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Susceptibility to Potentially Harmful Self-Medication: The Place of M-Health Apps in Ensuring Well Being

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Abstract
The ubiquity of mobile technologies has engendered opportunities related to the utilization of mobile health technology applications which offer health solutions. Such health care areas where mobile technologies are applicable include: disease management; medication adherence; safety monitoring; health information and wellness. m-Health technologies are used by patients, caregivers, and clinicians to improve health care management and enhance communication and information transfer between and among patients and medical personnel. The practice of self medication in a developing economy like Nigeria poses a great health challenge. The idea of self-medication implies the use of any medicine for the treatment of ailments without a physician's prescription. Self-medication in Nigeria has reached a crisis situation such that Nigerians, especially, youths, take anything; even potentially toxic substances, as remedies for ailments. This paper was an attempt to establish a critical health issue and suggest the place of mobile health technologies in tackling the issue. We suggested the idea of the E-medication App – a mobile app technology which when considered, conceived and developed could arm mobile app subscribers with a tool enabling them to ask questions in the virtual sense using the E-medication App installed on their mobile phones and receive expert diagnosis and drug prescription.
Keywords: Mobile technologies, m-Health App, Self medication, E-medication

1. Introduction

Mobile services can be put to a variety of uses including healthcare. The World Health Organization (WHO)'s publication: "Global Observatory for e-Health" suggests the ubiquity of the mobile phone and the potential application of mobile technology for health. Opportunity areas highlighted in this publication include: Health call centres; Emergency toll-free telephone services; Treatment compliance; Appointment reminders; Community mobilization; Awareness-raising over health issues; Mobile telemedicine; Patient monitoring; Patient records and Information and decision support systems.

The recognition by WHO of the potential of mobile technologies to provide health solutions would appear to dwell on the fact that mobile technology has become a part of our everyday life (Alepis and Lambrinidis, 2013). m-Health is broadly defined as the delivery of health-related services to patients, clinicians, and caregivers through mobile technology platforms on cellular or wireless networks (Centre for Technology and Aging).

2. Mobile Technologies: An Overview

Mobile technologies include: mobile phone, PDAs smart phones, tablets, laptops and other specialized devices like diagnostic devices. These are discussed as follows:

2.1 The Cell Phone

The mobile phone or cellular phone connects to a wireless communication network via radio signals or satellite waves. Mobile phones feature, voice communication, GPS (Global Positioning Satellite), Short Message Service (SMS), Multimedia Message Service (MMS), e-mail and browsing capabilities

Figure 1: Functionality of the Cell Phone

2.2 The PDA (Personal Digital Assistant)

The personal Digital Assistant (PDA) is a small handheld device that combines computing, telephone/fax, Internet and networking features. It can also function as a cellular phone. The PDA comes in either stylus or keyboard version

Figure 2: Functionality of the PDA

2.3 The Smart Phone

The smart phone integrates mobile phone capabilities with the common features of the PDA. Smart phones are phones that have more than the basic capabilities of cellular phones. Users can store information, install programs or apps, e-mail and engage in online networking activities. The storage capacity of the smart phone is usually bigger than the mobile phone.

Figure 3: Functionality of the Smart Phone

2.4. The Tablet

A Tablet is smaller than a laptop and bigger than a smart phone. It features Internet connectivity; create and share presentations, video conferencing capability, program installation, games etc.

Figure 4: Functionality of the Tablet

2.5. The Laptop

A laptop is a personal computer with a clamshell suitable for mobile use. The laptop combines the components and inputs of a desktop computer. Different apps could be run on the laptop; it features Internet connectivity via modem or WiFi. Its portability means it could be used in a more flexible manner than the desktop.

Figure 5: Functionality of the Laptop

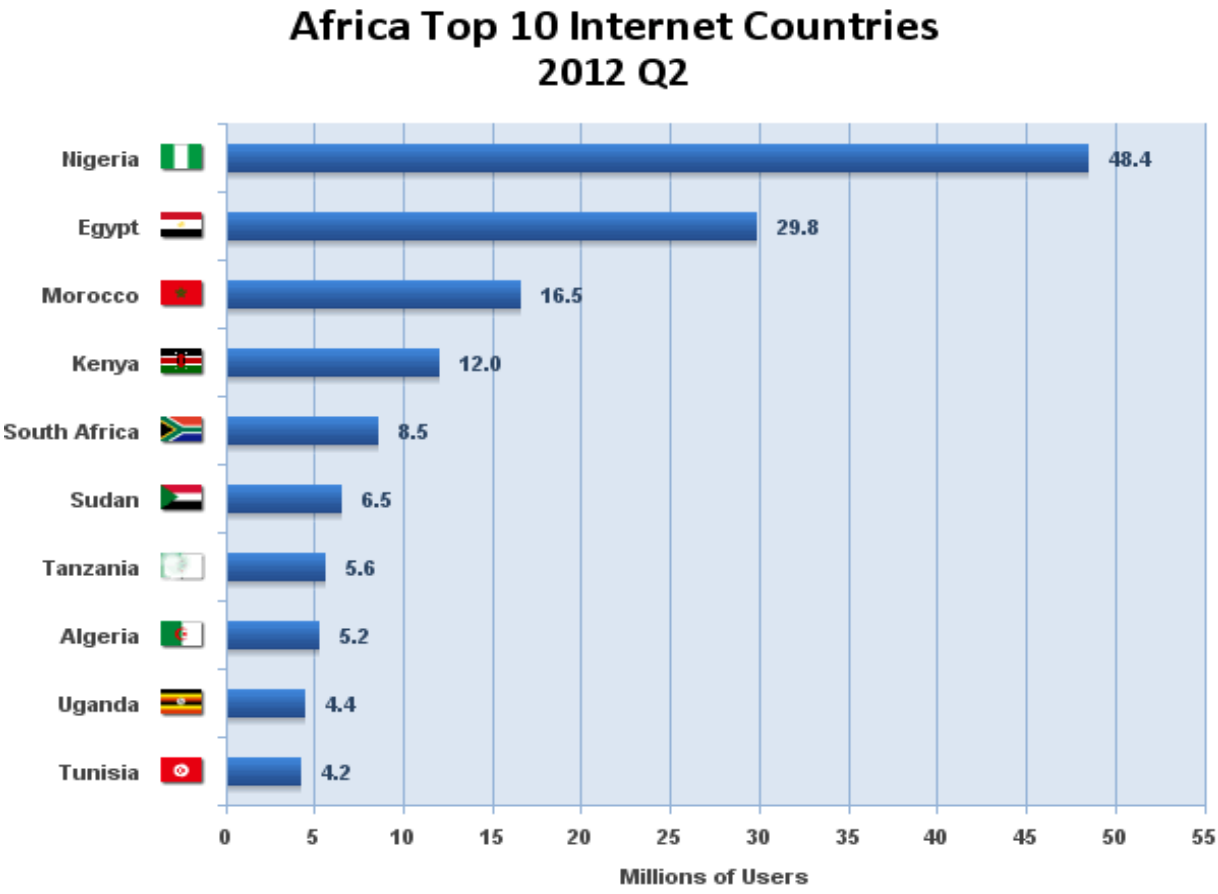
2.6. Diagnostic Devices

Mobile diagnostic devices have features that can diagnose potential health conditions like blood pressure and sugar level. These devices can work in a stand-alone format or in tandem with mobile phones.

Figure 6: Functionality of a Mobile Diagnostic Device

The mobile phone (especially Smartphone) remains the most popular device to access the Internet in Nigeria. Internet users usually perform online activities on their mobile phones (Ericsson Consumer Insight Summary Report April 2015).

Nigeria is ranked first among the top 10 Internet countries in Africa. This stands Nigeria out as a potentially good ground for healthcare mobile technologies



Source: Internet World Stats - www.internetworldstats.com/stats1.htm
167,335,676 Internet Users in Africa estimated for June 30, 2012
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Figure 7: Top Internet Countries in Africa

This paper identifies an area which is adjudged critical but which as of the moment seems to be at the fringe of consideration in the application of mobile technologies for health: medication prescription.

The position of this paper, therefore, is that potentially harmful self medication practice among a susceptible population could be mitigated through the use of handy m-Health Apps that afford professional medical diagnosis, advice and drug prescription, on the go.

The focus of this paper is Nigeria. Nigeria is a developing economy with a number of health care concerns. One of such concerns is the issue of self-medication, especially among the youths.

The application of ICT to health has been recognized by global bodies like WHO as one major way of delivering health care to people worldwide.

We therefore sought in this paper to establish the trend of self medication, using the Nigerian situation, and then make a case for global attention to the need to use mobile technologies to mitigate the dangers of self-medication.

3. The Issue Of Self-Medication In Nigeria

"When Peter Onwe left his residence in Abakaliki, the Ebonyi State capital to learn a trade in Lagos in the year 2000, his parents agreed that he would spend six years with his master who trades in textile materials.

Three years into his apprenticeship, Peter noticed, to his dismay that he began to have frequent sensation of some objects crawling around his body, a condition he had never experienced in his life. He informed his master of the development with the hope that he would be taken to see the family doctor.

Narrating his ordeal to *LEADERSHIP Sunday*, he said the master turned down the option of visiting the family physician; rather, he informed him that it was his veins that were malfunctioning since he was a man, adding that the feeling of crawling objects was one of the signs of puberty.

He noted that as he travelled to his home town in the Southeast to seek for alternative medication for the ailment, he purchased some herbs while in transit. The hawker had assured him that it cures all forms of diseases including moving objects in the body.

He said that two days after he returned to Lagos, he began to stool and vomit and eventually, he

collapsed.

According to him, "I was rushed to the hospital where I was placed on drip. When I regained consciousness, the doctor asked if I ate anything that was not compatible with my system because the test conducted revealed that I ate something working contrary to my system.

"I couldn't remember eating any food that is alien to my system except the herb which I informed him that I bought inside the bus. The doctor screamed upon hearing that I drank herbal mixture without prescription from qualified personnel.

"Though he cautioned me to keep away from self medication since it could cause liver and other dangerous diseases, he equally blamed my master for neglecting me when I complained about my health."

Onwe's dilemma is comparable to that of over 75 per cent of the [Nigerian] population that fall back on self-medication for survival due to poverty and absence of accessible health care facility" (*Nigerian LEADERSHIP* Newspaper, April 12, 2015)

"Odutola complained of lump in his stomach in the evening and went to a purveyor to buy some drugs he assumed would cure the stomach ache he had self-diagnosed himself of. After [taking] the self-prescribed drugs, in the middle of the night [he] died even before help could be sought from a qualified doctor to save him from the intense snag that followed the drugs he self-administered".(*National Mirror* Newspaper, November 29, 2014)

These excerpts from two Nigerian national dailies show the dangers self-medication can pose to individuals who for some reasons use their initiative to effect healthcare rather than seeking professional medical advice.

Medically challenged individuals naturally seek relief. Our progenitors simply tried everything within their immediate environment to ascertain their usefulness. They found effects for some of the things they ate or used in curing ailments. They used oral tradition to pass on medication information from one individual to the other and from one group to the other. Such information were utilised in self medication. So we can say that self medication is as old as humankind (Chauncey, 2007).

Self-medication is a common practice worldwide, particularly in developing countries where incidences of tropical diseases like malaria have contributed to self-medication with anti-malarial drugs (Chipwaza, Mugasa, Mayumana, Amuri, Makungu, & Gwakisa (2014).

In Nigeria, self-medication appears the order of the day. Virtually any adult could walk into the many dappling Pharmacies or Patent Medicine Stores (PMS) - popularly called "chemist" by locals - and purchase any available drug in any quantity required without any recourse to a doctor's prescription. This behaviour is not exclusive to any category of Nigerians, but cuts across virtually all categories – lower class, middle class and the upper class. Reasons for self medication among Nigerians include:

- The state of health care facilities in the country which are on the average somewhat in adequate, in the sense of qualified medical personnel, availability of equipment and drug supply.
- Medical attention in major hospitals, with the exception of some private hospitals where medical charges can be prohibitive, are inadequate. This can be highly inconveniencing to people seeking medical attention. There are cases where patients have died in some hospitals while waiting for medical attention by the few available doctors in government hospitals
- The availability of alternative medicines like herbals which efficacy most times have not been scientifically verified.
- The presence of "chemists"- local dispensary stores- and pharmacies, where drugs of all kinds could literally be bought off the counter.
- Lack of clear-cut enforceable guidelines and regulations as to who can purchase which drug and for which ailment.

The use of drugs with therapeutic intent but without proper professional medical advice or prescription implies self medication – individuals simply use their initiative to administer medicines for reason of overcoming a health condition which might be perceived as not necessitating visiting a doctor (Sehdiya, Smrithy, Siddharth & Sarath, 2013). Such health conditions include catarrh, fever, malaria, body pains, diarrhoea, menstrual pains, indigestion etc.

Although self medication potentially has very serious consequences such as side effects, drug resistance, wrong drugs taken for wrong ailments, taking expired drugs, taking of wrong doses (Bennadi, 2014), it is presently being widely accepted as an important aspect of the health care system (WHO Drug Information, 2015).

4. Evidence of Self-Medication in Literature

We highlighted some related studies to see what the body of research on healthcare holds about the subject matter of self medication; especially among the youth who are predisposed to self-medicate.

Findings from Tamuno & Fadare (2011) show that among a sample of 183 medical undergraduate students in northern Nigeria, 71 (38.8%) students admitted to the practice of self medication. Antibiotics from

the penicillin group (ampicillin/cloxacillin, amoxicillin andampicillin) were the most frequently used.

Osemene & Lamikanra (2012) estimated the prevalence of self-medication with antibiotics and antimalarials and evaluated the factors associated with self-medication among university students in south western Nigeria. Findings show that 982 (53.8 %), of the students used antibiotics for self-medication while 845 (46.3 %) used anti-malarial drugs for self-medication. The sources of drugs for self medication were patent medicine stores (901 or 49.3 %), community pharmacies (531 or 29.1 %), friends (210 or 11.5 %), relatives (130 or 7.1 %) and left-over drugs from previous prescriptions (55 or 3.0%).

Olayemi, Olayinka & Musa (2010) evaluated the prevalence and pattern of self-medication with antibiotics among 430 undergraduate students at the main campus of Ahmadu Bello University, Zaria, Nigeria. More than a half of the students (57%) admitted they self-medicate. The main reasons given for self medicating were; assumed knowledge of drugs like antibiotics (35%); prior experience on use (28.30%), while others admitted to lack of time to go for consultation (14.50%) and the attitude of school clinic staff.

Afolabi (2008) found that literacy and public health education were the major factors influencing the pattern of self-medication among market women in Ifako-Ijaiye area of Lagos, Nigeria. Patent Medicine Stores (PMS) were the commonest source of information on medications (31.4%) and where they were obtained (52.2%). Exceptions were among the educated respondents (62.5%) who obtained information on medications as well as drugs from hospitals and pharmacies. The common means of drug recognition, especially among the educated respondents ($P < .05$), were trade and generic names (61.1%). Benefits suggested for the practice includes: curing of ailments (58.0%), saving time and money (32.0%) and independence of care (7.0%).

Findings from Achema, Odira & Umerah (2014), reveal that Kogi state university students have an appreciable knowledge of self medication (92%) and practise same (41%), though, they are very much aware of the dangers of self medication. Main reason for self-medication was because their ailments were not too serious.

A survey by Umebese (2014) shows that among a sample of 200 undergraduate students in Edo State, Nigeria, 85.5% had self-medicated in the past. About 60.2% reported not visiting the hospital during their last episode of illness. The commonest self-reported illness was malaria (26.5%) and the commonest medications used for self-medication were anti-malarials (47.7%) and antibiotics (22%). More than half of the respondents (53.4%) reported that a pharmacist had not required a drug prescription before selling a medicine and 70.6% cited long waiting hours at the hospital as the most important reason for self-medicating. About 85.9% reported that their perceived knowledge of the medicine they needed to treat the illness was the reason for choosing a particular medicine for self-medication while 57% perceived self-medication to have been effective in addressing their last reported illness.

Results from Sapkota, Coke, Rosenberg, Atkinson, Sweet, Sopeju, Ojo, Otivhia, Ayepola, Olajuyigbe, Shireman, Pottinger & Ojo (2010) show that among 706 university students sampled in south western Nigeria, 86% of the participants experienced menstrual symptoms, and 39% reported using analgesics to treat them. About 24% of these participants reported self-medicated use of antibiotics to treat menstrual symptoms such as cramps, bloating, heavy bleeding, headaches, pimples/acne, moodiness, tender breasts, backache, joint, and muscle pain.

Ogunsile (2013) sought to determine the prevalence of self-medication and its associated factors among residents of Ado-Ekiti local government area of Ekiti State Nigeria. The study reveals that majority of the respondents (70%) practised self-medication and this was common among the adults, females, those with primary education and those having low occupational status. The factors associated with the practice of self-medication include: high cost of medical bills (24%), time wastage at health facilities (16%) and having knowledge of which drugs to use when ill (30%).

Abubakar, Jibo, Umar & Rufai (2013) show that among adult residents of Kano State, Nigeria, about three-quarter (78.95%) admitted using drug (s) in the past without prescription. The drugs commonly consumed were anti-malarials (42.10%), analgesics (40.56%), antibiotics (29.41%), and cough mixtures (13.31%). Their common sources of drugs were patent medicine stores (62.54%) and the market (19.81%). The reasons for self medication were long queues in the hospitals (38.39%), and in-accessibility to doctors (25.08%). About two-thirds (65%) correctly perceived that self medication could be hazardous; and half (51.58%) were aware of at least one hazard of self medication.

Tadele, Araya, Alemayehu, Solomon & Ali (2014), conducted a cross-sectional study among regular undergraduate students of Adi-haqi Campus of Mekelle University, Ethiopia. Results show that among 407 study participants, 44.5% had self-medicated with antibiotics in their lifetime while 27.5% had practiced within the last three months. These students most cited reasons for self-medication with antibiotics are previous experience with similar illness and antibiotics being less expensive, assumed knowledge of antibiotics, and emergency use

A cross sectional study by Uppal, Agarwal and Roy (2014) among 200 students of Delhi University reveals that self medication was commonly practiced among 93% of these students

Sheravi, Mahmood, Amin, Zaka, Riaz and Javed (2012) suggest that easy access to a wide range of drugs without prescription, inadequate health care services and poverty encourage self medication among the

Pakistani populace.

Du and Knopf (2009) asserts that the practice of self medication in Germany is highly prevalent among children and older adolescents. Drugs mainly used are CCMs and aspirin which inappropriate use could hold potential risks.

A study of 18 year-olds, in Pelotas (Brazil), by Bertoldi, Camargo, Silveira, Menezes, Assuncao, Goncalves and Hallai (2014) reveals a high point prevalence of self medication. Seventy-eight percent (78%) of the drugs used were non prescription drugs. The drugs most frequently used were analgesics (56.1%), systemic antihistamines (7.4%) and anti-inflammatory and antirheumatic drugs (7.1)

Shehnaz, Sreedhanran, Issa, and Arifulla (2013) surveyed 324 expatriate students in the United Arab Emirates (UAE); findings suggest that the prevalence of self medication in this group was 89.2%. Headache and fever were the common self medicated ailments. Use of analgesics and antipyretics were also common. Sources of drug and drug recommendation were community pharmacies and parents.

Our probe of existing literature shows findings suggesting prevalence of and susceptibility to self-medication among young Nigerians, on the one hand, and their contemporaries in other parts of the world, on the other hand.

Against this backdrop, the current problem becomes, how could the supposedly intractable practice of self-medication be rendered safer; especially in the light of available technologies like mobile telephony?

5. A Suggestion to Medical m-Health App Developers

The peculiarities of developing economies like Nigeria make self-medication unavoidable. The issue is not whether adults should self-medicate but the need to develop measures or systems that would help them to do it in a safer sense.

We envision that m-Health could be one major way safer self medication could be achieved in Nigeria; and perhaps in other developing economies where indices like poverty and poor health care delivery apparently make self medication inevitable. Against this backdrop we make this suggestion to medical m-Health App developers.

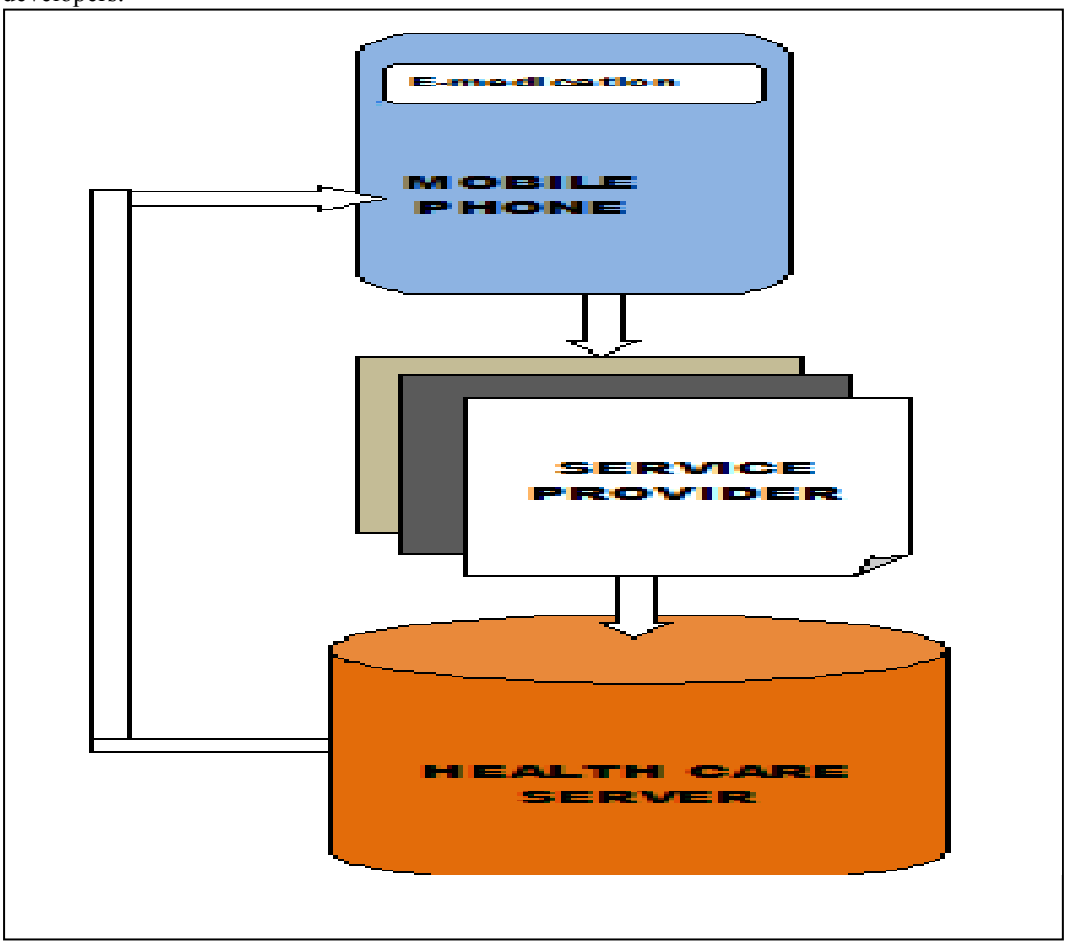

Figure 8: E-medication m-Health Technology

The idea of the E-medication app as illustrated in fig 8 is basically a mobile app which facilitates

diagnosis of common ailments and prescription of medication via a service provider who has access to a health care server. This system works in this way: A subscriber uses the E-medication app to input symptoms that have been noticed. The data gets to the service provider who cross matches the symptoms with logs in health care servers and retrieves data on diagnosis and prescribed medication which are forwarded to the subscriber. This process can involve voiced communications between the subscriber and health personnel.

6. Conclusion

Mobile health care adoption in Nigeria appears to be in its infancy (Ofoma, 2013); but the potential exists for the utilization of m-Health to ensure the well being of Nigeria's young population which is prone to potentially harmful self-medication

Our position in this paper therefore was to articulate a critical health issue – in this case, self medication – in the light of possible mitigation of dangers that attend such practice, using mobile technology-based E-medication Apps.

References

Abubakar, I., Jibo, A.M., Lawan, U.M & Rufai, A. (2013). Pattern, awareness and perceptions of health hazards associated with self medication among adult residents of Kano metropolis, North western Nigeria, *Indian Journal of Community Medicine,* Vol. 38, No. 3, pp. 144-151

Achema, G., Odira, C. & Umerah.C (2014). knowledge and practise of self medication among undergraduate students of Kogi State University, Anyigba, *International Professional Nursing Journal*, Volume 12 Number 1pp 65 – 67.

Afolabi , A.O. (2008). Factors influencing the pattern of Self-medication in an adult Nigerian population, *Annals of African Medicine* .Vol.7 (3), pp120-127.

Alepis, E., & Lambrinidis, C. (2013). M-health: supporting automated diagnosis and electronic health records, Springerplus; ;2(1):103. doi: 10.1186/2193-1801-2-103.

Bertoldi, A.N., Camargo, A.L., Silveira, M.P.T., Menezes, A.N.B., Assuncao, M.C.F., Goncalves, H. & Hallai, P.C. (2014). Self-medication among adolescents aged 18 years: the 1993 Pelotas (Brazil) birth cohort study, *Adolescence Health*, 55(2): 175–181.

Bennadi, V. (2014). Self medication: A content challenge, *Journal of Basic Clinical Pharmacology*, Vol5(1) pp 19-23.

Center for Technology and Aging Report 2011

Chauncey, D.L. (2007). The History of self-medication. Annals of the New York Academy of Sciences, Vol. 120 Issue 3 pp 815-822

Chipwaza, B, Mugasa, J.P., Mayumana I., Amuri, M., Makungu, C, & Gwakisa, P.S. (2014). Self-medication with anti-malarials is a common practice in rural communities of Kilosa district in Tanzania despite the reported decline of malaria, Malaria Journal 3;13:252. doi: 10.1186/1475-2875-13-252

Du, Y. & Knopf, H. (2009). Self-medication among children and adolescents in Germany: results of the National Health Survey for Children and Adolescents (KiGGS), *British Journal of Clinical Pharmacology*, 68(4): 599–608.doi: 10.1111/j.1365-2125.2009.03477.x

Ericsson Consumer Insight Summary Report April 2015

Fadare, J.O & Tamuno, I. (2011). Antibiotic self-medication among university medical undergraduates in Northern Nigeria, *Journal of Public Health and Epidemiology* Vol. 3(5), pp. 217-220, May 2011

Ofoma, U. (2013) How the mobile phone is changing the face of Health care in Nigeria retrieved from http://www.healthblogng.com/mobile-phone-changing-face-of-healthcare-in-nigeria/

Ogunsile, S. E (2013). Self-medication and its associated factors among residents of Ado-Ekiti Local Government Area, Ekiti State, Nigeria, African *Journal for Physical, Health Education, Recreation & Dance*, Vol. 19 Issue 4-1, p814

Osemene, KP Lamikanra, A (2012) Study of the Prevalence of Self-Medication Practice among University Students in South-western *Nigeria, Tropical Journal of Pharmaceutical Research*, Vol 11, No 4

Sehidiya, H., Smrithy, V., Siddharth, S., & Sarath, V. (2013). Prevalence of self-medication among youth. academia retrieved from http://www.academia.edu/6805309/Prevalence_of_Self_Medication_among_youth

Sapkota, A., Coke, M.E., Rosenberg, R.E., Atkinson, N.L., Sweet, S.J., Sopeju, P.O., Ojo, M.T., Otivhia, E., Ayepola, O.O., Olajuyigbe, O.O., Shireman, L., Pottinger, P.S. & Ojo, K.K. (2010). Self-medication with antibiotics for the treatment of menstrual symptoms in southwest Nigeria: a cross-sectional study, *BMC Public Health* 2010, **10**:610 doi:10.1186/1471-2458-10-610

Shehnaz, S. L., Sreedhanran, N.K. J., Issa, K. J., & Arifulla, M. (2013). Self-medication and related health complaints among expatriate high school students in the United Arab Emirates, *Pharm Pract (Granada)*; 11(4): 211–218.

Sherazi, B. A., Mahmood, K.T., Amin, F., Zaka, M., Riaz, M., & Javed, A. (2012). Prevalence and measure of self medication: A review, *Journal of Pharmaceutical Science and Research*, Vol4 (3), 774-1778

Tadele Eticha, Haylay Araya, Adissu Alemayehu, Gebremedhin Solomon and Dagim Ali (2014). Prevalence and predictors of selfmedication with antibiotics among Adi-haqi Campus students of Mekelle University, Ethiopia, *International Journal of Pharma Sciences and Research*, Vol 5 No 10

Umebese, A (2014) . Self-medication practices among university undergraduate students in Edo and Delta State, Nigeria, The ScHARR Student e-Journal. Retrieved from on http://scharr-ejournal.blogspot.com/2014/11/self-medication-practices-among.html Sept 9th 2015

Uppal, D., Agarwal, M., & Roy V. (2014). Assessment of Knowledge, attitude and practice of self medication among college students, *International Journal of Basic Clinical Pharmacology*, 3 96): 988-994 doi:10.5455/2314.

WHO Drug Information Vol. 29 , No. 1, 2015