Medical apps for reproductive health practices: Uses and implications for supporting sustainable development in Nigeria

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Abstract

Background: Empirical investigations on the adoption of selfcare medical apps for reproductive health services among women are not popular in literature and rarely dicussed openly.

Objective: This study evaluated the uses of medical apps for reproductive health practices among women in Nigeria.

Method: Quantitative questionnaire approach was adopted among randomly selected 340 urban literate women in prime reproductive age (15-35 years) in Ota Community.

Results: The study identified three predominant disproportionately used of selfcare healthapps: My Fitness Pal (23.7%), Flo (22.2%) and my Calendar (17.8%). Common selfcare practices are pregnancy test, weight management, but infection test was low (6.5%).

Conclusion: The study concludes that the use of selfcare medical apps that could aid early discovery of health challenges are not common in the study location. The authors recommended the use and training on these apps as crucal part of women's reproductive healthcare services to achieve healthy lives and reduction in maternal and infant morbidities.

Keywords: Selfcare medical apps, health care, maternal and infant death, sustainable development, Nigeria

Introduction

Inhealth studies, the idea of reproductive health underpins the importance of complete wholeness of an individual, which is indispensable to sustainable development. One of the sustainable development goals is to ensure universal access to sexual and reproductive health services, including family planning, information, and education (goal 3.7), which are been promoted through radio, television, and other media of communication. Generally, the mass media have served as vanguards for creating information, awareness, and knowledge on reproductive health issues (Velente& Saba, 1998; Jegede, 2016; Oyero&Salawu, 2014; Okorie &Bigala, 2016; Okorie &Salawu, 2017; Okorie &Bwala, 2017). Wittet (2012) and Allison et al, (2012) reported that the local media have greatly influenced public health policy and health-related attitudes and behaviour with greater potential for mobilisation of communities towards better health outcomes. The media play a vital role in communicating health information that can help save lives (Allison et al., 2012). There is dire need for universal access to health for all individuals, especially women within the reproductive age bracket in a country with endemic maternal and infant mortality and morbidity. The feasibility of health goals of sustainable development and better health outcomes could be achieved if selfcare medical practices are entrenched in the country's healthcare system.

In recent times, advances in technology are playing significant roles in the emergence of several devices and applications with ease of use. The internet and other mobile technologies have formed veritable media platforms for promoting reproductive healthcare practices and services. According to a Pew Research Center survey, (2013:10), "78% of teens now have a cell phone and almost half (47%) own Smartphones.One in four teens (23%) has a tablet, and 93% have a computer or have access to one at home. In addition, seven in ten (71%) have access to a laptop or desktop that is shared with family members, making access to social media sites and text messaging a safer sex health promotion option". In the same vein, Ippoliti and L'Engle (2017:1) observed that "more than 93% of the world's population is covered by mobile phone networks, and more than 87% of people living in the developing world are mobile phone subscribers. Due to declining mobile phone costs and increasing reliance on mobile phones as essential commodities, mobile phone use is on the rise, even in the most resource-poor settings".

Interestingly, it is assumed that the increasing availability of mobile gadgets can be applied for medical purposes. However, the extent is not known. Importantly, there are scanty literaturesin this area. Therefore, this study is poised to examine the level of awareness in the use of medical apps for reproductive health among women, and the types that are predominant as well as the utilisation of these devices for self-health care measures.

Literature review and theoretical framework

Reproductive health problems are perennial issues in any modern society. Across the globe, scholars agree that there are several challenges that negatively affect the reproductive health care practices among women (Ayanleye, 2013; Quilliam, 2013; Fadeyi, 2016; Amodu, Alege & Oluwatobi, 2017; Salawu, Oyero, Moyo &Moyo, 2017). Alubo (2000: 1) observed that "reproductive health are important contemporary concerns especially for reproductive health problems such as unintended pregnancy, maternal mortality and sexually transmitted disease, including AIDS". Iyanleye (2013:132) observed that "essential elements of a comprehensive reproductive health package are: comprehensive sexuality education, access to contraception, safe abortion, maternity care, and diagnosis. Treatment of sexually transmitted infections (STIs), including HIV, diagnosis and treatment of breast and cervical cancers and other cancers that affect the reproductive system. This package of services enables girls and women to decide whether and when to get pregnant, to decide whether to carry a pregnancy to term, and to experience pregnancy and childbirth safely". From these perspectives, the common reproductive health problems are maternal mortalities, sexual transmitted infections, family planning problems and cancer. Also, the need for sexual education and comprehensive health services are crucial for promoting reproductive health care management.

Interestingly, the media can serve as carriers of health information on reproductive health issues. Okorie and Bwala (2017) reasoned that the media are potent health communication vehicles for creating awareness and knowledge of reproductive health issues or to reduce the spread of the diseases. Similarly, Singh, Grizzle, Yee and Sherri (2015) noted that UNESCO sees the media as an essential platform to empower citizenries all around the world to have full benefits of these fundamental 21 human rights and freedoms as well as enable sound social discourse. They also enable the citizens to be aware of their responsibilities in the context of their universal human rights. These include the responsibility to demand quality media and information services and to use information and technology ethically. This is in line with goal 3.7 of the SDGs, which ensure universal access to sexual and reproductive health services, including family planning, information, and education. Thus, the media serve asnexus for promoting access to reproductive health services in Nigeria.

The internet as a media platform has been argued to promote infrastructural support for reproductive health care management in Nigeria (Sobowale, Amodu, Aririguzoh & Ekanem, 2015; Okorie, Loto & Omojola, 2018). Nwagwu (2007: 1472) observed that "despite the harsh political and economic situation in Nigeria, the country is rapidly evolving as an information society and an information technology hub in West Africa. Internet services are available in cyber-cafes, in-schools and in many homes, and could be serving the purpose of informing the girl child about her reproductive health". Also, Quilliam, (2013) observed that the Internet has the advantages of accessibility and confidentiality on issues of reproductive health. The internet helps young women to have privacy on sexual health issues such as menstruation and pregnancy management. Furthermore, Quilliam, (2013) maintained that the Internet has the focal-point on reliability and quality control on preliminary health management. From these interjections, the Internet serves as a core enterprise for health communication interventions on reproductive health issues. Also, the Internet has the unique benefits of information, accessibility, privacy, reliability, and education for reproductive health management.

In the sphere of health communication, there are several studies that explore the use of the media for reproductive health practices. For example, Velente and Saba (1998) investigated the influence of mass media and interpersonal channels on reproductive health communication in Bolivia. The thrust of the study explored how reproductive health campaigns in Bolivia made use of six behavioral change steps in health communication interventions. These steps were: awareness, detailed knowledge, attitude, intention, interpersonal communication, and family planning methods. The study maintained that communication campaigns are essential for health communication invention on reproductive health problems. The study found that the mass media such as radio, television and internet had significant influences on behavioural change on issues of reproductive health. Furthermore, the study indicated that the media channels influenced the adoption of contraceptives use among individuals in Bolivia. The study asserted that high infertility rate was due to lack of information on reproductive health management.

In the same vein, Nwagwu (2007) examined the internet as a source of reproductive health information in Nigeria. The study focused on how young female Nigerians made use of online resources for their reproductive health needs. It also maintained that the internet served as a crucial information source that aided access to health education and information services. In summary, more than 73% of the respondents had made use of the internet for seeking reproductive health information. Also, the results indicated that a significant number of respondents had home-access for internet use compared to few respondents that relied on the internet from school. The study concluded that young female Nigerians may face the challenge of quality reproductive health information because of the myriads of websites on adolescent health.

In another research, Levine (2011) examined the use of new media to promote sexual health among adolescents. The results of th researchposited that web-based social networking sites were veritable health communication platforms for promoting reproductive health. Furthermore, healthcare providers and agencies were identified and how they made use of widgets, apps, podcasts, video games and video sharing to create awareness and educate individuals on reproductive health issues in any modern society. For example, AIDS.gov has three different widgets that can be shared and downloaded on any multimedia device. These three widgets are (1) HIV testing day widget (2) podcast widget (3) Nine and a half minutes widget. Levine (2011) observed that"Nine and a Half Minutes is a campaign to raise awareness that every 9 and a half minutes, someone in the U.S.is infected with HIV". It was recommended that user participation should be encouraged on the different new media platforms to increase user-generated contents.

Similarly, Allison et al., (2012) explored the intersection between youth, technology, and new media as they influence sexual health. The core of the researchwas how the new media offer multiple opportunities for sexual health and disease prevention for youths. It was observed that the potential of new media platforms were hinged on accessibility, acceptability, and feasibility. Thus, there should be easy access and acceptance of new media platforms among young people for reproductive health use.

Godwill (2014) conducted a researchon the challenges of sexual and reproductive health among adolescents in Northern Nigeria. A majorfindingwas that adolescents faced wide range reproductive health problems such as early marriages, unwanted pregnancy, maternal mortality, and sexual transmitted infections. The qualitative research method was adopted using 36 focus group discussions (FGDs) and 48 in-depth interviews (IDIs) to achieve the objectives of the study. The results indicated that a significant number of adolescents were knowledgeable of contraceptive methods. Also, the results indicated that most of the participants had the sense of vulnerability on issues of reproductive health problems, whereby parents of these adolescents influenced their decisions on early marriage and child bearing. The conclusion, therefore, was the need for intervention strategies to tackle issues relating to empowerment, and access to resources, improve

Importantly, the Uses and Gratifications Theory serves as the theoretical framework. The theory examines why people use the mass media and what they gain from putting the effort and energy to do so. The purpose is to identify and explain why individuals choose certain mass media over others and what appeal the chosen one has over the others (Cummings, 2008: 3). The Uses and Gratifications theory views the audience as active, which means that they actively look out for specific media and content to achieve certain results or gratifications that satisfy their personal needs. It is clear that media audiences spend time using the mass media in various ways. Whether they are buying time or using it as a social tool, each medium is unique in its purpose. Gratification from media is related to an individual's personal and basic information and communication needs. People go to the media to get gratifications like information on current state of affairs, education, insight, entertainment, etc. They see different media as efficient in meeting different needs.

The Uses and Gratifications theory explains how people use media for gratification of their needs, and why they choose a specific mediumover others. Littlejohn and Foss, (2009:65) reasoned that the theory focuses on media uses of the audience because of their health and social needs. This is because when an individual has a communication or information need, the individual selects the medium that he/she perceives as adequate to satisfy that need. This is based on his/her personal characteristics or ideologies. The audience is free to select from a wide range of media options and selectively consume the content he/she has access to.

Ruggiero (2000:13-14) posited that the emergence of computer-assistedcommunications has made the Uses and Gratifications theory important as the communication consumption pattern of media audiences has experienced a great alteration. Ruggiero (2000) identified three characteristics of computer-based mass communication that opens a new aspect of Usesand Gratifications for researchers.

They are:
(a) Interactivity: Interactivity is said to be extent to which players in the communication process exercise control in the entire process.
(b) Demassification is the control that the users have over whatever channel of communication they make use of. It explains that the new media provides users the opportunity to select from a wide range of options on the choice of media.
(c) Asynchroniety: This term refers to the idea that new media messages are not as transient as that of the traditional media.

Stafford, Stafford and Schkade (2004) identified three types of gratification sought by consumers. These are content gratifications, process gratifications and social gratifications. Content gratifications occur when consumers use certain media because of the content they can derive from them. It could be in form of entertainment, information, or education. This study will attempt to examine and put in perspective the possibilities medical apps can offer especially, as tools for the users to get the necessary information on reproductive health. The remaining needs include affective needs, personal integrative needs, social integrative needs, and tension needs.

This theory provides theoretical support to this research with the perspective that the audiences are very active in the communication process. They actively perform the choice of whether they are willing to use medical apps to look for information that answers their questions or fits a need on issues of reproductive health. Thus, there is a synergy between health care apps as a health communication channel and reproductive health practices among women. Across the globe, women make use of health care apps or medical apps for health education and disease prevention. Furthermore, some women make use of medical apps because they gain several gratifications as regards their health. For example, Flutter, Pregnancy + and Ovia Fertility are medical apps, which women make use for maternal health. Women make use of 'Pregnancy +' for antenatal and postnatal guide for child bearing.

Methodology

A survey was carried out on a population consisting of 340 women aged 15-35 years, selected from Ota Community in Ogun State. The choice of women aged 15-35 years was because women within this age range are highly reproductive (WHO, 2008) and the sample size is adjudged sufficient following the position ofWimmer and Dominick (2003), who asserted that a sample size ≤ 200 is fair while 300-500 as good but 1000 or above is excellent. Specifically, a multi-stage sampling technique was adopted whereby the community was divided into wards, and two wards were randomly selected. Second, the wards were clustered into streets and three streets were selected from each ward. Finally, the streets were clustered into residential homes.One female resident within the age range (15-35 years)from each household that was interested in participating in the research was selected.

Three levels of analyses were used for this study, namely: univaritate, bi-variate and multivariate analyses. The univariate analysis was used to profile the respondents. The bivariate analysis featured cross tabulations between two variables of interest especially in the investigation of the awareness and practice of medical apps for reproductive health among women. The study adopted multivariate analyses to test a hypothesis: to confirm the whether there is a significant relationship between the use of Internet and the awareness level for the use of medical apps.

Results

The attrition rate from the questionnaire was 3.2% while 96.8% were returned and processed. The use of digital social media was confirmed among the respondents using a Likert scale of very large extent, large extent, rarely and never used. The usage profile revealed that more than 60% of the respondents had greatly used Internet, while 39.2% indicated that they made sufficient use of the internet. Also, a majority of the respondents indicated that they made significant use of digital media devices. Table 1 indicates that more than 75% of the respondents were greatly aware of the use of medical apps for reproductive health. Also, 53.5% of the respondents maintained they make significant use of medical apps for reproductive health.

Table 1: Respondents' use of internet-based platforms

Responses	**Use of the Internet (**n=329)	**Use of Digital Devices (**n=329)
Very Large Extent	60.8%	91.8%
Large Extent	39.2%	6.2%
Rarely	0%	2.0%
Never	-	-
Total	100	100

Awareness of and proportion of use of Medical Apps	I am aware of Medical Apps for Reproductive Health (n=329)	I make use of Medical apps for reproductive health (n=329)
Very Large Extent	27.3%	21.5%
Large Extent	49.3%	32.0%
Rarely	23.4%	46.5%
Never	-	-
Total	**100%**	**100%**

Source: Authors' computation (2018)

Selfcare medical apps utilisation among women

Three major selfcare medical apps were identified as dominant among the women namely: My Fitness Pal, Flo, and My Calendar. Specifically, almost 50% of the respondents made great use of medical apps for their menstruation management (Table 2). Also, 26.1% of the respondents indicated that they made major use of medical apps for fitness and weight loss, while 10.8% make use of medical apps for pregnancy management. Table 4 shows that 23.7% of the respondents indicated that they make use of Fitness Pal which help women to reduce their weight as well as promote fitness. The result also shows that more than 22% of the respondents indicated that they made significant use of Flo, which is a medical app that assists women to record and manage their menstruation cycle (Table 2). Interestingly, the respondents indicated they made use of other medical apps that helped them to manage their menstruation cycle. The apps are: Period Counter, My Calendar, My Days X, Spot On. In addition, respondents also indicated that they made use of medical apps for pregnancy management. Some of these apps are: Clue, Infant Risk and Kick Counter. Thus, the three predominant selfcare medical apps used by Nigerian women were Fitness Pal, Flo, My Calendar, IOS Health and My Days X.

Table 2. Names and use of medical apps

Names of Medical Apps	n=239
Medical Apps	**%**
My Fitness Pal	23.7
Flo	22.2
My Calendar	17.8
IOS Health	8.5
My days X	7.2
Clue	4.9
Smart health	4.3
Spot On	3.0
Period Counter	2.1
Kick Counter	2.1
Infant Risk	2.1
Fitness 5	2.1
Total	100.0
Use of selfcare medical apps	n=239
Menstruation	48.3
Fitness and Weight Loss	26.1
Pregnancy	10.8
Diet and nutrition	8.5
Infection	6.3
Total	100%

Source: Authors' computation (2018)

Association between the use of Internet and the awareness level for the use of medical apps

A bivariate analysis was done to have an overview of the major reproductive health practices among the women and the specific selfcare medical apps in use. It could also provide a clue into appropriate and misuse of such devices in the location of study. The distribution indicated that most of the selfcare apps identified are being utilised for variety of purposes. While My Fitness Pal is more popular for fitness and weight management, the device is also associated with pregnancy and mensuration check among the women. Almost all the selfcare medical apps identified are used for pregnancy check except for Kick Counter, Infant Risk and Fitness-5. Almost one-

third of the women surveyedused IOS health and My Calendar a pregnancy check (75.0% and 67.7% respectively). The IOS health is noted to be used for only menstruation test and nutritional test.

A chi-square test was also conducted to examine the significant association between the use of selfcare medical apps and the identified selfcare medical apps. The result indicated a positive association between the two variables (r = 0.934, p-value = 0.000) while the standard deviation error values shows that the association was strong (Table 3).

Table 3. Distribution of major application use and their specific uses

	Major use of medical apps for reproductive health tests					
Major medical app used	**Pregnancy**	**Menstruation**	**Weight loss**	**Infection**	**Diet and nutrition**	**Total**
Clue	-	9(56.25%)	-	7(43.75%)	-	16 (100%)
Spot On	-	3(30%)	-	-	7(70%)	10 (100%)
Flo	7(9.59%)	29(39.7%)	30(41.10%)	-	7(9.58%)	73(100%)
IOS health	-	21(75.0%)	-	-	7 (25.0%)	28(100%)
My fitness pall	14(15.9%)	32 (36.4%)	35 (39.8%)	-	7(8.0%)	88(100%)
My calendar	14(21.5%)	44(67.7%)	7(10.8%)	-	-	65(100%)
Smart health	-	7(50%)	7(50%)	-	-	14(100%)
Period counter	-	7(100%)	-	-	-	7(100%)
Kick counter	-	-	7(100%)	-	-	7 (100%)
My days x	-	7(100%)	-	-	-	7 (100%)
Infant risk	-	-	-	7(100%)	-	7 (100%)
Fitness 5	-	-	-	7(100%)	-	7 (100%)
Total	**35(10.6%)**	**159 (48.3%)**	**86 (26.1%)**	**21 (6.5%)**	**28 (8.5%)**	**329 (100%)**
Chi-Square = 420.626, P-value = 0.000, r = 0.024						

Source: Authors computation (2018)

We also considered whether the use ofinternet had any influence on the utilisation of medical apps for preliminary health measures among the respondents at bivariate level using correlation analysis. The result indicated a negative association between the use of internet and application of medical apps for preliminary health measures (r = -0.606, P-value = 0.000) and the standard deviation error values showed that the connection is a weak and positive one.

Discussion

The study provided information on different types of selfcare medical apps that are being used among women for variety of reproductive health practices as distinct from existing studies on access to reproductive health services that are situated in health facilities (Ayanleye, 2013; Godwill, 2014). It has provided insight into unsuspected opportunities for early discovery of health problems. The study established that medical apps as health information platform could promote reproductive health management or as information resources, for women to guide their decisions on healthy living and reproductive choices. The findings also support the existing studies on the use of internet-based platform for primary health information (Allison et al., 2012; Nwagwu, 2007; Levine, 2011; Quilliam, 2013). The overall relevance of this study is that it could direct policy and decision making towards the achievement of universal access to health care services, especially among women in Nigeria within the prime reproductive age (15-35).Nigeria is currently classified among the countries with high endemic maternal and infant mortality and morbidity. The application of the findings from this study could enhance the achievement ofsustainable development health goals, and better health outcomes if selfcare medical practices are encouraged.

The findings indicated five predominant health care apps used by Nigerian women, viz: Fitness Pal, Flo, My-Calendar, IOS Health and My-Days X. While Flo, My-Calendar and My-Days-X are medical apps used for the management of menstruation cycle, the others like Fitness Pal and IOS Health are medical apps for the management of fitness and weight. The results confirmed that a great number of women were aware of medical apps for reproductive health which corroborates Levine (2011) who asserted that health care providers and agencies make use of apps to create awareness and educate individuals on reproductive health issues in any modern society. It can be inferred that most women make predominant use of medical apps for maternal health management.

For the first hypothesis, which was tested indicatedthere was a significant relationship between

the use of internet and the awareness level for the use of medical apps. The result supports the findings of Allison et al., (2012), that new media offers multiple opportunities for health management and disease prevention. The potential of new media platforms was hinged on accessibility, acceptability, and feasibility. Thus, young women must have easy access and acceptance to new media platforms such as medical apps for reproductive health use.

The findings of this research have several implications for sustainable health development. First, medical apps will increase multiple information gateways for reproductive health practices. Women could acquire more information on issues of health management and lifestyle by using medical apps as a multi-media manual for healthy living. The unbridled influence of the internet will open doorways for information consumption among women. Second, medical apps will provide preliminary health education on reproductive health issues. This would have a positive influence on the attitudes of women on health care management. Third, there will be a snowball effect for the adoption of alternative digital health therapies that provide health care management for women. The adoption of medical apps among women for reproductive health practices could invariably increase the use of alternative digital health therapies that provide health care management for women.

Conclusion and recommendations

Medical apps serve as internet-based platforms for health education and promotion. The study supports the views that there ares significant increases in the use of medical apps for reproductive health care management. For women, the years between puberty and menopause offer multiple opportunities for personal fulfillment and development. However, this can also be a time of health risks specifically associated with sex and reproduction that may result in a significant burden of mortality and disability. The study, therefore, recommends that health care providers must integrate the use of medical apps for health care delivery in the Nigerian society, and women should adopt health care apps for preliminary health measures and disease prevention. The use of medical apps will re-invent conventional medicine and serve as a springboard for the achievement of the sustainable development goal for promoting universal access to sexual and reproductive health services, including family planning, information, and education (goal 3.7).

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