Leveraging on Mobile Telephony to Strengthen Child Birth Registration Process in Tanzania: Proposed Prototype

Deo Donald Shao

College of Informatics and Virtual Education, The University of Dodoma, Dodoma, Tanzania.

deoashya@hotmail.com

Abstract

Reliable data is one of the important assets of the success of public health systems. Decision makers, policy makers and health service providers need accurate and timely data in order to improve the quality of their services. The trends of growth of human population in developing country have increased pressure on the demand for demographic data availability by the policy and decision makers. Child birth data is vital in policy and health strategic plans of any society. Timely accurate data on the location and number of births and deaths are essential if a country is to determine spending priorities, and to formulate and monitor actions. Distribution and allocation of national resources, for example, becomes extremely tedious to systematize without timely and accurate demographic data. In this paper, a prototype for mobile-based child birth registration (MobReg) is proposed. The proposed prototype offers ways of registering child birth data through mobile phones and visualizes the collected data in a web application. The evaluation of the prototype seems to show the feasibility of mobile technologies, particularly in improving the current process of registering birth and provide data for health and population planning at regional levels with possible extrapolation to national levels. The use of cellular phones for child birth registration is therefore one of the most promising developments in the quest to achieve improved child health outcomes.

Keywords: Mobile Technology, Child Birth Registration, mhealth, Health information systems.

I. Introduction

Birth registration is the official recording of the birth of a child by a state administrative process. It is a permanent and official record of a child’s existence and is fundamental to the realization of children’s rights and practical needs (UNICEF, 2002). Child birth registration process has been a challenging task in Tanzania and in other developing countries due to the resource and geographical constraints that face these regions. In Tanzania, large human population is found in rural and isolated areas where major services such as medical services are scarce (URT, 2013). Reaching these populations in terms of quality real time medical service has been a difficult task. The limitation of resources such as hospitals, doctors and poor infrastructure are the major stumbling blocks for the success of campaigns to ensure delivery of quality health services in the developing world. Hospital in rural areas are located far from the villages where people lives, this increases the morbidity rate as people fails to attend clinics regularly and sometimes lead to deaths. Despite the effort by the governments in these parts of the world in allocating medical experts in most of their regions, the highly profiled
doctors are mostly found in major cities only. Therefore the sustainable medical service in rural areas remains uncertain.

In recent years human population in the developing world has been reported to grow in high rate due to several factors such as improvement of health services, especially maternal health which has been the impact of foreign aid (Worldbank, 2000). However, this growth has raised a number of challenges to health practitioners. The increase of data volumes is one of the challenges that add a huge load chaos to health practitioners and pose a serious query of inadequate health information systems to facilitate efficient health planning and programmes. These challenges arguably lead to inadequate strategic power of controlling diseases (URT, 2012). With the daily increase of new births, paper-based Child birth registration process is not sustainable and could delay generation of relevant public health data that can assist monitoring of public health service. The current registration process involves several bureaucratic stages which makes the process tedious to practitioners and patients. The critical shortfall of the health workers in these regions for example the ratio of doctor to patient in Tanzania is 1:50,000 (MAT, 2010), this slow down the effort of improving health services.

The government of Tanzania has been busy in creating and implementing strategic plans towards meeting millennium development goals (MDGs) especially those relating to health. Centrally, the MDGs are about improving the lives of people particularly in the developing world. According to UNDP, the MDGs number 4 to 6 targets on improving health services (MDG 4. Reduce Child Mortality, MDG 5. Improve Maternal Health & MDG 6. Combat Major Diseases) (UNDP, 2010). Reliable and effective birth registration process could add value in reducing child mortality and improving maternal health therefore fasten meeting of MDG4&5. According to WHO (2010) governments are expressing interest in mobile technology as a complementary strategy for strengthening health systems and achieving the health-related MDGs in low and middle income countries. In Tanzania, the birth registration services are not integrated in all health centers, there are still home births in remote areas and even when babies are delivered hospitals, and some parents don't provide all the documents necessary to complete the registration. Mobile technologies could be leveraged to improve birth registration process.

Mobile phones have become prolific in society, both in industrialized and non-industrialized countries. The latest ITU (International Telecommunication Union) statistics on number mobile phone subscribers globally, the number of cellular phone subscribers was expected to reach six (6) billion by the end of the year 2012. Interestingly, seventy percent (70%) of the cellular phone subscribers globally live in middle and low income countries (Patil 2011a). Several researchers have acknowledged mobile technology as a candidate technology for improving health service delivery systems (Downer SR, Meara JG 2005) (Downer SR, Meara JG, Da Costa AC 2006).Perera (2009) says “With the capabilities and advantages of Mobile-based systems it is undoubtedly suitable to consider developing paradigm-shift application infrastructure to overcome problematic issues in present healthcare systems”. Patil (2011) assert that “In the future, mobile technologies will play the roles of life enablers, life simplifiers, and life navigators for people”.

This study explore the challenges that hampers the child birth registration process and propose a mobile technology-based framework for improving child birth registration process in Tanzania.
This paper is organized in sections and sub-sections; first section presents background and related work on mobile based health information systems. Section two presents the research methodologies that have been adopted in this study. Section three presents related work. Section four presents the design of the proposed prototype. Lastly, we concluded with a discussion and suggestion of the future work in improving child registration process through the use of mobile technology.

II. Methodology

The basis of this study is grounded in exhaustive literature review of conference proceedings, state-of-the-art- articles, technical reports and journals articles. A list of publications on mobile learning was exhaustively reviewed. The process of reviewing selected articles followed the ‘literature review steps’ defined by Oates (Oates 2006), (Search->Obtain->Assess->Read->Evaluate->Record->Review). The articles that fall on the context of our objectives were chosen and reviewed accordingly.

The gained understanding from the literature geared our focus on analyzing how mobile cellular technology can be harnessed to improve the child birth registration process. Mobile child birth registration has been pioneered by few scholars in Senegal1, Nigeria2 and Uganda3. The experience from pioneered projects reports feasibility of the mobile child birth registration to be effective tool towards archiving sustainable civil databank (Toivanen et al. 2011) (GSMA, 2013).

III. Related work

Mobile telephony technology is increasingly being used in the many healthcare facets. Mobile communications is playing a big role in offering effective means of bringing healthcare services to remote citizens in developing countries. With low-cost handsets and the penetration of mobile phone networks globally, tens of millions of citizens that never had regular access to a fixed-line telephone or computer now use mobile devices as daily tools for communication and data transfer. This growing ubiquity of mobile phones could be a central element in the promise of mobile technologies for health (UNITED NATIONS, 2007). Experience from many successfully implemented research projects reveal the potentiality of mobile technologies in uplifting health services particularly in resource limited regions.

Ye et al. (2012), study on health and demographic surveillance systems (HDSS) figure birth registration process as an important components to build a sustainable civil registration and vital statistics (CRVS). Error! Reference source not found. shows the components that form a baseline of a national census population.

A. Challenges of Birth Registration Process

1 Available at: http://www.openequalfree.org/ed-news/seaturtle-chinese-students-turning-into-seaweed-2
2 Available at: http://unicefstories.org/2012/10/17/nigeria-using-rapidsms-for-birth-registration/
3 Available at: http://mobilevs.co.ug/home.php
Distance and lack of communication

Inadequate communication infrastructure is one of the major challenges that affects public health sector in general. Health centers and civil administration offices are mostly located far from the residential areas where people are found. This impedes the efforts of registering birth using paper-based methods.

Lack of awareness

In many cases, the rural population is unaware of the reasons why it is important to register births. The registration authority however needs to propagate the public education on the importance of registering birth events.

Economic Barriers

Despite the advantages that can be grasped from developing a technology-based birth registration system. The economic constraints facing the developing countries such as Tanzania forces the governments to be reluctant at tapping the initiatives of sophisticating the birth registration process (UNICEF, 2002).

B. Benefits of Mobile Child Birth is important

The government of Tanzania has been conducting Housing Census after every ten years since its independence. These regular censuses have cost Tanzanian government a lot of its resources. The undertaking is a very big operation, which needs a lot of money. As a country, it has the responsibility of providing social services to its people. Being a developing country, constrained with limited resources needed to fulfill its obligations. Tanzania, definitely, has to find ways and means of reducing Census costs in future. Abdurrahman (2001) outlined the strategies that can help the government to reduce census cost, some of strategies are Vital registration, restricting number of questions census questionnaire to reduce cost of printing and processing. There is still a pressing need of establishing a sustainable national population database which will track and maintain human population information. This database will ease data access to other government agencies such as electoral commission and national revenue authority. It could also help national security units in effective monitoring and tracking criminal and immigration issues. Birth registration information will eventually serve a key role of ensuring citizen civil rights such as ability to vote and land ownership. In general, a sustainable birth registration process could be a great asset to inspire not only democracy, but also economic development (GSMA 2013).

There is a bunch of advantages of leveraging mobile cellular phones in facilitating child birth registration process, these includes, improved registration rates, availability of reliable data for decision and policy makers. Availability of reliable child registration data will help the government to properly allocate resources and improve planning of service provision for children and their caregivers through making data-driven plans. Mosquito-net distribution campaigns to mother and child could be easily streamlined with the availability of reliable data. Furthermore, family plan campaigns could also take advantage of early child registration platform (GSMA, 2013).
IV. Proposed Prototype

A. Stakeholders of the proposed prototype

Identifying system stakeholders is an important aspect of the software development as it guides the requirements engineering process (Nuseibeh and Easterbrook, 2000). This study identified key stakeholders who are involved in birth registration process. The identification process was guided by the general knowledge drawn from the literature review and the survey carried in this study.

RITA (Registration, Insolvency and Trusteeship Authority): This is the government agency which is aimed to ensure effective and efficient management of information on key life events, incorporation of trustees, safeguarding properties under trust, of deceased persons, insolvents, and minors to enable the law to take its course. In MobReg, RITA shall be able to administer all data received from the registration module and issue birth certificates.

Third part agencies (Policy/decision makers): These are the health plans administrators. In MobReg they will be able to visualize, analyze and make informed decisions to improve the health services.

Health centers: These are health facilities where birth can occur. In MobReg, Health facilities shall be able to send birth registration data using Mobile Phone (SMS/ Mobile forms).

Community members: These are community members in general including parents who will be able to send birth registration information to the birth registrar upon child birth event.

B. Use case diagrams

User’s characteristics modeling is important aspect of software engineering process which specify roles and variation between users (Bertolino et. al, 2002). Figure 1 presents the MobReg use cases.

![Use case diagram of MobReg](http://www.rita.go.tz/)
C. Components of the proposed MobReg prototype

The general architecture of the MobReg prototype has several stakeholders that work together to improve the efficiency of child birth registration process. Figure 2 shows how the different MobReg users interact with the system.

![General MobReg architecture](image)

**Figure 2.** General MobReg architecture

D. Significance of the proposed prototype

Availability of child birth registration data could be a stepping stone towards open data initiatives. Once the data about child birth are made available to third part agencies such as global decisions, policy and plan makers could raise open window for transparency, accountability and collective efforts in improving/enforcing child health initiatives. The proposed has drafted a blueprint which can further be implemented to provide a building block towards development of a national civil registry in which each registered person will be uniquely identified.

V. DISCUSSION

The use of mobile technologies, specifically cheap short text messaging services (SMS), and engaging community (health, social, educational, NGOs) workers to report whenever they identify an un-registered child, particularly in remote areas, could be useful to the registration authorities. This will increase the data availability and strengthen data driven plans on improving child health outcomes. The prototype developed in this study could light touch major implementation of a national birth registration system that will ensure sustainable national civil registry in which each registered person is uniquely identified. Furthermore it will improve recordkeeping, reporting and therefore ensure cost effective budgeting.

This paper has focused on leveraging mobile technologies to improve the birth registration process where individuals are partially or entirely un-documented. There numerous advantages
of registering birth as it give light torch some other aspects such as number of abandoned children and children under guardianship.

VI. Conclusions

While the importance of ICT particularly mobile technology in healthcare systems has been recognized widely, the use of ICT to improve child birth registration process in the developing regions is promising. While governments are investing efforts to achieve the Millennium Development Goals (MDGs) by the year 2015, it is necessary for governments to have accurate population data in order to plan service provision for children and their caregivers. Mobile child birth registration could have a great effect on undertaking MDGs 4 and 5.

Many research initiatives has focused on leveraging ICT particularly mobile phones to improve maternal health without paying attention on improving child birth registration process, which could assure reliable data to monitor child health outcomes.

The realization that mobile child registration is feasible and effective in the developing world has important implications for health reforms in these parts of the world. It has already been observed that the use of mobile phone for health services is prevalent in the developing world and that the current paper-based child birth registration systems are not sustainable. There is thus the need for pilot projects to adopt technology based models such as the prototype proposed in this research to improve the child health outcomes.

References


