from obstetric fistula annually. Since efforts to eradicate obstetric fistula have been inadequate, the researcher was motivated to employ MLA in BIO informatics to detect obstetric fistula. The purpose of this chapter was to use DM techniques to predict obstetric fistula. The datasets involving 367 patient records from January 2015 to February 2019 were collected from CCBRT. The environment was used to describe the accurate of predictive model was CV, ROC, and CM. The research was performed using six different MLA. The accuracy performance between algorithms shows that LR has better accuracies of 87.678%, precision measures of 91%, recall measures of 82%, f1-score measures of 86%, and support measures of 74%. Thus, the researcher chose to use LR as the proposed obstetric fistula prediction model.

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INTRODUCTION

Data mining is the process of discovering hidden information from existing huge dataset. An important inspiration in data mining is whether the huge datasets should be handled statically or dynamically. In general, statically data is easy to handle as it is compared to other format of data storage and stored more easily. On the other hand, dynamically data refers to high volume and data that continues changing to refined information, which are not stored easily for analysis and processing like statical data. It is often difficult to maintain dynamically data because it changes with timeline (Durairaj & Ranjani, 2013).

Data Mining algorithms is one of the several crucial steps in Knowledge Discovery in Databases (KDD), that is known as the non-trivial process of verifying a validity patterns in crude datasets, and including the use of explorative algorithms to identify meaningful patterns in data with acceptable computational efficiency (Zadeh, Rezapour, Sepehri, & Cart, 2014). Most of DM algorithms are used to analyze the data of interests. Data can be in form of sequential, video signals, audio signals, and time series (Gera & Goel, 2015).

In health sector, DM provides several benefits such as detection of frauds in health insurance, availability of low cost medical solutions for patients, detection of the causes of diseases, and the identification of medical treatment methods. Many studies have been conducted to find solutions for patient diseases using DM techniques such as the study conducted by Idowu, Williams, & Balogun, (2015) which focused on breast cancer prediction by using DM classification techniques; Kamaraj & Priyaa, (2018), which focused on heart disease prediction using DM, and Gharibdousti, Azimi, Hathikal, & Won (2018) which focused on prediction of the chronic kidney diseases by using DM techniques. In addition, most studies show that the existing approaches are related to data-mining prediction for specific diseases like kidney failure, heart disease, and breast cancer. However, to the best of our knowledge, there are few works done to predict the occurrence of obstetric fistula, the disease that severe impact to pregnant women but have received little campaign and attention like malaria and HIV/AIDS. This study aims to apply DM techniques to predict the occurrence of obstetric fistula.

Obstetric fistula is childbirth injury caused by unrelieved, or prolonged labor. This obstructed labor can be developed during the second stage of labor when the fetus cannot fit through the birth canal due to the small size of the pelvis, the baby head is too big, or because there is a mal-presentation. If the woman cannot die, the pressure of the baby head to the mother's pelvis can cause the death of the tissue in the birth canal, meanwhile it creates a hole called obstetric fistula. Then from these hole, the urine or feces can constantly leak without any control (Ryan, 2017). Despite measures taken by the government, non-governmental organizations, and United Nations Agencies, obstetric fistula is not a problem in developed and industrialized countries but remains a health problem in developing countries, which face challenges due to lack of health access facilities, including Tanzania. Obstetric fistula can be prevented and treated, although untreated conditions remain prevalent in developing countries, including Tanzania (Narions, 2017). To the best of our knowledge, there are a few findings that have been conducted to solve the problem of obstetric fistula using DM techniques. This include the study conducted by Tefera, Mola, Jemaneh, & Doyore, (2014) that is concerned with the application of DM techniques on prediction of urinary fistula surgical repair outcome: the study was done in Addis Ababa Fistula Hospital, Ethiopia. Despite of the efforts that have been taken, the problem of obstetric fistula is still increasing in Africa and Tanzania. Over 3,000 Tanzanian women per year develop obstetric fistula after childbirth as a result of obstructed labor and the unavailability of emergency care and treatments (Sitan, 2015). Therefore, based on the aforementioned shortcomings, there is justification for conducting this study. Obstetric