FRAMEWORK FOR AN EFFICIENT ONLINE MEDICAL RECORD SYSTEM FOR EFFECTIVE HEALTH CARE DELIVERY IN SUB-SAHARA AFRICA USING BIOMETRICS: (A CASE STUDY OF NHIS, NIGERIA).

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Abstract
As Nigeria strives to become one of the world’s 20 biggest economies by the year 2020, there is the fear that the noble objective may not be achieved unless its citizens enjoy effective health care delivery backed by a robust financing system that can stand the test of time. So, in this paper, we have presented the design of a system for the implementation of the National Health Insurance Scheme (NHIS) in Nigeria with the aim of making the scheme accessible to all subscribers irrespective of their primary hospital. We have also highlighted the benefits of the system and its mode for its implementation.

Keywords: Health care delivery, Medical records, Biometrics, NHIS, framework.

1.0 INTRODUCTION
In recent decades, global attention to the harrowing state of health in sub-Saharan Africa has increased enormously. Funding to combat major health problems in this part of Africa has reached unprecedented levels and marked improvements have been made. In Nigeria, for example, malaria deaths have been cut substantially. In Uganda, maternal mortality has dropped by more than half [2]. Despite these improvements, the health of the vast majority of people in sub-Saharan Africa remains in jeopardy. From 1990 to 2005, life expectancy slid by more than 2 years from 49.1 to 47.1 years [7, 12]. Millions of African still suffers from diseases that are relatively simple to prevent or treat. As the region’s health systems struggle to meet basic standards of care, many experts have come to believe that system wide barriers to its delivery are preventing greater progress.

As Nigeria strives to become one of the world’s 20 biggest economies by the year 2020, there is the fear that the noble objective may not be achieved unless its citizens enjoy effective health care delivery backed by a robust financing system that can stand the test of time. It has been argued that a productive workforce must be strong, fit, mentally stable and mentally mobile. It may be difficult to doubt the fact that Nigeria is committed to the Millennium Development Goals and Vision 20-2020, especially with the introduction of the NHIS scheme to take health care financing and delivery to the next level, experts still believe that much still needs to be done to make the impact of the scheme better felt by the citizens because they are fundamental to the development of the nation.

Some years back, the government of Nigeria provided ‘free healthcare’ for its citizens, funded by its earnings from oil exports and general tax revenue. However, the global slump in oil prices in the 1980s greatly affected Nigeria’s major source of income. Government could therefore no longer afford to provide free health, and subsequently introduced several cost recovery mechanism like user charges and Drug Revolving Funds. Furthermore, the introduction of the Structural Adjustment Programme in 1986 adversely affected the health sector allocaton.

The factors outlined below, among others, informed the establishment of National Health Insurance Scheme.

a. The general poor state of the nation’s healthcare services.
b. The excessive dependence and pressure on health facilities provided by the government.
c. Dwindling funding of health care
d. Poor integration of private health facilities into the nation’s health care delivery system.
The National Health Insurance Scheme (NHIS) is a body corporate established under Act 35 of 1999 by the Federal Government of Nigeria to improve the health of all Nigerians at an affordable cost [10]. The origin of the National Health Insurance Scheme dates back to 1962, when the need for health insurance in the provision of healthcare to Nigerian citizen was first recognised. Although the NHIS has significantly increased out-patient attendance by almost 50% and doubled in-patients for many hospitals, there are no corresponding increases in staff [1]. The effect of this is that the capacities of most hospitals already strained before NHIS was introduced are now at the breaking point. The scheme has so many teething problems amongst which are:

a. The scheme is not portable
b. There is no standardised card for the system and where such cards exist, it is just plastic ID cards.
c. Reimbursement of hospitals for services is not prompt
d. Reimbursement given to state hospital are never channelled back to the hospital for development
e. Non remittance by various state governments that are captured by the scheme
f. Non good usage of the fund by states to fund hospitals
g. Fiscal politics between the states and the Federal Government
h. Difficulties in accessing the scheme through non primary hospitals of the subscriber to scheme.

A critical examination of these problems would reveals that a robust, portable and integrated medical care, record system that can use biometrics is the necessary prerequisite to successful implementation of effective, efficient and good quality primary health care delivery system in Nigeria.

2.0 RESEARCH OBJECTIVE
The main goal of the research work is to design an implementable, portable and sustainable clinical record system driven by robust ICT solution that has the following sub objectives.

a. Examining various issues militating against the delivery of health care services in Nigeria during the pre-NHIS era.

3.0 RESEARCH METHODS
The research methods employed in this research work are sampling, interviewing methods and questionnaires. Data were collected through an in-person household interview, conducted by the researchers on a random basis. A stratified sampling strategy was used to analyse the data to be collected. A total of 120 geographic sampling areas were selected. In order to ensure randomness, 20 geographical areas were selected from each of the six geo-political zones and the survey of the data collected was designed to yield a sample of 4170 individuals and this done over a period of 12 months. The system will be implemented as a centralized J2EE web application which will use agent architecture to link publicly accessible data repositories on the internet and make relevant information available to the user in an appropriate form, amount, and level of detail with little effort.

4.0 RESEARCH OUTPUTS
This research will also introduce a framework that assesses these issues and to add to research that will help in the introduction of health management information systems on a more international level. This research will help research organizations to gain insight on issues that may arise with the introduction of web-based NHIS scheme in Nigeria. It will also benefit other countries in the developing world to come up with similar idea and help the developed world to improve their system.
a. Benefits of the Proposed Systems
The overall goal of this research work is to improve the efficiency and effectiveness of healthcare delivery through the creation and use of information for clinical, administrative and monitoring purposes;

i. Make patient information from other hospitals available where the patient is currently being treated

ii. Improve the accessibility of patient related information to healthcare professionals through improved handling of medical records and getting results of investigations more quickly.

iii. Standardisation of patient administration and management procedures across hospitals.

iv. Provision of information to evaluate performance and audit health care

v. Improve management decision making through the availability of integrated management information

vi. Save costs through the identification of primary cost drivers at hospital level and the monitoring of mechanisms introduced to lower costs.

b. Biometric Application
The system was based on biometric technology because of its ease of use and reliability. A look at biometric systems that use the voice, it is to confirm identity, does not fit our needs in terms of reliability, cost and usability. Biometric technologies are best suited for providing definitive identification of patients to ensure that health personnel use the right record [4, 5]. The system settled on fingerprint scanning technology, a biometric system that uses scanning of the fingertips to confirm identification [3, 8, 9]. To use the new technology, a patient places his fingertips in the scanner. A positive ID automatically brings up the patient’s electronic record.

Biometric technologies have been used for decades in law enforcement to identify criminals. But use outside of law enforcement is relatively new [11]. And some early adopters regret the decision to use biometrics because it can be difficult to use and unreliable. The most common type of biometrics technology used in health care is fingerprint scanning. Many fingerprint-scanning products are on the market, and the cost of these is relatively low compared with other biometric options [6]. In most cases, health care organizations are using fingerprint scanners and other biometric options as a substitute for user names and passwords to identify health personnel before they access information systems [13]. This system uses biometric technologies to identify patients at the point of admission.

c. Implementation
Each hospital would have its own server to manage all local data and distribute summary data on each patient encounter to other hospitals where the patient had been seen and to a central server at the NHIS headquarter in Abuja. The NHIS headquarter therefore would contain a master patient index and data for all the NHIS accredited hospitals across the nation. At the first registration of patients in the system, they have photograph taken and provide their names, identification numbers, NHIS information and other demographic data. Then the patient places their fingertips in the scanner and a template is created. Whenever patients come to any hospital that is not on the scheme, that is (H₁, H₂, H₃ …Hn), they provide only their date of birth, and then place their hand above the scanner to confirm their identity (this can be done with the assistance of any operatives in case of death or unconsciousness). The biometric application interfaces with the delivery system’s database through an agent to gather the necessary information from various information systems, including the electronic record (fig.1).

Fig 1: NHIS biometric deployment conceptual Architecture

The emergency department and wards in the hospitals are to be equipped with the biometric technology to
capture information at the bedside. Group practices using the technology will have a scanner at the front desk for use when patients come in for appointments, in this case the system can be accessed by anyone that has subscribed to it in any hospital that is also on the scheme anywhere in the country for treatment. After such treatment, the account of the benefactor’s primary hospital will be debited for necessary reimbursements. The system will definitely remove the problem associated with inability to access the NHIS scheme through any other hospital other than the beneficiary primary hospital.

d. Evaluation Methods
We designed the evaluation programme to support the implementation as well as to assess the benefits and costs of the systems. The cost-benefit evaluation will be modeled on health technology assessment and it will be more extensive than the traditional technical assessment of hardware and software. It is to assess the daily use of the system, the clinical and managerial environment, and ultimately its effect on the quality of patient care and public health. The design drew on a range of disciplines and included representatives of all stakeholders. The evaluation programme consisted of three separate but interlinked activities: an orientation study, creation of an evaluation framework, and designing the evaluation programme.

e. Orientation Study
The aims of the orientation study are to identify the aspirations and expectations of potential users and give the designers a detailed understanding of what was required. We did a survey of knowledge, attitudes, and perception and asked users what questions the evaluation should include and about potential problems requiring preventive action. Interviews with 250 potential users generated 55 and we have included the questions in the evaluation.

5.0 CONCLUSIONS
The failure of implementation resulted in the failed aspirations of many dedicated information technology staff, health managers, and other professionals in the country. Nevertheless, this story is not unique to developing countries as The United Kingdom has had its share of failed health information systems, wasted millions, and disciplinary hearings. The computer industry has flourished by portraying its products as essential for efficient and effective health care. We hope to prove this experience by sound research and implementation strategy in this our ongoing research work. This is to avoid the errors described above from being continuously replicated to enable us have a unique Health management Information Systems that is recognised based on its proper design which is robust and foul prove in such a way that it can stand the test of time. It is then that the overall goal of the research work which is to improve the efficiency and effectiveness of healthcare delivery through the creation and use of information for clinical, administrative, and monitoring purposes with the aid of biometrics can be achieved.

References
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