

# Deploying Expert System and Big Data Analytics to Curb Maternal and Child Mortality in Nigeria

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## ABSTRACT

The paper worked on deploying expert system and Big Data Analytics to curb maternal and child mortality in Nigeria.. Based on in dept analysis the system revealed the following; Firstly, there is lack of predictive mechanism in place to curb the menace. Secondly, there is absence of mobile application for e-health management system to assist in immediate response. Aim: Is to Design and implement a predictive model that will run analysis of data through hadoop and yran platform and then forecast cases of maternal and child mortality, of which the analysis will be to curb the menace. Methodology, Agile methodology was deployed due to its time to time system architectural adjustment framework by testing the different phases of the program development model. Software employed were, Python, Java Script, and knox programming language then Mongo DB and Mysql for the database development were used. Technique Employed: Data mining technique was adopted. Result: The implementation of this predictive model system produced a predictive decision support through the help of hadoop and yarns. The system was specifically meant to run analysis , which it did and the analysis has helped to curb the menace. The system will run analysis in the pool of data harnessed through Big Data Analytic which brigbed the gap of expert system knowledge base aquisition challenge. After running the analytics the system then sends its updates result findings, in which Doctors and health organizations will rely on for decision making. In fact, the system will dictate upward or downward trends which will prompt the needed decision.

**Keywords:**

Big data analytics , Curbing, Data Mining, Dream weaver, Expert, Mortality, Maternal, MySQL.

## I. INTRODUCTION

Expert system is a computer program that uses artificial intelligence (AI) technologies to simulate the judgment and behavior of a human or an organization that has expert knowledge and experience in a particular field. [1]. The concept of expert systems was first developed in the 1970s by Edward Feigenbaum, professor and founder of the Knowledge Systems Laboratory at Stanford University. Feigenbaum explained that the world was moving from data processing to "knowledge processing," a transition which was being enabled by new processor technology and computer architectures. [1]

Expert systems consist of two main components. The first is a knowledge base that consists of "if/then" statements. These statements contain rules that the expert system uses to make decisions. The second component is an inference engine that follows the tree formed by the knowledge base and fires a rule when there is a match.[2].

In fact, the introduction of an expert system into curbing maternal and child mortality in Nigeria is a great mile stone achieved in health sector.

### i. Introduction of Expert Systems

An Expert system is a domain in which Artificial Intelligence stimulates the behavior and judgment of a human or an organization containing experts. It acquires relevant knowledge from its knowledge base, and interprets it as per the user's

problem. The data in the knowledge base is essentially added by humans who are experts in a particular domain. However, the software is used by non-experts to

gain information. It is used in various areas of medical diagnosis, accounting, coding, gaming and more.[1]

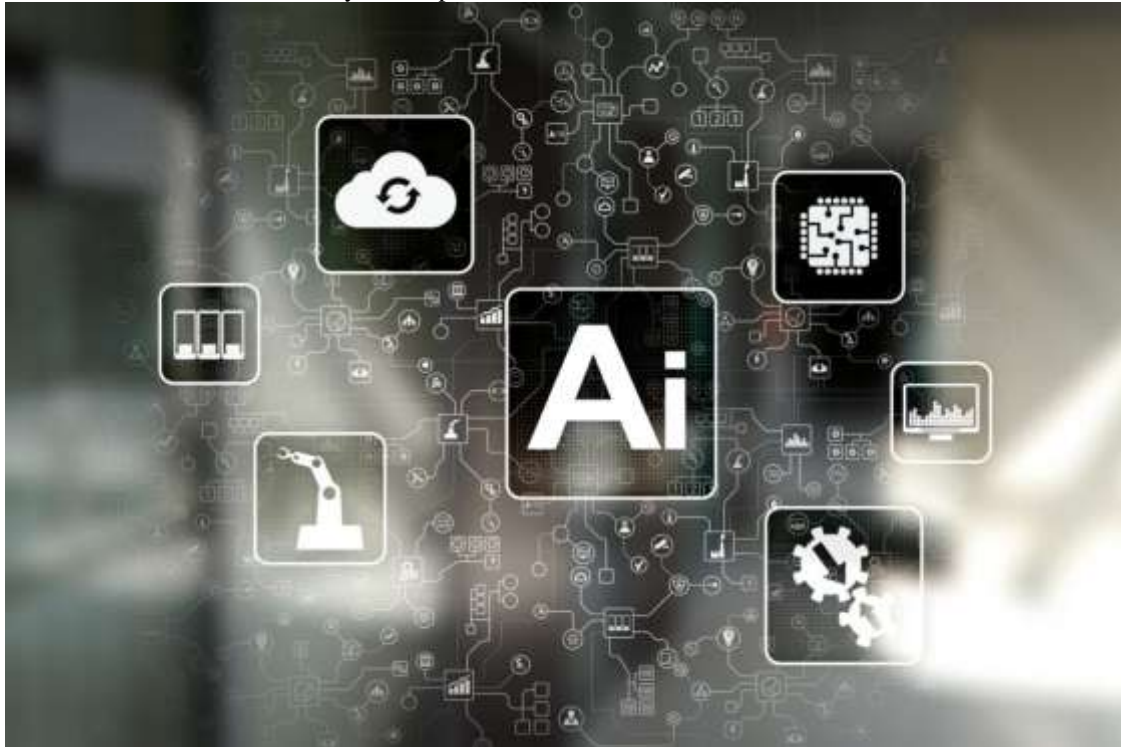


Fig 1: AI cyber space. source, [samudyata bhat 2020](#)

Breaking down an expert system, essentially is an AI software that uses knowledge stored in a knowledge base to solve problems. This usually requires a human expert, and thus, it aims at preserving human expert knowledge in its knowledge base. Hence, expert systems are computer applications developed to solve complex problems in a particular domain, at an extraordinary level of human intelligence and expertise.

#### The Three C's of ES

##### (a) Characteristics of Expert Systems

- They have high-performance levels
- They are easy to understand
- They are completely reliable
- They are highly responsive

##### (b) Capabilities of Expert Systems

The expert systems are capable of a number of actions including:

- Advising
- Assistance in human decision making
- Demonstrations and instructions
- Deriving solutions
- Diagnosis
- Interpreting inputs and providing relevant outputs

- Predicting results
- Justification of conclusions
- Suggestions for alternative solutions to a problem

##### (c) Components/ Architecture of Expert Systems

There are 5 Components of expert systems:

- Knowledge Base
- Inference Engine
- Knowledge acquisition and learning module
- User Interface
- Explanation module

##### ii. Expert System Composition

**Knowledge base:** The knowledge base in an expert system represents facts and rules. It contains knowledge in specific domains along with rules in order to solve problems, and form procedures that are relevant to the domain.

**Inference engine:** The most basic function of the inference engine is to acquire relevant data from the knowledge base, interpret it, and to find a solution as per the user's problem. Inference engines also have explanatory and debugging abilities.

Knowledge acquisition and learning module: This component functions to allow the expert systems to acquire more data from various sources and store it in the knowledge base.

User interface: This component is essential for a non-expert user to interact with the expert system and find solutions.

Explanation module: As the name suggests, this module helps in providing the user with an explanation of the achieved conclusion.

### iii. How the expert system structure will apply the big data analytics.

The expert system structure is designed in such a way that it operates in three compartments which comprises the user interface, the inference engine and the knowledge base. On this three compartments stands out the knowledge base which is of great importance when it comes to expert system. The expert system most importantly draws its strength and drive from the knowledge base compartment. The knowledge base compartment are directly the expert knowledge from the experts . and the level of expert knowledge at the disposal of the knowledge base compartment determines the strength and level of delivery of that system.

Bringing in Big Data into the expert system structure will be through the knowledge base compartment of the expert system structure. By so doing the expert system structure will be connected to the hotton works platform where the big data resources operates as a warehouse of raw data from different sources round the globe. To this end the expert system knowledge base acquisition challenge will be bridged. Because the major challenge in expert system is in knowledge base acquisition problem. On that note, the knowledge base compartment of an expert system being connected to the big data unlimited knowledge base platform known as the hotton works platform solves the problem.

### V. Expert system application in maternal and child mortality

As an expert system in curbing the maternal and child mortality, it is going to be achieved with introduction of a machine learning predictive mechanism, in which it will run a forecast and give update that will aid decision making. One of the pivotal point at this machine learning technique will operate will be Data Mining mechanism of which, will source its data power through the use of Big data analytics approach.

In Nigeria like many other countries in Sub-Saharan Africa had not only failed in embracing expert system but also have failed to achieve the goals of

using it to curbing death rate, that's why it still had high maternal and prenatal morbidity and mortality rates due to lack of expert system. Globally, thousands of women die annually from complications during pregnancy, childbirth, or postpartum period, with most deaths occurring in developing countries and that's why the need for expert system using big data analytics is of utmost importance . These trends over the past decades had been adjudged as unacceptable, as it remained a problem of public health importance necessitating the attention of all stakeholders in maternal and child health care. [4]

### II. RELATED WORKS

This chapter look into the Big data analytics ideology. It x-rayed the popularity of child maternal and mortality rate being on the increase by the day, it is not just a promise or something only discussed at seminars and conferences anymore. It is the reality that needs fast, automated, and inexpensive management of IT resources such as big data analytics that have combined to make maternal and child mortality curbing system a compelling paradigm for greater efficiency and enhanced predictive system. Big data analytics uses the data from various sources as its backbone to provide flexible on-demand and dynamically scalable analytical infrastructure in its applications using data mining deployment models: as the algorithm in its service delivery models.

#### I. Maternal and Child Mortality

The spate of maternal and child mortality in Nigeria has really been on the increase. Nigeria s ranks second globally in the number of maternal deaths. This is to say that maternal and child mortality can be better described as an epidemic in Nigeria, since it has reached its global alarming rate. [11] maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes[14]. [3] revealed that the new report by the United Nations Children Fund, UNICEF, which states that ,n early ten per cent of newborn deaths in the world last year occurred in Nigeria.[3] also opined that maternal mortality refers to deaths due to complications from pregnancy or childbirth. Even though, the United Nations International Children Emergency Funds ,they reported that from 1990 to 2015, the global maternal mortality ratio declined by 44 per cent – from 385 deaths to 216 deaths per 100,000 live births, according to UN inter-agency estimates. This translates into an average annual rate of reduction of 2.3 per cent. While impressive, this is less than half the 5.5 per cent annual rate needed to

achieve the three-quarters reduction in maternal mortality targeted for 2015 in Millennium Development Goal 5. More worrisome is the fact that maternal mortality, known to be the loss of lives of women in their maternity stage due to pregnancy complication, is classified among preventable deaths. Maternal and infant mortality rates are social indicators used to measure the development of any country, and the situation in Nigeria is of great concern. In spite of resolution and adoption of the Sustainable Development Goals (SDGs), an effort by the United Nations enacted at the end of the Millennium Development Goals (MDGs) timeline in 2015. Part of its major task is the improvement of the health of pregnant and nursing mothers (maternal health) and reducing maternal and child death by 2030. Despite this global commitment, the loss of women's lives resulting from complications during pregnancy has been on the increase in most sub-Saharan African countries. In Nigeria for instance, maternal mortality accounts for 59,000 deaths of women annually. Arguably, Nigerian women are 500 times more probable to lose their lives in childbirth when compared to most advanced nations of the world. He further noted that Nigeria is ranked second after India in global maternal incident rate and the worst in Africa. Furthermore, Nigeria's maternal mortality is reported to be 545 per 100,000 births [9]. The prevalence of maternal mortality in Nigeria has become very disturbing as every birth procedure becomes a potential incidence, from the report above, there is at least one case of maternal mortality in every 20 live births. This challenge may not be unconnected

to the nation's poor maternal health care system.

## II. The Causes of maternal and child mortality in Nigeria.

There are several causes of maternal and child mortality in Nigeria, which are growing by the day. In Nigeria Haemorrhage remains the leading cause of maternal mortality while daerrearh, accounting for over one quarter (27 per cent) of deaths. Similar proportion of maternal deaths were caused indirectly by pre-existing medical conditions aggravated by the pregnancy. Hypertensive disorders of pregnancy, especially eclampsia, as well as sepsis, embolism and complications of unsafe abortion also claim a substantial number of lives. The complications leading to maternal death can occur without warning at any time during pregnancy and childbirth. Most maternal deaths can be prevented if births are attended by skilled health personnel – doctors, nurses or midwives – who are regularly supervised, have the proper equipment and supplies, and can refer women in a timely manner to emergency obstetric care when complications are diagnosed. Complications require prompt access to quality obstetric services equipped with life-saving drugs, including antibiotics, and the ability to provide blood transfusions needed to perform Caesarean sections or other surgical interventions. But a look at the analyses conducted by [17] at the UCTH, are few of the root causes analyses which when captured between the year 1999 and 2014. The table below are the breakdown:

TABLE 1. Comparison of causes of maternal death in UCTH

Cause of Death	1999 – 2009*		2010 - 2014		Percentage change
	Frequency	Percentage	Frequency	Percentage	
Direct causes					
Septic abortion	15	6.5	13	21.3	+14.8
Hypertensive disease of pregnancy	49	21.2	10	16.4	-4.8
Antepartum hemorrhage	11	4.8	5	8.2	+3.4
Prolonged obstructed labor	21	9.1	4	6.6	-2.5
Molar pregnancy	0	0	4	6.6	+6.6
Puerperal sepsis	33	14.3	3	4.9	-9.4
Intrauterine fetal death septicemia	0	0	2	3.3	+3.3
Post-partum hemorrhage	66	28.6	2	3.3	-25.3

Cause of Death	1999 – 2009*		2010 - 2014		Percentage change
	Frequency	Percentage	Frequency	Percentage	
Ectopic pregnancy	6	2.6	1	1.6	-1
Amniotic fluid embolism	0	0	1	1.6	+1.6
Indirect causes					
Malaria in pregnancy	12	5.2	4	6.6	+1.4
Aids	11	4.7	4	6.6	+1.9
Congestive cardiac failure	0	0	3	4.9	+4.9
Pulmonary embolism	0	0	2	3.3	+3.3

source: thomas u. et al (2018) trend and causes of maternal mortality in a nigerian tertiary hospital: a 5-year retrospective study (2010-2014) at the university of calabar teaching hospital, calabar, nigeria

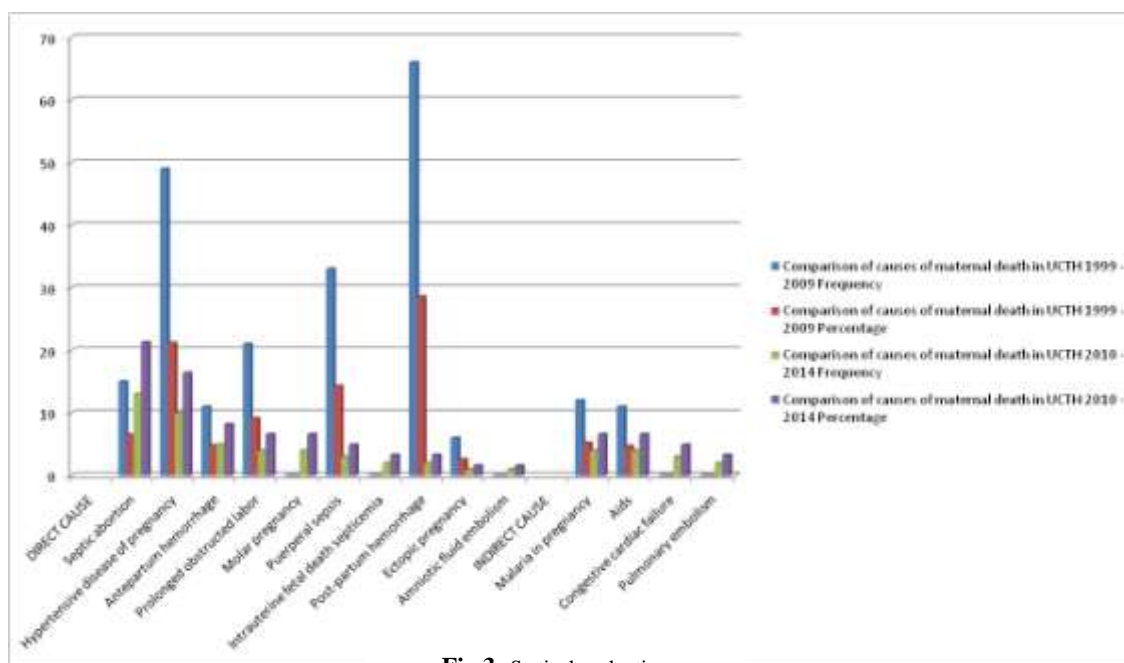


Fig 3: Statical evaluation

### III. Works On Maternal And Mortality

[14] submits that the health of women and their ability to perform economic and social functions are central to the Sustainable Development Goals. Methods In 2012, WHO began an initiative to standardize the definition, conceptualization, and assessment of maternal morbidity. The culmination of this work was a conceptual framework: the Maternal Morbidity Measurement (MMM) Framework. Results The framework underscores the broad ramifications of maternal morbidity and highlights what types of measurement are needed to capture what matters to women, service providers, and policy makers. Using examples from the literature, we explain the framework's principles and its most important elements. Conclu-

sions we express the need for comprehensive research and detailed longitudinal studies of women from early pregnancy to the extended postpartum period to understand how health and symptoms and signs of ill health change. With respect to interventions, there may be gaps in healthcare provision for women with chronic conditions and who are about to conceive. Women also require continuity of care at the primary care level beyond the customary 6 weeks postpartum.

[6] assessed the impact of the adoption of evidence based guidelines on maternal mortality reduction at Enugu State University Teaching Hospital, Nigeria. A retrospective review of all maternal deaths between 1<sup>st</sup> January, 2005 and 31<sup>st</sup> December, 2010 was carried out. Evidence based management guide-

lines for eclampsia and post-partum hemorrhage were adopted. These interventions strategy were carried out from 1<sup>st</sup> January, 2008-31<sup>st</sup> December, 2010 and the result compared with that before the interventions (2005-2007). Main outcome measure: Maternal mortality ratio (MMR) and case fatality rates. There were 9150 live births and 59 maternal deaths during the study period, giving an MMR of 645/100 000 live births. Pregnant women who had no antenatal care had almost 10 times higher MMR. There was 43.5% reduction in the MMR with the interventions (488 vs. 864/100 000 live births  $P = 0.039$ , odds ratio = 1.77). There was also significant reduction in case fatality rate for both eclampsia (15.8% vs. 2.7%;  $P = 0.024$ , odds ratio = 5.84 and Post partum hemorrhage (PPH) (13.6% vs. 2.5%  $P$  value = 0.023, odds ratio = 5.5. Obstetric hemorrhage was the most common cause of death (23.73%), followed by the eclampsia. Administration of evidence based intervention is possible in low resource settings and could contribute to a significant reduction in the maternal deaths.

[7] used datasets from the record department of federal medical center Kastina, to compare data mining algorithms to determine the predictive performance of different classification trees, predictive relationship of the selected model and identify most influenced predictor variable(s) from 1999-2015 in Katsina state. The best candidate model among the competing models was selected based on information criteria as well as diagnostic checking. The model identified to be adequate among the competing models using the testing dataset is Conditional inference tree model and after which the training dataset was used to discover the predictive relationship using the selected model. The risk factors influenced maternal mortality are maternal education, Antenatal care attendance, and maternal age. The result improved prediction accuracy and this could help researchers in the field of public health for monitoring process and future managerial decision.

[12] estimated the lifetime risk (LTR) of maternal death and maternal mortality ratio (MMR) in rural areas of Kebbi State, northwest Nigeria, using the sisterhood method. Using the sisterhood method, data was collected from 2917 women aged 15–49 years from randomly selected rural communities in 6 randomly selected local government area of Kebbi State. Retrospective cohort of their female siblings who had reached the childbearing age of 15 years was constructed. Using the most recent total fertility rate for Kebbi State, the lifetime risk and associated MMR were estimated. A total of 2917 women reported 8233 female siblings of whom 409 had died and of whom 204 (49.8%) were maternal deaths. This corresponds to an LTR of 6% (referring to 11 years before the study) and an estimated MMR of 890 deaths/100,000

live births (95% CI, 504–1281). The findings provide baseline information on the MMR in rural areas of the State. It underscores the need to urgently address the bane of high maternity mortality, if Kebbi State and Nigeria in general, will achieve the health for all by year 2030 as stated in the Sustainable Development Goals (SDGs).

[10] They recognized early that timely and adequate treatment for obstetric complications were a major factor in reducing maternal deaths. They therefore came up with work that offered a new approach to examining maternal mortality, using a three-phase framework to understand the gaps in access to adequate management of obstetric emergencies: phase I – delay in deciding to seek care by the woman and/or her family; phase II – delay in reaching an adequate health care facility; and phase III – delay in receiving adequate care at that facility. Recently, efforts have been made to strengthen health systems' ability to identify complications that lead to maternal deaths more rapidly. This article shows that the combination of the “three delays” framework with the maternal “near-miss” approach, and using a range of information-gathering methods, may offer an additional means of recognizing a critical event around childbirth. This approach can be a powerful tool for policymakers and health managers to guarantee the principles of human rights within the context of maternal health care, by highlighting the weaknesses of systems and obstetric services.

#### IV. On Expert System

[1] expert system, as a knowledge-based system, that it is an AI program that has expert-level competence in solving specific problems. That the process of building an expert system is known as knowledge engineering. According to them expert systems include two primary components: (1) the knowledge base and (2) the reasoning engine. The reasoning engine is often based on a series of complex rules (eg, ‘if-then’ statements). The information that comprises the knowledge base is almost always incomplete or uncertain. The development of fuzzy logic—a set of mathematical principles for knowledge representation based on probability and uncertainty—has accelerated the evolution of expert systems in recent years. Incorporating fuzzy logic into decision support applications can help better approximate how human would approach complex problems with high degrees of uncertainty.

However,[11], looked into the current technologies which as presented in their paper significantly develop concepts on how to use the information. It shows that IT expert systems analysis influences the flow of data generated by Big Data. In the paper they looked at the implementing the current technologies (IT security, Cloud Computing, Big Data, IOT and

expert systems) within organization, there results a proper environment for analysis and development. Combining conceptual models of Big Data and Cloud Computing favors IT expert systems and worthless-considered data analysis. Looking ahead, Cloud computing and Big Data have become one of the most discussed topics in recent years, and information systems analysis is an important factor in shaping business decisional systems. Using the solutions presented in the paper offers significant advantages. After analysis, the interpretation of significant data flow can be performed continuously and in real time. Organizations use data analysis as a connection process from confidential sources and for interpretation of incidents and vulnerabilities in real time.

[9] also in their work developed an expert system that combines several solutions to combat COVID-19. The main solution is based on a new developed software called General Guide (GG) application. This expert system allows the user to explore, monitor, forecast, and optimize the data collected in order to take an efficient decision to ensure the safety of citizens, forecast, and slow down the spread's rate of COVID-19. It will also facilitate countries' interventions and optimize resources.

[5], in their studies they pruned so many methodology that have used in the development of expert system for over three decade now. While all having the advantages the approach using neural network has proven to be the most effective and efficient way of developing durable and reliable expert system that would not become obsolete over time. They discussed cogito a neural network expert system as a case study and shown how neural network can improve the work that is already done by expert systems. Employing the methodology in expert systems for many fields would further improve efficiency in those fields.

### III. EXISTING SYSTEM

The existing system is known to be the present system that is been used with no or little computer help or application. Although majority of the hospitals works are done on paper works which involves more of human physical capabilities on dictating prenatal and child birth challenges. The present units involves: The doctors, The Nurses, The hospital attendants and health admin staff.

- a. **MEDICAL Doctors:** These were Doctors activities concerning the maternal and child mortality are been diagnosed. The portal captures the Doctors remark on the patient through manual means of getting personal information which would have been automated. The system has its challenges of been domiciled on a particular server and not mobile. The doctor at this point can only take care of whatever he discovers at that time but cannot offer a prevention measure against future occurrences, as there is no provision for analysis from external sources.
- b. **Nurses:** This section handles the aspect of handle their patient based on what the doctor makes available to them. Whatever the doctor does or prescribes determine the progress of the mother and child.
- c. **Health workers:** this section handles the guides the health workers on the operations that flows from the doctor's recommendation. This health workers are mostly the ones to handle the system work.
- d. **Minister of Health:** This section create the platform for health minister to view the system for updates from the predictive system in other to facilitate government decision in curbing the menace
- e. **Administrator:** This is the section of the platform which coordinate the entire process of the system. It can be said to be a client that manages the process following a layed down function and directives on how to link the different entities.

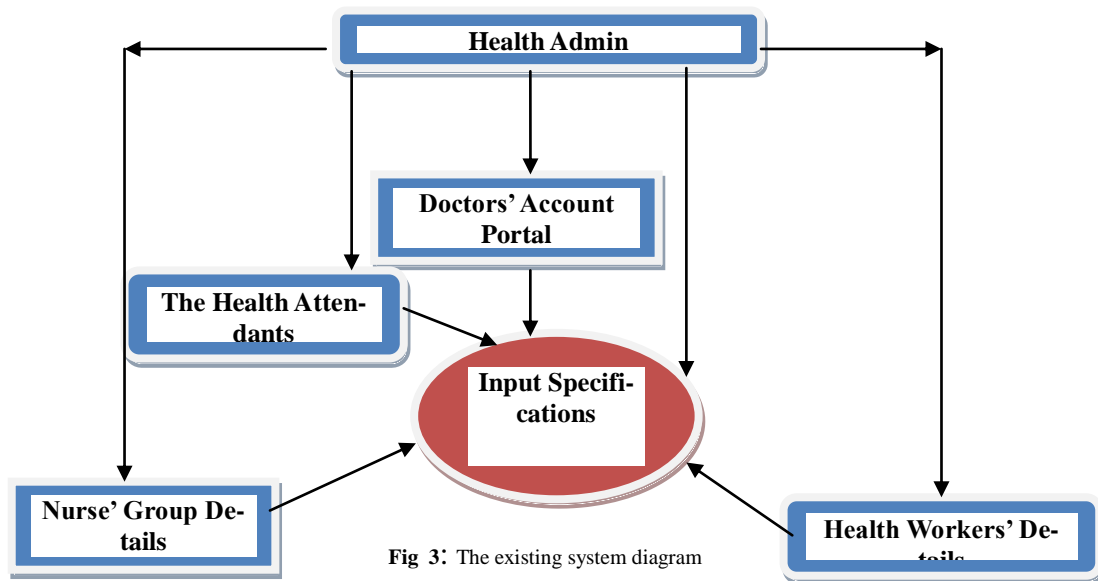


Fig 3: The existing system diagram

#### IV. METHODOLOGY

Methodology Adopted : Expert systems development is a complex and expensive process that needs to be applied in an organized manner. Many approaches have been introduced for this purpose. In order to move from the old service system to an AI system it becomes imperative to methodically review the old system with a view of getting its general outline and all the operations involved, and analyze their

possible constraint. But in developing this software Extreme programming(XP) programming which is an agile software engineering technology was adopted due to its ability to adapt to an unstable environment. More importantly its flexibility in changing cost of requirement at any stage. The adopted methodology presented in this paper is based on a the overall life cycle of expert systems development .

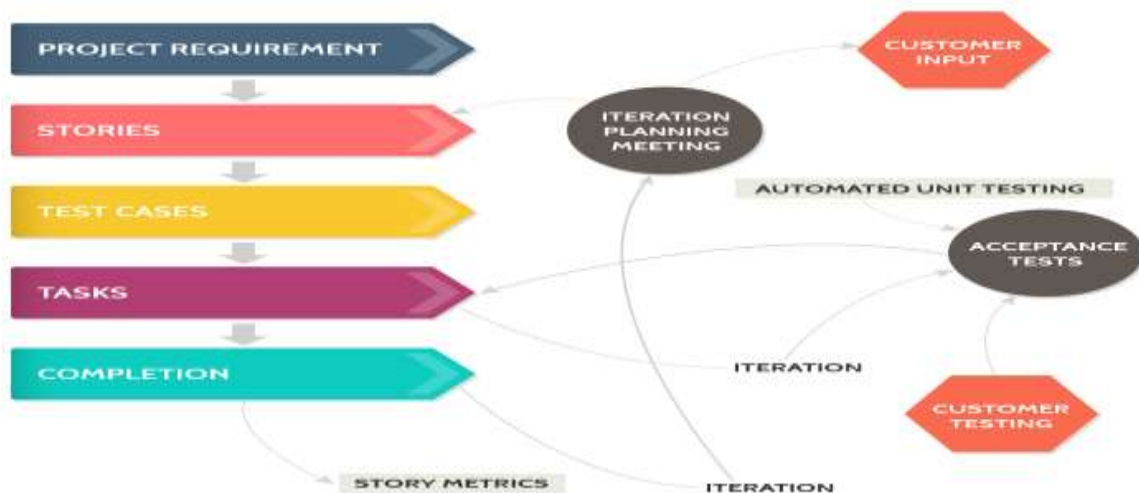


Fig 4 Extreme Programming Methodology diagram.

Source:Kamal Sharma (2020).



The adopted methodology has the following components listed below:

- Extreme programming application happens in the projects where the requirements keep on changing.
- In some critical projects, even before starting the project, the timelines are decided. It is referred to as project risk as it is challenging to meet those timelines. Therefore, Extreme programming also addresses the project risk by frequent and shorter development cycles and consequently enabling early feedback.
- XP gets applied where we have a small group of programmers, not more than 12.

Extreme Programming (XP) an agile research methodology approach that will provide periodical testing prototypes to continue building the system until all user requirements are completely satisfied. Good programming package such as Python, Java Script, and nox programming language then Mongo DB for the database development.

Python programming language is the tool selected for the implementation of the system. Tensor flow open source library of python has been chosen for the implementation of the suite.

## V. SYSTEM IMPLEMENTATION

Expert system on maternal and child mortality is design with nox, Python, Java and HTML programming language using Mysql server architecture. The system can be hosted online and once this is done, all FORMS, MODULES and FUNCTIONS that make up the system are activated ready for use. The application is window based, menu driven and highly interactive. The implementation platform for the proposed system is to be in all the health service institutions . The proposed system will be designed as a mobile application, deployed to health centers especially in rural communities where access to analytical data is at its lowest ebb.

The system was built around a large body of Big data platform known as Hoton works platform. It becomes therefore necessary that a sensitive platform of this kind should be adequately protected to grant confidence in its applications.

### I. Requirement definition of the proposed system Functional and non-functional

#### a. Functional requirement

Doctor: the Doctors to be able to register their personal data online

- The Doctors will be able to select the required buttons that will enable the system predict.

- The system will enable students to receive correspondence from the system through the predictive mechanism.
- The system will enable doctors to check for updates on the maternal child mortality forecast at every work interval e.g chapter 1 or chapter 2.

#### Nurses

- The Nurses will be able to register their personal data
- The Nurses will be able to receive correspondence approved through the doctors observations.
- The system will enable the Nurses to have access to a direct checker system results.
- Each Nurses sub system platform will be able to communicate with other sub systems.

#### Health workers

- The health workers will be able to login and register personal data.
- The health workers will be able access all necessary result that pertains to the mortality challenge .
- The system will enable health workers have access to results.
- The health workers will be able to communicate with other users and other sub systems.

#### Data base:

- The Doctors personal data recorded
- The system will record Nurses personal data
- The health workers personal data will be recorded
- The system will record all results and correspondence
- All the data's can be accessed from any location.

#### b. Non-Functional Requirement

##### 1. Operational

- The system should be able to upload and display result on mortality updates.
- The system should be able to run online
- The system should be able to do audio and visual calls to aid the system .
- The system should be able to give access to other similar and health facility platform.

##### 2. Performance

- The system should allow a wide range of database
- The system should support a range of valid values for up to 2000 characters.
- The system should support up to five users per group for all.

##### 3. Securities

- No entity in the system should be able to access the platform without permission.
- Only the accredited admin can make changes and updates where necessary.

Cultural and political

- Only users who have their licenses as health staff and permission will access the system.

**VI. HIGH LEVEL DIAGRAM OF THE PROPOSED SYSTEM:**

The high level diagram depicts the movement and

direction at which the program flow. The level shows off a complete picture of an expert system for curbing maternal and child mortality.

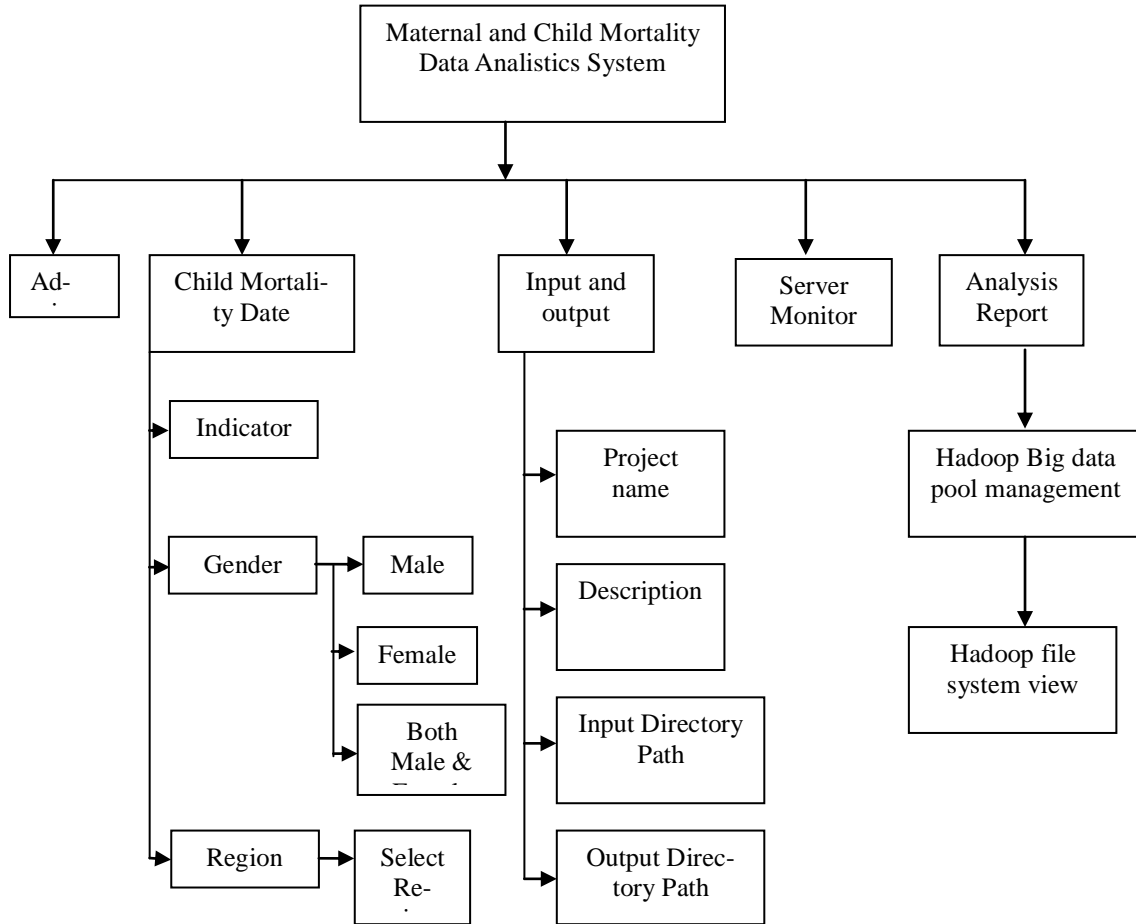


Fig 5 : High Level Diagram

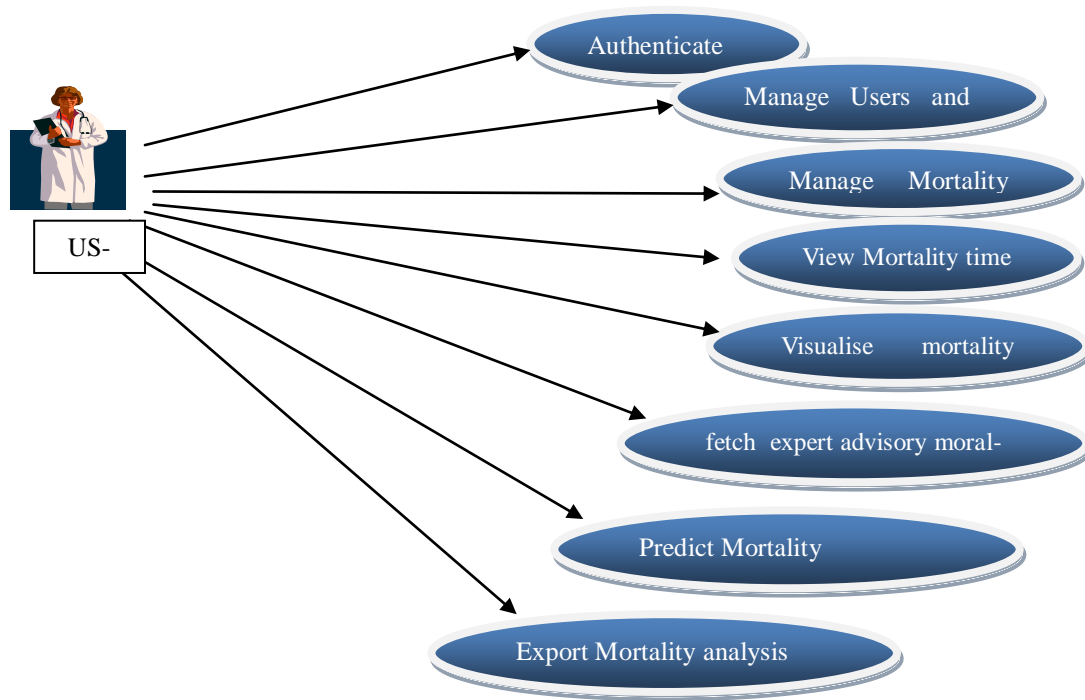


Fig 6: THE SYSTEM USE CASE DESIGN

**I. The Use Case System:** It always rolls out the possible scenarios of user’s activities in the system . It always outlines the possible activities of the users in the system.

## VII. COMPARISON OF SIMILAR TECHNIQUE

Having used big data technique and extreme engineering methodology in achieving this system . A look at the technique used by [11] revealed something similar but of a different approach . while we used expert system using big data to curb the challenge they only looked at how big data and cloud approach is achieving the development IT. Of which when we looked at their system we discovered that the application was only discussed and not geared real development of a predictive system . But in our work a real development of a predictive system was achieved and deployed to curb the maternal child mortality challenge.

## VIII. PERFORMANCE EVALUATION

The software performance was very good; very easy to use and with a well documented help file. For real time and embedded system, software that provides required function but does not conform to the performance requirements is accepted. Performance Evaluation is designed to test the run-time performance of software within the context of an integrated system. Performance evaluation occurs through all

steps in the testing process. The software evaluation is a successful one, because actual test yielded both design, specification and performance capabilities.

## IX. RESULT

The implementation of this predictive model system produced a predictive decision support through the help of hadoop and yarns. The system was specifically meant to run analysis , which it did and the analysis has helped to curb the menace. This was designed, implemented and delivered for use by Nigerian medical personnel and their clients has been to show progress.

## X. SUMMARY

An expert system to curb the menace of maternal and child mortality issues in Nigeria was conceived with a high zeal aiming at setting a new standard, powered by the maternal and child mortality problems in Nigeria. The expert system when deployed will bring timely solution to Nigeria’s health sector. The knowledge contribution in this work, is the introduction of expert system to bridge the challenges in maternal and child mortality ,which will help bring about accurate predictive system to curb maternal and child mortality. Other are as follows:

- Created a distributed system that can function anytime, anywhere in any part of the world, irrespective of demographics, which was made possible through the big data analytics technology of cloud.

– Solved the problem of decision making to curbing the menace and, which enables to also know the level of impact and being made.

## XI. CONCLUSION

Expert system designs has since been trending as answer to various problems. Therefore the predictive mechanism was made possible through the deployment of expert system, using data mining technique to curb the maternal and child mortality. It will also serve as a comprehensive mobile application for e-health management system institutions. This model, when implemented, is expected to eliminate the uncertainties being experienced through maternal and child mortality in Nigeria. In Conclusion, this software is light at the end of the tunnel and will be utilized to support more research advancement in curbing the menace of maternal and child mortality in Nigeria.

### Suggestion For Further Studies

1. More research should be geared towards, Big data analytics ,using data mining technique to enhance the robustness, versatility, and breakthroughs of every research.

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