A REVIEW OF MOTHER CHILD MORTALITY RATE USING DATA MINNING TECHNOLOGY

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ABSTRACT

Mother–child Mortality rate is high mostly in Sub Saharan Africa. In Nigeria several intervention schemes have been developed to reduce mother child mortality rate. The intervention includes improving access to skilled health professionals during pregnancy and at the time of birth, life saving intervention such as immunization, breastfeeding, and inexpensive medicine and so on. There are also records of mobile application to address mother child mortality rate. While these interventions have contributed to reducing mother child mortality rate. The rate at which mother child mortality deaths occur is still high. There is no technology based intervention scheme that analyzes and classify data for real time dissemination to stakeholders for intelligent decision making in Nigeria. To close this knowledge gap, this research work proffers a technology that leverages on the potentials of the web application, robust database and data mining techniques to achieve the objective. The system through web application collects mother child mortality rate data across different hospitals, stores them in the central database for classification. K Means clustering technique of data mining technology is used for classification, afterwards the insight gained is shared to stakeholders for intelligent intervention decision making. Object oriented methodology was utilized in the system. The result generated helps to analyze mortality rate based on state, cause of death and giving their percentages. Intelligent decision on the right intervention for the right focus group makes government intervention scheme effective in mother child mortality rate control

Key Words: Data mining, ICT, Mortality. Immunization, breastfeeding

1.1 INTRODUCTION

Universally childbirth is an event that attracts celebration, but this is not so for many women who experience childbirth as suffering and tragedy that may end in death. The state of maternal, newborn and child health is an important indicator of a nation's health care delivery system and the level of the society's development. Previous efforts to meet the Millenium Development Goals (MDGS) on the reduction of maternal and child mortality in Nigeria have shown only marginal reductions in the last five years, making the MDGs targets by 2020 clearly unachievable using current strategies alone (Mid Point Assessment Overview, MDGs Nigeria, 2008). Nearly ten per cent of new-born deaths in the world last year occurred in Nigeria, a new report by the United Nations Children Fund, UNICEF, has revealed.According to the report, five countries accounted for half of all new-born deaths last year, with Nigeria third in the list. These are India (24 per cent), Pakistan (10 per cent), Nigeria (9 per cent), the Democratic Republic of the Congo (4 per cent) and Ethiopia (3 per cent). Most new-born deaths occurred in two regions: Southern Asia (39 per cent) and sub-Saharan Africa (38 per cent). The report showed that 15,000 children died globally before their fifth birthday in 2016, with 46 per cent of the deaths (7,000) occurring in the first 28 days of life. The World Health Organisation issued a press statement on the new study titled: Levels and Trends in Child Mortality 2017. The study reveals that although the number of children dying before the age of five is at a new low – 5.6 million in 2016 compared to nearly 9.9 million in 2000. The proportion of under-five deaths in the new-born period has increased from 41 per cent to 46 per cent during the same period. The UNICEF Chief of Health, Stefan Peterson, said though the lives of 50 million children under-five have been

saved since 2000 through increased level of commitment by governments and development partners to tackle preventable child deaths, more still needs to be done to stop babies from dying the day they are born, or days after their birth.“We have the knowledge and technologies that are required, we just need to take them where they are most needed.”According to the report released by UNICEF, the World Health Organization, the World Bank and the Population Division of UNDESA, which make up the Inter-agency Group for Child Mortality Estimation (IGME), at current trends, 60 million children will die before their fifth birthday between 2017 and 2030, half of them new-borns.

The Nigerian Minister of Health, Isaac Adewole, had earlier this year described the high mortality rate of under-five in the country as unacceptable. He said the government has however made significant progress in reducing the rate of new-born deaths in the country as it has declined from 201/1000 live births to 128/1000 live births in 2013. Every single day, Nigeria loses about 2,300 under-five year olds and 145 women of child bearing age, making the country the second largest contributor to under-five and maternal mortality rate in the world. The latest report notes that many lives can be saved if global inequities are reduced. If all countries achieved the average mortality of high-income countries, 87 per cent of under-five deaths could have been averted and almost 5 million lives could have been saved in 2016.Tim Evans, Senior Director of Health Nutrition and Population at the World Bank Group said it is unconscionable that in 2017, pregnancy and child birth are still life-threatening conditions for women, and that 7,000 new-borns die daily. “The best measure of success for Universal Health Coverage is that every mother should not only be able to access health care easily, but that it should be quality, affordable care that will ensure a healthy and productive life for her children and family”.

Pneumonia and diarrhoea top the list of infectious diseases which claim the lives of millions of children under-five globally, accounting for 16 per cent and eight per cent of deaths, respectively. Preterm birth complications and complications during labour or child birth were the causes of 30 per cent of new-born deaths in 2016. In addition to the 5.6 million under-5 deaths, 2.6 million babies are stillborn each year, the majority of which could be prevented. Ending preventable child deaths can be achieved by improving access to skilled health-professionals during pregnancy and at the time of birth; lifesaving interventions, such as immunization, breastfeeding and inexpensive medicines; and increasing access to water and sanitation, that are currently beyond the reach of the world's poorest communities.

Just as with maternal mortality, the neonatal mortality rate in Nigeria has wide geographical variation, the highest rates are seen in the North-East and Northwest Zones of the country, the lowest rates noticed in the South-West and South-East. It is sad to note that, most of the causes of these deaths are either preventable or treatable. Government can improve the health facilities to reduce mother child mortality if a control system is put in place to report mortality rate in the country. The neglect which results to a higher mortality rate may be attributed to the lack of information on the rate of death experienced in the country during child birth. More specifically rural areas are the ones lacking the high quality services needed to reduce mother child mortality.

Various ICT tools have been used in the reduction of mother child Mortality rate but the rate has not been significantly reduced. These are some of the ICT tools

a) Mobile phones have been used in bettering of mother child mortality rate. Mobile phone are used for sending short services reminders (S.M.S) for antenatal appointments

and making calls to primary providers/medical professionals in case of acute or non acute problems. Mobile phone showed positive results towards improving, quality maternal and newborn healthcare.

b) Websites are also ICT tools used for bettering mother child mortality rate.Website is powerful in delivering vast amount of information. Relevant information on mother child healthcare services is posted on websites.

c) E-Prescribing has also been used to view patient's records, confirm medication and dosages listed on formularies this also ascertains what medicine have already been prescribed by other doctors.

d) Some other existing ICT tools have been used in health includes but are not limited to CommCare, Medic Mobile, RapidSMS, Nokia Data Gthering tool, Maggi (formerly EpiSurveyor), eMOCA and MoTech Suite. These platforms and tools have already shown promising result in gathering, collecting and exchanging health information.

The goal of this research is to develop an integrated IT solution that is suitable for Nigeria, World Health Organization (W.H.O) and United Nation International children fund (UNICEF), focused on the maternity care conditions and control the rate of mother child mortality in Nigeria using K-mean cluster data mining technique.

1.2 SUMMARY OF RELATED LITERATURES

This paper presented a background study of main machine learning and data mining technologies used in the present research. It also presented data mining in the field of healthcare. Some related prior work on different data mining techniques, and the technique used in this thesis described. Healthcare industry today generates large amounts of complex data about patients, hospital resources, disease diagnosis, electronic patient records, medical devices etc.

Larger amounts of data are a key resource to be processed and analyzed for knowledge extraction that enables support for cost-savings and decision making. Data mining applications in healthcare can be grouped as the evaluation into broad categories (HianChyeKoh, 2013).

Treatment Effectiveness

Data mining applications can develop to evaluate the effectiveness of medical treatments. Data mining can deliver an analysis of which course of action proves effective by comparing and contrasting causes, symptoms, and courses of treatments.

Healthcare Management

Data mining applications can be developed to better identify and track chronic disease states and high-risk patients, design appropriate interventions, and reduce the number of hospital admissions and claims to aid healthcare management. Data mining used to analyze massive volumes of data and statistics to search for patterns that might indicate an attack by bio-terrorists.

Customer relationship management

Customer relationship management is a core approach to managing interactions between commercial organizations-typically banks and retailers-and their customers, it is no less important in a healthcare context. Customer interactions may occur through call centers, physicians' offices, billing departments, inpatient settings, and ambulatory care settings.

Fraud and abuse

Detect fraud and abuses establish norms and then identify unusual or abnormal patterns of claims by physicians, clinics, or others attempt in data mining applications. Data mining

applications fraud and abuse applications can highlight inappropriate prescriptions or referrals and fraudulent insurance and medical claims.

Medical Device Industry

Healthcare system's one important point is medical device. For best communication work this one is mostly used. Mobile communications and low-cost of wireless bio-sensors have paved the way for development of mobile healthcare applications that supply a convenient, safe and constant way of monitoring of vital signs of patients. Ubiquitous Data Stream Mining (UDM) techniques such as light weight, one-pass data stream mining algorithms can perform real-time analysis on-board small/mobile devices while considering available resources such as battery charge and available memory.

Pharmaceutical Industry

The technology is being used to help the pharmaceutical firms manage their inventories and to develop new product and services. A deep understanding of the knowledge hidden in the Pharma data is vital to a firm's competitive position and organizational decision-making.

Hospital Management

Organizations including modern hospitals are capable of generating and collecting a huge amount of data. Application of data mining to data stored in a hospital information system in which temporal behavior of global hospital activities is visualized. Three layers of hospital management:

1. Services for hospital management
2. Services for medical staff
3. Services for patients

System Biology

Biological databases contain a wide variety of data types, often with rich relational structure. Consequently multi-relational data mining techniques are frequently applied to biological data. Systems biology is at least as demanding as, and perhaps more demanding than, the genomic challenge that has fired international science and gained public attention. Data mining has played an important role in health sector and can be extended to mother child mortality rate control system. This will track all cases of mother child mortality in different parts of Nigeria with the intension of proffering solutions for a better and efficient healthcare delivery system in Nigeria.

The research has identified a number of models and frameworks that have been developed in the area of software applications. These models can be used as the basis for the design and implementation of health applications. The review has identified some examples of development initiatives using ICTs in developing counties. These initiatives have been able to provide useful and required health care for women and the general public.

From the studies reviewed, it is evident that although ICTs are seen as a tool for empowering underserviced communities, there is no general strategy across the board on how to utilize them successfully in economically deprived areas. Moreover, most of the case studies do not include any method of evaluation or monitoring so it is hard to gauge the true success of the projects. Based on these reviews, it is crystal clear that application developers need to develop local applications that are relevant. By so doing, it will help foster trust and usage of such applications. Most importantly, relevant content is critical to the success of any local applications. The studies have revealed that possible areas for software technology to uplift rural

areas could be maternal and infant health care monitoring using web application with enhanced security. In other words, the review has established this gap in the health sector, provoking the researcher to build the application. In addition various existing, application target at design and implementation of health applications. To the best of my knowledge none has utilized data mining approach to provide real time information on mother child mortality rate for intelligent intervention on decision making.

1.3 SUMMARY OF ACHIEVEMENT

The extension of information technology to modeling of mother child mortality rate control system using data mining helped us to achieve the following:

1. Develop a database for each maternity center in Nigeria to record all the live and still birth in the maternity.
2. Hospitals to register patients for antenatal online and keep track of antenatal visits before delivery.
3. Motivate mothers to go for antenatal visits or immunize their children by sending a SMS to them on regular basis to remind them of their antenatal or immunization days and by so doing reduce mother to child mortality rate.
4. Develop online software that can use data mining technique to generate data from different maternity database for the purpose of analysis of the mortality rate in various states or hospitals.

It is expected that the mortality rate control system developed will assist in keeping track of all the records in maternity relating to mother to child mortality. Also, the records will be made accessible to government and healthcare administrators so as to monitor and access the level of reduction or rate of mother to child mortality in a given region or state

or locality. The software will present data both in statistical and graphical pattern. The model generates reports that can aid people to view and compare the rate of improvement or otherwise in terms of mother to child mortality for a given period of time.

1.4 CONCLUSIONS

The model of mother child mortality rate control system using data mining as developed in this thesis is a work in progress that is expected to make a positive impact once it is implemented in any of the hospitals in Nigeria. Research demonstrates that the mortality rate control system is a viable solution to the maternal-infant mortality problem that is currently present among the rural community areas in various states of Nigeria. Also the use of electronic healthcare services makes possible to reduce attention issues associated with the main causes of death (hypertension, hemorrhages, and other complications of delivery) that are much higher in maternity-infant care. The mortality rate control system is a two-part system developed both for antenatal record assessment from any hospital terminal, and mother to child mortality rate control reports using health tips SMS to persuade women to utilize clinics for Medicare and immunizations. In the design, the Server development integrates with a wireless system in the as a gate way for sending SMS to the women, when such communication technology is made available in the communities hospitals.

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