The Use of mHealth in the Promotion of Smoking Cessation in Nigeria: An Untapped Potential

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Abstract

The use of mobile or cellular phone Apps for the promotion of health care service delivery (mobile Health or mHealth) has increasingly gained momentum in the developed and developing countries alike. And with an unprecedented upsurge in the ownership of mobile phones by households in Sub-Saharan Africa and Nigeria in particular, a huge but untapped potential exist for their widespread application in disease control interventions. This review shows that between 5.6% – 6.9% Nigerians aged 15 years and above are known to be current smokers. The aim of thispaper therefore, is to examine the plume opportunity for curbing this burden by promoting smoking cessation via mHealth. Available evidence accessed also revealed that 75% of households in Nigeria own mobile phones and that there are up to 162,763,480 GSM subscribers in the country and a market penetration rate of about 84%. These varied data on the volume of cellular phone availability and connectivity presents an open market for mHealth. Leveraging on a number of behavior change theories, some smartphone applications have been developed and deployed in the country. Not less than 30 mHealthprogrammes have been either piloted or/and fully implemented in different degrees in Nigeria. Though most of such mHealth programs implemented have recorded laudable degrees of success, they were not without some documented challenges. Some of the challenges identified include lack of a reliable power source for recharging of cell phone batteries, data security issues, occasional failure of mobile data/apps to synchronize and integrate with other health system data. Effective collaborative efforts with relevant stakeholders within an amiable government policy environment would go a long way towards promoting smoking cessation using mHealth in the country.

Keywords: *mHealth, Mobile Apps, Nigeria, Smoking cessation.*

INTRODUCTION

Tobacco use accounts for the deaths of an average of one person every six seconds. Tobacco has been reported to kill about seven million people each year, six million of whom are as a result of direct use whilearound 890, 000 are due to non-smokers exposure to second-hand smoke (SHS) (WHO, 2018). This is against the backdrop of WHO estimate that 20.2% of people aged 15 and above years were current smokers in the year 2015 which indicates that smoking rates reduced by 6.7% worldwide from the year 2000 and by 4.1% since the inception of WHO FCTC in 2005 (WHO Global report, 2018). As at 2016, over 1.1 billion people aged 15 years and above were current smokers worldwide, while the prevalence rate for the African region is 13.9% (WHO GHO, 2018). In Nigeria tobacco smoking prevalence among people aged 15 years and above ranges between 5.6% – 6.9% (Nigeria FMoH (2012); NPC & ICF Int., 2014; NBS & UNICEF, 2017 and WHO GHO, 2018). Meanwhile, in order to reduce this high

prevalence rate of tobacco smoking the Sustainable Development Goal 3.a advocates strengthening the implementation of WHO FCTC in all countries (WHO GHO, 2018). In line with this initiative since 2007, WHO has assisted countries to institute the MPOWER demand reduction measures, specifically (WHO Global report, 2018):

- Monitor tobacco use and prevention policies (Article 20)

- Protect people from tobacco smoke (Article 8)

- Offer help to quit tobacco use (Article 14)

- Warn about the dangers of tobacco (Articles 11 and 12)

- Enforce bans on tobacco advertising, promotion, and sponsorship (Article 13); and

- Raise taxes on tobacco (Article 6).

Within the ambit of these control efforts, stakeholders have deployed a number of innovations including various information communication technology (ICT). Broadly speaking, the values in deploying mobile apps in healthcare services delivery are quite vast – they can connect with electronic health records (EHRs) for sharing patient data. Other benefits include improvement of patient/physician relationship by promoting shared health management as well as connecting patients with peer and support communities online to be more actively engaged in their own care. They also assist caregivers to follow care instructions; and provide useful patient information to the patient whose role in his/her own care is critical (Scher, 2015).

The promotion of smoking cessation is one of the vital interventions for tobacco control. One of the efforts being driven by WHO, partners and countries is the use of mobile cellular phones technology to achieve this. This has been considered to be one of the cost effective platforms for local solutions that is appropriate not only for the developed but for the developing world as well. Lees et al, (2017) reports that between 2006 and 2016, 487 mHealth programs have been implemented in sub-Saharan Africa (same programs implemented in multiple countries counted separately). In Nigeria, not less than 25 mHealthprogrammes have been piloted (See Table. 1). In 2011, WHO launched an initiative to promote the use of mHealth for tobacco control in developing countries (WHO, 2011). A review conducted on eight selected studies in Africa illustrates the use of mobile phone apps in enhancing quit rates among smokers (Regmi et al, 2017). Adherence to app features was observed to influence quit rates and audiovisual features followed by a quit plan, monitoring progress as well as sharing features were the most accepted and Apps utilized. The advantages of mobile technologies are vast: availability, accessibility, innovation, cost effectiveness, real-time access to information, and portability are just a few (WHO, 2017).

The context of this paper presupposes a burgeoning information and communication technology (ICT) in Nigeria with a limitless array of opportunities for applications to address the various gaps in the ailing healthcare industry and the abysmal health indicators in the country. Hence, thepurposes of this paper are to: 1) explore through literature the potential that abound for a robust mHealth in Nigeria, 2) identify some existing mHealth initiatives and programmes in the country, and 3) identify relevant challenges and proffer possible solutions

MATERIALS AND METHODS

Materials for this study mainly consist of extant literature review. In order to access and retrieve information on the subject matter, Google search engine was used tocomb the cyberspace for relevant materials. Articles domiciled in PubMed, SciVerse Scopus, CINAHL, BMC-series, Google scholar etc; were accessed. Selected terms and key words on the subject matter of this discourse were typed on the search engine to obtain web page with specific search links, articles and materials. The Boolean search strategy was used to input a number of possible options and combination of search terms to retrieve specific articles, papers, survey and evaluation reports of government and non-governmental organizations and agencies. Key words like "mHealth", "smoking", "cessation", "mobile", "cellular", wireless", "phone", "smartphone"; as well as the combination of such terms with other words in Boolean fashion such as "mHealth AND smoking cessation", "mHealth AND tobacco in Nigeria", "cellular OR mobile phone" and sentences like "Promotion of smoking cessation in Nigeria" to streamline the search for different aspects of the write-up. This review heavily drew inspiration from extant data of the World Bank world development indicators, Nigerian Communication

Commission (NCC) and national surveys which were freely accessed and used, in the light of literatures searched, to form opinions and draw conclusions in this study.

Though about a hundred materials were accessed for this study, only 35 were selected for use and therefore included in the list of references for this article. The key eligibility criteria were; relevance to the topic of this write-up and publication not being older than 10 years from the time of this study. The Nigerian general population and especially smokers were the primary subjects of study.

FINDINGS AND DISCUSSION

Trend of Tobacco Prevalence in Nigeria

Smoking prevalence among adults aged 15 years and above has been reported by the FMoHas 17.1%

in 1998 and 18.1% among youths aged 13-15 years in 2001. An annual increase of 4.7% in consumption rate of tobacco was reported between 2001 and 2006, by the Nigeria, FMoH. The 2008 Nigeria Demographic and Health Survey (NDHS) indicated that less than 1% of women aged 15-49 reported using tobacco and 14% among men aged 15-49 reported tobacco use with those smoking cigarettes constituting 9% of the population (FMoH GATS, 2012, NPC & ICF Int., 2014, NBS & UNICEF, 2017). Though the overall trend in smoking prevalence in the country may appear to be nose diving from a height of 17.10% to between 5.60% and 6.90% it looks quite irregular which seems to suggests that much needs to be done by the Nigerian government and other stakeholders in curbing the menace (See fig. 1).
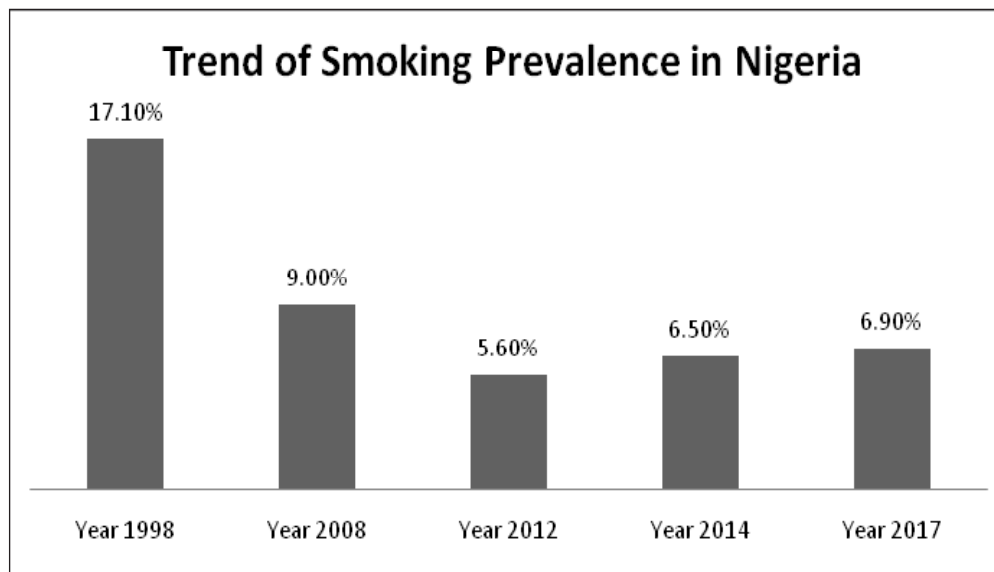

Figure 1. *Source: FMoH GATS Nigeria, 2012, NPC/ICF Int.,2014, NBS/UNICEF, 2017*

Tobacco Control Efforts in Nigeria

Previous government attempts at legislating against tobacco date back to 1990 with the establishment of the Tobacco Smoking (Control) Decree 20, 1990 in 2001, the decree was converted to an act titled "Tobacco (Control) Act 1990 CAP, T 16". Under the provisions of the act, smoking in specific places such as schools and Stadia was banned. It also required warning messages on all tobacco and sponsorship advertisement. The warning, "The Federal Ministry of Health warns that smokers are liable to die young," resulted from the enforcement of the act but the ban

on smoking in the specified public places was not enforced and was ineffective (FMoH GATS, 2012).

Besides the conventional policy and systemic measures adopted for tobacco control, WHO has encouraged innovations and initiatives including information communication technology (ICT) or/and use of electronic devices in healthcare service delivery (eHealth) and for disease prevention including tobacco use (WHO, 2011, Kamana, 2016, WHO, 2016 & WHO, 2018a). The use of mobile or smartphones has been exploited in this regard. Reason being that, even in the

developing world where 80% of the world's 1.1 billion smokers live, cellular phone ownership is quite high (WHO, 2018b).

Mobile Cellular Use, Internet Access and the Mhealth Environment in Nigeria

Since the introduction of Mobile cellular services by the Obasanjo regime in 1993, the Nigerian Global System for mobile communication (GSM) market has witnessed accelerated growth (Abiodun, 2014, Bakare et al, 2017). The debut of GSM was preceded by the establishment of the Nigeria Communication Commission (NCC) by the military regime of General Ibrahim Babangida in 1992 (Bakare et al, 2017). This body was charged with the key responsibility of providing regulatory and oversight role to all telecommunication operators and services in Nigeria. According to NCC (2018) as at the end of the second quarter of the year 2018, there were 162,763,480 GSM subscribers in Nigeria which translates to about 84% penetration rate in the country. This figure grew

from about 450, 000 active lines as at the year 2001 for a population of about 100 million Nigerian. Hence, the telecom industry in Nigeria can be said to have witness tremendous growth in the recent past. Though this was not altogether without some challenges, the popularity that mobile cellular services has gained within a few years of its inception constitute one of the highly celebrated technological revolutions the country has witnessed within the last two decades (see fig. 1).

The Nigeria 2013 National Demographic and Health Survey (NDHS) estimated that seventy-five percent (75%) of households in the country own mobile phones (NPC & ICF Int., 2014). According to the World Bank development indicators data, as at 2017 there were up to 144,920,170 mobile cellular subscriptions in Nigeria (The World Bank, 2018). But as at the end of the second quarter of the year 2018 there were 162,763,480 GSM subscribers (NCC, 2018).
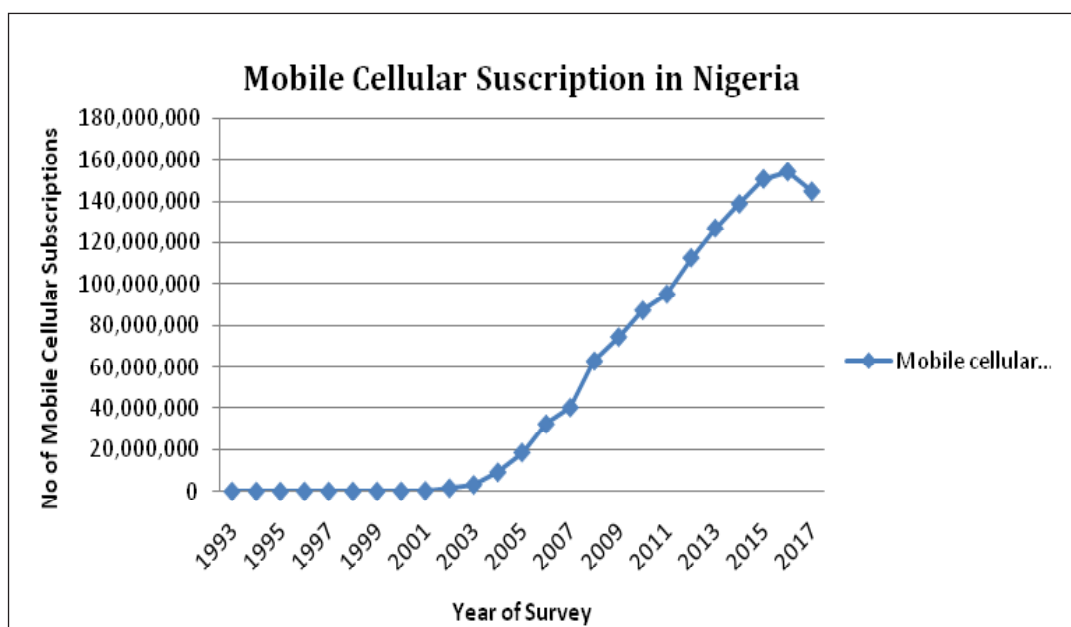
Figures 2. *Source: The World Bank, World Development Indicators Database (2018)*

In last decade the Nigeria telecom industry has also witness a corresponding rise in the number of GSM internet data subscription rate from 32,017,232 subscribers in the year 2012 to 104,628,342 as at August 2018 (See fig. 3). This represents a current

internet penetration of about 52% (NCC, 2018)

There is no doubt that the picture above is that of an environment that holds great potential for a robust mHealthprogramme and particularly with reference to its application to promoting smoking cessation.
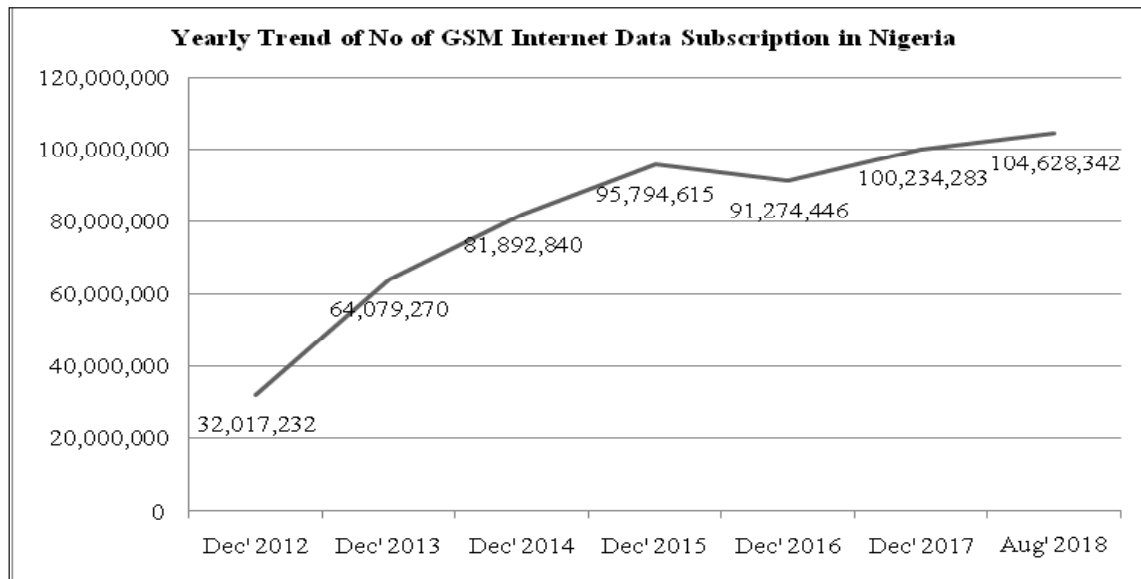
Figure3. *Source: NCC, 2018*

mHealth and its Applications

mHealth is the use of mobile and wireless technologies to support the achievement of health objectives. mHealth falls under a broad category of electronic or simply eHealth. And eHealth is the use of information and communication technologies (ICT) for health. The Executive Board in 2016 considered "mHealth: use of mobile wireless technologies for public health," reflecting the increasing importance of this resource for health services delivery and public health, given their ease of use, broad reach and wide acceptance. "mHealth" or mobile health has been shown to increase access to health information, services and skills, as well as promote positive changes in health behaviours and manage diseases (WHO, 2016a). It's application cuts across various health intervention areas such as the promotion of health and prevention of disease, healthcare delivery, capacity building and training of health workers, monitoring and supervision, electronic or e-payments, and health information management systems (HIMS). It is believed that mHealth programs hold great potential for innovative solutions to a host of challenges being faced by the health system. Some of these include: (1) inequities in accessing healthcare services; (2) inadequate health infrastructure; (3) Shortage of human resources for health; (4) catastrophic cost of health services for households and individuals; and (5) healthcare financing challenges (USAID, 2016).

About 87% of countries of the world reports having one or more national mHealth initiatives (WHO, 2018a). mHealth has found numerous applications as evidenced by the sample of mHealthprogrammes. The K4Health (2018) mHealth evidence describes diverse, widespread and tested applications of mHealth in healthcare service delivery. Some of which include;

a) Supply chain management. This has been used in cold chain management for essential drugs, medical commodity tracking and replenishment, counterfeit prevention, equipment maintenance, prevention of stock out, support and development of workforce for optimal performance, feedback on quality of service, human resource management, training and education of healthcare providers, work planning and scheduling for healthcare providers and in supportive supervision.

b) Financial transactions and incentives; these include uses such as in conditional cash transfers, insurance payment for health services, performance-based incentives, etc.

c) Social and behavior change communication (SBCC). Key among the ways this has been deployed are dissemination of appointment reminders, health education or promotion messages, hotlines and information services, mass messaging campaigns and treatment adherence.

d) Health Information systems. mHealth has also been useful in data collection and reporting for health service delivery records, Household surveys,

Surveillance data, Electronic health records and Registries/vital events tracking. Others include service delivery and support in the areas of electronic decision making, disease diagnosis, disease management and prevention, communication among service providers, referrals and telemedicine.

mHealthProgrammes in Nigeria

The World Bank (2018) has listed in its World Development Indicators Database a number of mHealthprogrammes that have been field tested or implemented in Nigeria and in a few other African countries as well (See Table 1). The success of most of these programmes is indicative of a very bright prospect for the use of the technology in promoting smoking cessation in the country. Beside these ones listed by The World Bank, there are other success stories of mHealth in Nigeria,

Table 1. *List of mHealthProgrammes in Nigeria*

S.N	mHealthProgramme	Area of intervention	Facilitating Agency	Year
1	Alive & Thrive	Breastfeeding	USAID	2011
2	DoctorDial	Allows the Patients to have access to confidential Doctor	CHMI	2016
3	DrugStoc	A hybrid eHub for drugs and medical consumables via app, text messages and call center	USAID	2015
4	GxAlert	3G USB modem and innovative processes integrated into GeneXpert devices to aggregate Multi-Drug Resistant (MDR) tuberculosis tests results in real-time	WHO	2012
5	HiDoctor NG	Brings health care to people through their mobile devices via, chat, audio/video calls	CHMI	2014
6	iDEA: Interactive Distance Education Application	Providing health workers with mobile-based video instruction and reference materials	USAID	2013
7	Kano Connect	The Kano Connect platform digitally connects all health facilities in Kano State by providing phones for over 1,900 healthcare workers, allowing everyone to communicate (using SMS and voice calls) for free within the system and access mobile data	Hopkins	2014
8	Learning About Living	Helps inform and engage young people in Nigeria on issues around sexual health, HIV and AIDS, maternal morbidity and gender violence through a mobile and online platform	CHMI	2007
9	Logistics Indicators Assessment Tool (LIAT)	Supply Chain Management Systems Project (SCMS) using mobile phones with the EpiSurveyor software	Hopkins	2011
10	m4Change + mCCT	Facilitating mobile money transfers to improve maternal and newborn health	USAID	2014

11	m4Change: Clinical Decision Support for facility based ANC providers	SMS reminders and ANC application using CommCare for ANC attendance to women and Community Health workers (CHWs)	Hopkins	2012
12	Mobiles for Quality Improvement (m4QI)	The use of mobile phones to provide post-training support to clinical team members and/or social franchisees in family planning skills.	Hopkins	2013
13	MOVE (phasing out it's previous name; LoMIS)	An open-source last-mile information management platform called Sense -a smartphone application stack to support health workers for workflow facilitation and offline-first data collection	Hopkins	2014
14	Nokia Ovi Life Tools	A Nokia phone application that has a range of personalized informational services, one of which covers health issues such as childcare, fitness, and diseases	CHMI	2009
15	Occupational Health and Safety Managers (OHSM)	Birth and death registration through SMS	Hopkins	2015
16	Omomi (meaning 'my child')	A mobile platform consisting of a mobile app and an SMS service that enables mothers and expectant mothers monitor their children's health	CHMI	2014
17	Omowunmi	A mobile and web based application that delivers health education via voice calls and text messages to expectant and new mothers	Hopkins	2014
18	Safermom	Uses SMS and voice call to provide vital information to mothers, especially to high risk girls who have been subjected to forced marriages	CHMI	2014
19	SMS Printers to Accelerate Return of Test Results for Early Infant Diagnosis of HIV/AIDS (SMART)	To reduce the turnaround time (TAT) for infant HIV test results using SMS printers	WHO	2011
20	Supportive Supervision (SS) for TB in Nigeria	The use of smartphones during supportive supervision visits at TB care facilities to provide comprehensive monitoring of all clinical, commodity, and laboratory functions.	USAID	2010
21	The SureHealth Plan	SureHealth plan was designed initially to enable subscribers to pay premium through their phones on the mobile money platform	CHMI	2011

22	TrakVac: reminder-recall system for routine immunization	Validating the need for deployment of tracking system using automated Reminder-Recall messages for routine immunization	Hopkins	2010
23	U-Report	Short Message Service (SMS) for subscribers to ask questions and get real time answers about various issues, such as Ebola outbreak	WHO	2014
24	Vaccinator Tracking System (VTS)	A mobile phone-based tracking system for field vaccinators that monitors staff's coordinates and activities	Hopkins	2012
25	Open Health and Demographic System (OpenHDS)	An open source Android tablet application that enables community field workers to collect pertinent health information	USAID	2012
26	Mobile Health Research Lab	Researches how mobile technology can be used to improve access, quality, and funding of healthcare such as mobile money to pre-pay for healthcare	Hopkins	2013
27	Mobile Interactions bringing Hope (MI Hope)	Volunteers will be using mobile phones in data collection, sharing information or help in the diagnosis of various ailments	CHMI	2011
28	CliniPAK (Clinical Patient Administration Kit)	Open Data Kit (ODK) is used to Collect, an open-source tool for mobile data collection is loaded onto an Android smartphone that the Community Health Workers (CHWs) carry when visiting patients	CHMI	2011
29	Sense Ebola Follow Up	A mobile and internet based contact tracing system used to facilitate data collection and perform real time reporting and GPS tracking	Hopkins	2014
30	CLIP (community Level Interventions for Pre-eclampsia)	CLIP Trial is a cluster randomized controlled trial involving mHealth platforms to reduce pre-eclampsia burden via community mobilization and empowerment of community health workers	Hopkins	2013

Source: The World Bank World Development Indicators Database

It is pertinent to remark at this juncture that this list (Table 1) from the World Bank database is by no means exhaustive. Other mHealth trials reported in Nigeria include MTN mNutrition (for daily alerts of different food benefits for people as it relates to their health), Mobile Midwife Nigeria, the mobile baby for polio immunization, Cash and Asset transfer (CAT) strategy for mosquito net distribution, SFH MNCH mobile programme, SURE-P MCH Mobile Conditional Cash Transfer etc (FMoH/UN Foundation, 2014; CRS, 2018).

Smoking Cessation and the mHealth Initiative

Smoke-related health problems are the leading preventable

causes of death in the US (Ahsan et al, 2013). Tobacco use is generally defined as use of any type of tobacco, smoked or smokeless -the trends estimated are in four indicators of tobacco smoking: current and daily tobacco smoking and current and daily cigarette smoking (WHO Global report, 2018).

The 71st World Health Assembly of 2018 acknowledged the potential of digital technologies to play a major role in improving public health, where delegates agreed on a resolution on digital health. The resolution urges Member States to prioritize the development and greater use of digital technologies in health as a means of promoting Universal Health Coverage and advancing the Sustainable Development Goals. (WHO, 2018a)

Since its early development stage, the potential for a mHealth approach has been widely explored to empower public health functions for low- and middle-income countries (LMICs) (Lees et al, 2017).

The effectiveness of the use of mHealth for smoking cessation has been variously reported worldwide (Ahsan et al, 2013, Regmi et al, 2017). And a systematic review of mHealth programs implemented in sub-Saharan Africa between 2006 and 2016 revealed there were a total of 487 programs (Lees et al, 2017).

Potential mHealth Options for Tobacco Cessation in Nigeria

A few of models of mHealth solutions for smoking cessation have been developed and tried elsewhere. Hors-Fraile et al (2018) developed a protocol with apps for tailoring motivational health messages aimed at smoking cessation by means of amHealth recommender system integrated with an electronic health record system (eHSR). This leveraged on some features of smartphones that allows users to receive messages from a server and equally track their activity and interaction. According to the protocol the system is able to connect with the smoking cessation unit of a hospital's electronic health record using Mirth Connect software. This enables the following interconnections:

- Hospital user database to patients' demographic information

- Hospital clinical database to patients' clinical data

- Lightweight Directory Access Protocol to/

for validation of credentials of the healthcare professionals who access the hospital data system

The app requested information is processed and selected from the eHRS database, formatted and sent back by the Mirth software Connect platform. Hence, a patient's profile; name, gender, age, smoking quit date, type of medication; becomes automatically loaded on the patient/client's platform/device without inputting anything besides a code provided by their care provider.

In addition, the system provides for an interface between the hospital (clinical station) and the client's care activities, such that healthcare providers with appropriate consent are able to monitor the patients' activity using the app. Messages sent to client's are in five categories: benefits of being a non-smoker, motivation, diet tips, personal performance and physical exercise tips. Each category has a pool of a hundred and fifty messages approved by a smoking cessation psychologist and pulmonologist, along with useful tailored information to help the patients.

Another potential option for amHealth smoking cessation programme in Nigeria is the collective intelligence tailored messaging system where a Patient Experience Recommender System for Persuasive Communication Tailoring (PERSPeCT) (Sadasivam et al, 2016a). It exploits computer-tailored health communication (CTHC) systems whereby messages are tailored based on what best suits the patient's need given his or her characteristics. This has been proven to be effective in motivating smoking cessation. The primary difference between standard CTHC and recommender systems cited above is in the messages selected. Recommender systems offer multiple potential advantages to CTHC including the ability to continually learn and adapt to user feedback. Machine learning algorithms make use of user profiles and continuous feedback ratings of content from themselves and other users- to empirically tailor content (Sadasivam et al, 2016b).

Finally, in the recent past a number of documents on Health ICT and digital health in Nigeria have come up with a lot of options and initiatives that requires a careful study with the aim of specific adaptation to particular areas of disease prevention and public health importance like promoting smoking cessation using mHealth. Some of these documents include;

Nigeria Health ICT Strategic Framework, ICT4SOML Situational Analysis, Nigeria eHealth Landscape Report, Health and ICT policy review in Nigeria, Nigeria Health ICT field implementation assessment, Nigeria Patent Health Data Privacy and Security Guide, Assessment of Health ICT capacity and curricula in Nigeria, Toolkit – assessing enabling environment, National ICT policy 2010, National Broadband policy 2013, National Health Act 2014, National health Policy 2016 (Nigeria Digital Health Dashboard, 2018).

Challenges in mHealthProgrammes Implementations

Despite a flurry of mHealth program initiatives all over the world and especially in developing countries like Nigeria, a number of challenges need to be highlighted.

First and foremost is the endemic problem of energy and power outage in the country. Since the operation of mHealthprogramme depends on not only owning mobile/smartphones but having them constantly powered using electrically charged batteries; the epileptic nature of the national electricity power supply still imposes a huge challenge of inability of individuals to keep functional cellular mobile phones, thereby hampering seamless interoperations.

Secondly, is the high level of illiteracy (60 %) among the beneficiary populace in Nigeria (CIA, 2018). This makes usability of the technology difficult (Gurupur& Wan 2017). In all designs of computer and mobile apps, the subject of Human Computer interaction (HCI) which centres on how humans interact with machines (user centered approach) (Kamana, 2016).

Thirdly, there are conflicting health system priorities in Nigeria just as it obtains in other developing countries (WHO, 2011). The deplorable state of health infrastructure and lack of essential medicines are among some competing health system priorities.

The fourth is inadequate number of trained personnel and lack of digital health skills and capacity (UN Foundation, 2015). A greater proportion of the health workforce in Nigeria lack requisite training on ICT and therefore digital health skills.

Another challenge is lack of available and reliable ICT info-structure and infrastructure. This poses a threat to an enabling environment for not only mHealth but for all Digital health technologies, "an umbrella term

reflecting the maturity and integration of mobile health (mHealth) and electronic health (eHealth) technologies" (UN Foundation, 2015).

The sixth is lack of funding allocation to digital health generally. This tends to also limit the implementation and scale-up of mHealth programs in Nigeria.

Other challenges include lack of training opportunities and supportive tools like reporting forms, guidance manuals and SOPs.

RECOMMENDATIONS

In view of the above outlined challenges the following are recommended;

The government of Nigeria should address the fundamental issue of lack of a reliable power supply not only for mobile phones functionality but for other critical development sectors.

There would be need to also address usability issues. There should be a lot of sensitization and capacity building initiatives by government as even designers tend to focus on technologies that make human computer interaction (usability) easy (Kamana, 2016).

The government of Nigeria should also prioritize digital health technologies including mHealth for adequate funding. A budget line for the subsector should be provided.

Reliable ICT info-structures and infrastructures should be made available within a supportive ecosystem of policy makers, donors, technologists and public health professionals (UN Foundation, 2015).

Finally, adequate training opportunities for healthcare providers especially nurses and the use of supportive tools like reporting forms, guidance manuals and SOPs should form part of an implementation plan and policy direction within the health sector.

IMPLICATION FOR PUBLIC HEALTH / COMMUNITY HEALTH NURSING

Quitting smoking is the single most important step patients can take to improve their health, and ensuring they receive appropriate support to do so can make a huge difference to their chances of success. Mobile health technology has broadened nurses' horizons beyond what anyone could have imagined, giving them the ability to improve care and communication and educate patients in managing their own health.

If adequate ICT info-structure and infrastructure are made available and accessible to nurses in Nigeria for the purpose of mHealth in smoking cessation, they will no longer need to assess and make clinical decisions based only on office visits, episodic emergency care and hospitalizations emanating from complications of smoking. By using technologies from smartphones to wearable activity trackers and Web-based or downloadable apps, they can monitor smoking cessation of the affected patients or client even at the grassroots.

Conclusion

In conclusion, that mHealth is a huge but largely untapped potential for critical interventions such as the promotion of smoking cessation is clearly elucidated by this paper. This is owing to a currently high rate (84%) of mobile phone penetration and a good number of field trials and some fully implemented mHealthprogrammes in Nigeria. These however have brought to limelight some attendant challenges that must be tackled for effective and successful scale-up of existing schemes and deployment of new mHealth initiatives. A paradigm shift in priority of government to favor a hitch free implementation and diversification of mHealthprogrammes in the country is imperative. Addressing some underlying barriers like high level of illiteracy in the country might require sector-wide government actions.

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