



ASSESSMENT OF NEW MEDIA USE IN THE FIGHT AGAINST COUNTERFEIT MEDICINES IN NIGERIA

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Abstract

This paper assessed the extent of utilisation of anti-counterfeiting cutting-edge technologies by NAFDAC in the fight against counterfeiting and the impact these technologies have had on the control and regulation of counterfeiting of medicines in Nigeria. Findings indicate that these technologies are being deployed to a large extent in the fight against counterfeit medicines in Nigeria. Further, the impact of these technologies on the control and regulation of counterfeiting in the country is reported to be positive and massive as recent studies have shown progressive reduction of counterfeit medicines. The recent study on the Quality of Anti-Malaria Medicines in Sub-Saharan Africa (QAMSA) which showed significant decline in the incidence of the counterfeiting of anti-malaria drugs in Nigeria from 64.9 percent (64.9%) in 2008 to 20 percent (20%) in 2012 is a watershed case of success. The strong correlation between the Agency's 2012 National Survey on Quality of Medicines using *Truscan* device and laboratory analysis which put the failure rate of anti-malaria drugs in Nigeria currently at 19.6 percent is again a significant milestone on NAFDAC's path of winning the war against counterfeiting. Holistically, evidence shows that the incidence of counterfeiting has significantly been reduced by the agency via deployment of the anti-counterfeiting technologies. Results from the National Survey on Quality of Medicines across the 36 states of Nigeria and the Federal Capital Territory (FCT) by NAFDAC between January 2010 and April 2012 using *Truscan*, for instance, showed that the incidence of counterfeiting has been reduced to 6.4 percent. The foregoing results by all standards clearly attest to the remarkable successes NAFDAC has achieved in the fight against counterfeiting through the adoption of anti-counterfeiting cutting-edge technologies. The paper also suggested a corpus of applications for other forms of new and social media platforms in the anti-counterfeiting fight. These included: Targeted awareness raising, strengthening policy and operations capacities, impact inventory and assessment, and vulnerability assessment.

Introduction

Counterfeiting of medicines has been acknowledged as a significant public health problem that has assumed global dimensions and is rapidly gaining grounds daily with scores of new reported cases (Factsheet, 2013). Reports indicate that counterfeit medicines have had adverse effects on consumers, which range from injury, disability, paralysis, complications and treatment failure, and even death in some instances (IMPACT, 2013).

It has been observed that counterfeiting of medicines is an organised crime that fetches perpetrators millions of naira in profits. According to a report "criminals in many parts of the world have discovered that the counterfeiting of medicines is financially lucrative and of relatively low risk. As a result, organized crime has shifted from the smuggling of narcotics and running of weapons to the counterfeiting of medicines" (Akunyili, 2005, p. 5).

Generally, it is reported that counterfeiting of medicines affects different countries in different ways, however statistics of global and regional prevalence of counterfeiting are scarce, and where available, the figures are grossly inaccurate partly because they are under-reported and partly because they have not been updated. As a result, what obtains as statistics are mere estimates of the crime. This point has been unequivocally made by (Factsheet, 2013) which asserts that:

Counterfeiting of medical products and similar crimes affect all countries, whether as countries of origin, transit or marketplace. As with all clandestine criminal activities, it is impossible to gauge exactly the extent of the problem. The latest estimates suggest that global sales of counterfeit medicines are worth more than €57 billion, having doubled in just five years between 2005 and 2010.

Surveys have shown that the situation is much the same on all continents, Europe, North America, South America, Australia, however with higher incidents in the Third World, particularly in Asia and Africa. According to a report:

Counterfeit medicines have become a critical issue for developing nations, with an impact measured in lives. For example, of the one million malaria deaths that occur worldwide each year, 200,000 are reportedly the result of counterfeit anti-malaria drugs. Additionally, the WHO indicates that 700,000 Africans die annually from consuming fake anti-malaria or tuberculosis drugs (*biztechafrica.com*, p. 1).

High incidents of counterfeit medicines across the globe have ushered in recent years, the epoch of anti-counterfeiting, which dovetails to the fight against the menace. The fight is gaining global momentum and a flurry of activities and strategies are being engaged by anti-counterfeiting regulatory agencies towards curbing the menace. Nigeria is not left out of this move and has established a regulatory agency - the National Agency for Food and Drug Administration and Control (NAFDAC) which has been in the vanguard of the fight. According to NAFDAC News (2013, p.11)

The menace of counterfeit and substandard drugs is no doubt one that has been on the front burner of national discourse as far as the safety of the health of Nigerians is concerned. This led to the setting up of the National Agency for Food and Drug Administration and Control (NAFDAC) by the Federal Government in 1993 with a clear mandate of safeguarding the health of the nation through the provision of effective regulation of the food, drug and chemical sector of the economy.

In response to its mandate and to the increasingly complex public health problem of medicines counterfeiting, NAFDAC introduced a range of fake drugs detecting technologies - *Truscan*, *Mobile Authentication Service (MAS) using Short Message Service (SMS)*, *Black eye*, and *Radio Frequency Identification (RFID)* to assist NAFDAC inspectors at detecting fake and counterfeit drugs. This paper therefore assesses the extent of utilisation of these technologies and the impact of these on the control and regulation of drug counterfeiting in Nigeria.

Counterfeit Medicines: What They Are

According to the World Health Organisation (2013, p. 1), "counterfeit medicines are defined differently in different countries. The definitions used in various WHO Member States show that the nature of the problem of counterfeit medicines varies from country to country." However, it adds that participants at the first international meeting on counterfeit medicines in 1992 at WHO in Geneva agreed on the following definition:

A counterfeit medicine is one which is deliberately and fraudulently mislabeled with respect to identity and/or source. Counterfeiting can apply to both branded and generic products and counterfeit products may include products with the correct ingredients or with the wrong ingredients, without active ingredients, with insufficient (inadequate quantities of) active ingredient(s) or with fake packaging (www.who.int/medicines/services/counterfeit/faqs/03/en/).

Taking into account Nigeria's peculiarities of the counterfeiting menace, NAFDAC, anchoring on the key indices in WHO's conception of counterfeiting, defines as fake/counterfeit medicines in Nigeria:

- Drugs with no active ingredient(s) e.g. having only lactose or even chalk in capsules and tablets, olive oil in Supradyn capsules.
- Drugs with insufficient active ingredients e.g. 41mg Chloroquine instead of 200mg, 50mg Ampicillin as against 250mg.
- Drugs with active ingredient(s) different from what is stated on the packages e.g. Paracetamol tablets packaged and labelled as Fansidar (Sulphadoxine + Pyrimethamine).



- Clones of fast moving drugs - these are drugs with the same quantity of active ingredients as the genuine original brand, but may not have the same efficacy.
- Drugs without full name and address of the manufacturer.
- Herbal Preparations that are toxic, harmful, ineffective or deceitfully mixed with orthodox medicine.
- Expired drugs or drugs without expiry date, or expired and re-labelled with the intention of extending their shelf-life.
- Drugs not certified and registered by NAFDAC.

Implications of Counterfeit Medicines on individuals and the Nigerian Society

In a paper titled: *Counterfeit and Sub-standard Drugs, Nigeria's Experience: Implications, Challenges, Actions and Recommendations* presented at a meeting for key interest groups on health organised by the World Bank in Washington D. C. 10th -11th March, 2005, Professor Dora Akunyili, the immediate past Director General of the National Agency for Food and Drug Administration and Control (NAFDAC) enumerated the following implications of counterfeit medicines on individuals and the Nigerian society:

- Counterfeiting of medicines has been acknowledged as the greatest evil of our time and the highest weapon of terrorism against public health. It has also been said to be an act of economic sabotage, and an evil wind that blows nobody good.
- The evil of fake drugs is worse than the combined scourge of malaria, HIV/AIDS and armed robbery put together. This is because malaria can be prevented, HIV/AIDS can be avoided and armed robbery may kill a few at a time, but counterfeit/fake drugs kill en mass.
- The social problem posed by hard drugs, cocaine, heroine etc. cannot also be compared with the damage done by fake drugs, because illicit drugs are taken out of choice, and by those that can afford them, but fake drugs are taken by all and anybody can be a victim.
- Fake drugs have embarrassed our healthcare providers and eroded the confidence of the public on our healthcare delivery system. This development has led to treatment failures, organ dysfunction/damage, worsening of chronic disease conditions and the death of many Nigerians. The situation became so bad that even when patients were treated with genuine antibiotics, they no longer respond positively due to resistance induced by previous intake of fake/counterfeit antibiotics.

Incidence of Counterfeiting of Medicines in Nigeria and Reported Cases of Adverse Drugs Reactions

According to the paper, the first phase of the baseline studies by NAFDAC in six major drug markets across the country in early 2002, to measure the level of compliance to drug registration, revealed that 67.95 percent of the drugs were unregistered and therefore unauthorised for use by NAFDAC.

Retrospectively, the paper reported results of studies that were carried out over the years to measure the incidence of counterfeiting in the country. Accordingly:

- A study conducted by Poole in Nigeria in 1989 was reported to indicate that 25 percent of samples studied were fake, 25 percent genuine and 50 percent inconclusive.
- A study reported to have been conducted by the former Deputy Director of WHO (Prof. Adeoye Lambo) in Nigeria for a pharmaceutical firm in Lagos in 1990, showed that 54 percent of drugs in every major pharmacy shop were fake. Further, results were reported to indicate that the figure had risen to 80 percent in the subsequent year.
- A study carried out on 581 samples of 27 different drugs from 35 pharmacies in Lagos and Abuja (Nigeria) showed that 279 (48%) samples did not comply with set pharmacopoea limits, and the proportion was uniform for the various types of drugs tested.

▪ The following cases were also reported in the paper with respect to Adverse Drugs Reactions:

- In 1989, poorly compounded Chloroquine syrup killed several children in University of Nigeria Teaching Hospital (U.N.T.H) Enugu in the early '80s of which there is no statistics, partly because many of the deaths were not even reported.
- In 1990, the "Paracetamol syrup disaster" occurred when 109 children died in Ibadan and Jos, after taking paracetamol syrup produced with the toxic ethylene glycol solvent instead of propylene glycol. This tragedy occurred more than fifty years after that of the U.S.A.
- In 2002, 3 patients reacted adversely to infusions manufactured by a Nigerian company. Some of the adverse reactions exhibited by the patients were severe rigor, vomiting, sweating, restlessness, seizure, impaired level of consciousness, etc. The reactions stopped immediately after the administration of the infusions were discontinued. Investigations by NAFDAC on the offensive infusions collected from the hospital revealed that three (3) batches were heavily contaminated.
- In 2003 fake cardiac stimulant (Adrenalin) contributed to the death of three children during open-heart surgery at UNTH, Enugu. Further investigations by NAFDAC revealed that even the muscle relaxant used was substandard and the infusion was not sterile.
- In 2004 three Nigerian hospitals reported cases of adverse reactions from the use of contaminated infusions produced by four Nigerian companies. Consequently we sampled infusions and water for injection from all over the country. Our results confirmed that some batches of infusions produced by the indicted companies were heavily contaminated with microorganisms. 147 of the 149 brands of water for injection screened were also not sterile.

The foregoing demonstrates in concrete terms, the reality of the threat of counterfeiting to public health, and the general well being of Nigerians. Table 1 gives a list of some counterfeit medicines that have been banned by NAFDAC and the year they were banned.

Table 1: List of some counterfeit medicines that have been banned by NAFDAC

S/N	ACTIVE SUBSTANCE	PRODUCT NAME	DESCRIPTION OF ACTION TAKEN, GROUNDS FOR DECISION	YEAR
1.	Rosiglitazone	All Brands	NAFDAC directed Marketing Authorization Holder in Nigeria to voluntarily withdraw product from circulation in Nigeria within 6 months. Total recall to be effected by June 2012. Agency to carryout mop up of products remaining in circulation June 2012. Risk of congestive Heart failure.	2011
2.	Gentamycin 280mg	All Brands	Deregistration of 280mg and mop up from circulation. Public alert on action taken due to increased risk of ototoxicity, impaired hearing, deafness, nephrotoxicity and increased risk of endotoxin reactions with some recorded deaths.	2010
3.	Teething mixture	All Brands	Deregistration and ban of all teething mixture in circulation in Nigeria. Low benefit/risk ratio.	2009
4.	Nimesulide	All Brands	Restriction of registration of product due to report of liver toxicity. Product had no obvious advantage over existing NSAID that already in the market.	2005
5.	Dipyron	All Brands	Ban due to serious ADR's reported. E.g. Toxic epidermal necrolysis (TEN) and recorded death.	2005
6.	Chlorproguanil-	(Lapdap [®])	Voluntarily withdrawal by NAFDAC and GSK. Cardiovascular risk.	2005



	Dapsone			
7.	Phenylpropanolamine	All Brands	Ban of cough and cold remedies containing this active, directives from the agency for replacement of actives with the sympathomimetic agents.	2003
8.	Mercury Containing Creams and Soaps	All Brands	Ban on creams and soap containing mercury. Cause dermatitis, cumulative toxicity causes damage to kidneys which could manifest as hypertension and fatal kidney failure.	2002
9.	Creams Containing Hydroquinone > 2%	All Brands	Ban on creams containing Hydroquinone > 2%. Exogenous ochronosis which manifests as a dirty brown pigmentation on sun exposed areas, loss of skin elasticity.	2002
10.	Cosmetic Products Containing Corticosteroids	All Brands	Ban on cosmetic products containing corticosteroids. Prolonged use on the skin causes recalcitrant acne, red striae, excessive hairiness, proneness to infections (bacterial, fungal and parasitic). Absorption through the skin could manifest as severe hypertension in kidney, diabetes and cataract.	2002
11.	Potassium Bromate as Dough Improves/Ingredients in flour & Bread Improvers	All Brands	Banned and removed from the list of permitted food additives. Decomposes Vit A, B, B2 and E. Implicated in kidney failure and hearing loss.	2002
12.	Phenylbutazone	All Brands	Ban on use in human due to agranulocytosis	2002

Source: NAFDAC News (2013, P. 79)

Factors Influencing Counterfeiting of Medicines in Nigeria

Corruption: According to the World Health Organisation (1999, p. 16) "the efficiency of personnel is adversely affected by corruption and conflict of interests resulting in laws not being enforced and criminals not being arrested, prosecuted and convicted for crime." This situation smacks of corruption and has been the case with counterfeiting of medicines in Nigeria.

Economic factors: The adverse economic situation in the country has given impetus to the high incidence of counterfeiting. It has been observed that counterfeit drugs are usually cheaper and low priced compared to genuine ones. As a result they are preferred and heavily patronised at the expense of the genuine. A study by Adeagbo (1998) in Ibadan, a city in South West Nigeria showed that high cost of drugs and related health services were responsible for seeking alternative options like itinerant drug sellers.

Poor health seeking behaviour: Olujimi (2007) found that the health seeking behaviour of an average Nigerian is poor. Earlier, Downs (1970) observed that self-medication is usually the first step taken immediately the symptom of an illness is expressed or recognised. Self-medication, as Olujimi (2007, p. 59) further observes, "includes purchase of drugs, collection of herbs and preparation of concoction that is equally applied . . ." This attitude, to say the least, encourages counterfeiting.

Chaotic drug distribution system: Drug distribution in Nigeria has been said to be very chaotic with drugs marketed like any other commodity of trade. It has also been observed that due to poor regulation over the years, drug markets have evolved and got deeply established all over the country despite the illegality of such activities. As a result, almost all drug manufacturers and importers supply to these drug markets. Drug sellers and even health professionals have been acknowledged to patronise the drug markets, which also service the hawkers that sell in streets and commercial buses (Akunyili, 2005). NAFDAC has recently, however come up with a policy document - the National Drug Distribution Guidelines in attempt to address this systemic problem and ensure drug quality and safety.

Heightened global control of narcotics: It has been observed that the high global surveillance on the smuggling of narcotics and associated penalties has diverted attention to the low risk, yet highly lucrative crime of counterfeiting of medicines.

Sophistication in clandestine drug manufacture: According to NAFDAC News (2013), drug counterfeiters have taken advantage of the growing access and sophistication in printing technology and now manufacture fake drugs affixed with fake NAFDAC registration number. "This is why cloning of fast moving drugs is so perfect that even the brand owners find it difficult to differentiate between fake and original" Akunyili (2005, p. 8).

Lack/Inadequate legislation: Nigeria is said to have a multiplicity of drug control laws that are unwieldy, overlapping and sometimes conflicting. Some of the laws are said to be so old and would need to be amended or updated to meet the demands of present day realities for effective regulation. This perhaps explains the rationale behind the revised NAFDAC Law, "presently receiving attention of the Federal Executive Council" which tilts essentially towards greater use of criminal enforcement (NAFDAC News, 2013, p. 20).

NAFDACs Efforts at Combating Counterfeiting of Medicines in Nigeria

NAFDAC was established by the Federal Government of Nigeria in 1993 with the mandate of safeguarding the health of the nation through the provision of effective regulation of the food, drug and chemical sector of the economy. One of the objectives of the agency was to make available at all times to the Nigerian populace, adequate supplies of drugs that are effective, affordable, safe and of good quality. The high prevalence of counterfeit medicines particularly anti-malaria medicines, antibiotics, and vitamins in Sub-Saharan Africa generally and Nigeria particularly, discussed earlier in this paper necessitated this decision.

Over the years, the agency has engaged different strategies to combat the menace of counterfeiting. According to NAFDAC News (2013, p. 11), "in the past, a common strategy adopted by NAFDAC was the use of NAFDAC registration number on packages to be able to detect fake drugs." However, as earlier observed, growing access and sophistication in printing technology now enables counterfeiters to manufacture fake drugs affixed with fake NAFDAC registration number; as a result, cloning of fast moving drugs is so perfect that even the brand owners find it difficult to differentiate between fake and original.

It is against the backdrop of the above and the drive towards achieving the President's target of *Zero Tolerance* to counterfeit, fake, sub-standard, spurious, adulterated and expired medicines in the country that the agency has resorted to the fight against counterfeiting of medicines through the adoption of cutting edge technologies, the objective being to rid the country of the "activities of counterfeiters who are merchants of death, trying to benefit at the expense of the health of others" NAFDAC News (2013, p. 4). One of the anti-counterfeiting cutting-edge technologies engaged by the agency is the *Truscan*. It is a hand held device for carrying out on- the- spot detection of counterfeit medicines. Other technologies deployed by the agency to fight counterfeits are the *Text Messaging System* (also referred to as the *Mobile Authentication System, MAS*) that empowers consumers in detecting counterfeit medicines. Using this technology, consumers can send a direct message using the code on the drug they are about to buy to verify whether it is genuine or fake. Stressing the value and mode of operation of the *MAS*, NAFDAC News (2013, p. 20) observes that "the agency has deployed the use of SMS text messaging technology to authenticate medicines at the point of purchase, putting the power of detection of counterfeits in the hands of Nigerian consumers, thereby enlisting the entire Nigerian public in the war against counterfeiting." Other technologies like the *Black Eye* and the *Radio Frequency Identification (RFID)* have also been introduced by the agency to enhance the detection of counterfeit medicines. The *Black Eye* is an infra red technology used for speedy evaluation and detection of counterfeit medicines, while the *Radio Frequency Identification (RFID)* helps in authenticating sensitive documents. It is reported to have the capacity to track and trace the movement of regulated products and prevent the forgery of sensitive documents.



There is sufficient evidence that the anti-counterfeiting cutting-edge technologies are being deployed to a large extent in the fight against counterfeit medicines in Nigeria. Further, the impact of these technologies on the control and regulation of counterfeiting in the country is reported to be positive and massive as recent studies have shown progressive reduction of counterfeit medicines. For instance, a recent study on the Quality of Anti-Malaria Medicines in Sub-Saharan Africa (QAMSA) shows that the incidence of the counterfeiting of anti-malaria drugs has declined from 64.9 percent (64.9%) in 2008 to 20 percent (20%) in 2012 in Nigeria. Again, the Director General of NAFDAC was quoted as saying “there was a strong correlation between the Agency’s 2012 National Survey on Quality of Medicines using *Truscan* device and laboratory analysis which put the failure rate of anti-malaria drugs in Nigeria currently at 19.6 percent” (NAFDAC News, 2013, p. 10). “A similar study undertaken in Asia by the World Health Organisation (WHO) showed about 38 percent (38%) failure rate of anti-malaria medicines within that region” (NAFDAC News, 2013, p. 10). Comparatively, these figures show higher incidents of counterfeiting in Asia, a region that has notoriety like Sub-Saharan Africa in counterfeiting. Using these figures as indices, it is not difficult to see that the anti-counterfeiting cutting-edge technologies have impacted positively on the quality of anti malaria medicines in Nigeria, a feat which even the Director General of WHO, Dr. Margaret Chan recently acknowledged at the first meeting of the New Member State Mechanism on Spurious, Sub-standard, Falsely labelled, Falsified and Counterfeit (SSFFC) medical products held in Buenos Aires, Argentina.

Considered holistically, the incidence of counterfeiting has significantly been reduced by the agency via deployment of the anti-counterfeiting cutting-edge technologies. Results from the National Survey on Quality of Medicines across the 36 states of Nigeria and the Federal Capital Territory (FCT) by NAFDAC between January 2010 and April 2012 using *Truscan* showed that “the incidence of counterfeiting has been reduced to 6.4 percent.” Another Survey on the Quality of Medicines conducted in Lagos State in May 2012 using *Truscan* device showed that anti-malarials, antibiotics, antidiabetes, and anti-inflammatories showed a 3.8 incidence of counterfeiting, a figure which is significantly less than the national average (NAFDAC News, 2013).

The foregoing results by all standards clearly attest to the remarkable successes NAFDAC has achieved in the fight against counterfeiting through the adoption of anti-counterfeiting cutting-edge technologies. This paper, however suggests a corpus of strategies for engagement of other forms of New Media Technologies (NMTs) in the fight against counterfeit medicines in Nigeria.

Proposals for New Media Engagement in the Fight against Counterfeit Medicines in Nigeria Targeted Awareness Raising

It is appropriate to commend NAFDACs effort towards raising awareness of the general public to the drug counterfeiting menace in the country. In doing so, it has made use of the counterfeit medicines detecting technologies, the traditional media of television, newspapers, radio, etc, via commercials, public alert notices on banned products, phone-in programmes, talk shows, etc. This is in addition to the interpersonal media of community mobilisation and household sensitisation visits. The truth, however remains that the agency can do better in terms of targeted mobilisation and mass awareness creation. The defect with the on-going strategy is that it is too general and targeted at the entire populace. While this strategy should not be discontinued, more specific messages and targeted approaches should be directed at different groups of people for different effects/ results. Messages, for instance should be directed at key stakeholders for policy enunciation, development and implementation. On the other hand, artisans – commercial motorcycle riders, plumbers, cobblers, market women, youths, etc who are more vulnerable to counterfeit medicines should be sufficiently educated and enlightened on the dangers of counterfeit medicines and should be discouraged from patronising medicine hawkers. It is believed that this will lead to behaviour change, because it has been maintained that “the first step towards combating counterfeiting is getting people to know that it exists with all its consequent deleterious effects” (Akunyili, 2005, p. 1).

NAFDAC could therefore deploy other forms of New Media Technologies (NMTs) to compliment, consolidate, and extend the influence of the cutting edge technologies, traditional, and interpersonal media hitherto engaged in the anti-counterfeiting fight. These technologies could be used in a variety of ways in conveying multifarious content including education, entertainment, games, etc. The point that New Media Technologies (NMTs) can add value to pro-health causes - the fight against counterfeit medicines in Nigeria - in our case, has been clearly articulated by the World Economic Forum (2010). According to this agency, gaming, entertainment and social communities are viewed as powerful forces for change and a fundamentally important way to motivate and engage individuals in pro-health behaviours. The argument therefore is that NMTs and their related platforms can be engaged to significantly raise the awareness of key stakeholders particularly and the general public at large.

In this regard, this paper proposes that NAFDAC should engage such mobile technologies as ipads, iphones, laptops and notebooks (which are forms of mobile computers) palmtops, and a host of others like tablet computers and their attendant internet platforms to sensitise key policy institutions and stakeholders, for instance, Federal Ministry of Health, Pharmacists Council of Nigeria, Nigerian Medical Association, Nigerian Bar Association, Federal Ministry of Justice, Community Health Extension Workers, etc about the causes, dangers, implications and most importantly, possible strategies for addressing the menace.

NAFDAC could equally deploy details of counterfeit medicines, their batch numbers, samples, manufacturers, composition of active ingredients (test results by NQCL) etc, which hitherto has not been the practice on its website for public notice. It should also consider the option of posting public alert notices on banned products on its website to make room for wider access to such information. Social media platforms (Facebook, Twitter, Blogs, YouTube, etc) should also be engaged and encouraged; this will facilitate social networking and will promote digital engagement with key targeted audience (stakeholders) and the general public at large. Besides, NAFDAC should partner with telecommunication operators in Nigeria (MTN, Airtel, Glo, Etisalat, etc) to first of all, improve the poor internet/wireless connectivity in the rural and urban areas of the country, then develop/upgrade existing infrastructure (e.g. broadband, masts etc). This should be in addition to creating anti-counterfeiting awareness using Short Message Service (SMS). This was the case in Uganda, where (Etzo & Collender, 2010) observed that Celtel and AIDS Information Centre (an indigenous NGO) powered a SMS based quiz, christened *Text to Change* (TTC), which was used in providing AIDS awareness to 15000 mobile phone subscribers.

NAFDAC should also run Public Service Commercials on the Internet as is the case with other consumer products. These commercials, chances are, will effectively explore the internet and internet based networks which engage multimedia enabled wireless devices that users usually carry along in their hands and pockets, therefore enlarging the public sphere for access and application.

It is important to note that these technologies would provide opportunities for effective social participation, as they will make available to the user, interactive tools that are carefully structured to operationally accommodate multimedia channels which will enable dialogue among users. NAFDAC as a result, will exploit this system to send messages to a large, heterogeneous and anonymous interactants, who in most cases would respond with immediate feedback, giving vent to their feelings, opinions, and thoughts, which in some cases would constitute valuable ideas/suggestions. These communication transactions, it should be borne in mind, would occur within the virtual participants/interactive context, thereby empowering NAFDAC to harness and utilise brilliant ideas sourced via digital engagement. Anticipated results for the agency would be enhanced understanding and improved co-operation, while attitude change, and most importantly, behaviour modification would be the result from consumers of pharmaceutical products.

From the foregoing, we can conclude that the New Media, particularly the Internet and its networks can serve as veritable platforms for mobilising public opinion and raising awareness in the fight against counterfeit medicines in Nigeria. This point has been articulated by Hauser, who sees the Internet as a “discursive space in which individuals and groups congregate to discuss matters of mutual interest and, where possible, to reach a common judgement” (1998, p. 86).



Strengthening Policy and Operations Capacities

In addition to the engagement of the *Mobile Authentication System*, other digital technologies like mobile laptops and screens, projectors, films recorded on compact disks (CDs) etc could be deployed to teach people in rural communities as well as those in urban areas how to identify counterfeit medicines and to create awareness on the symptoms of ADRs. NAFDAC should also consider the possibility of developing creative applications that the public can engage on their smartphones in accessing useful information on counterfeiting. Social media platforms may prove useful in this regard.

The field of robotics could also be engaged by NAFDAC in the fight against counterfeiting in Nigeria. Under this arrangement, robots (artificial intelligence new media tools) with inbuilt on-the-spot medicines authentication mechanisms could be deployed to man the boarders and entry ports (air/water) with the objective of ensuring quality of medicines. This will give the counterfeiting fight a boost, particularly in the face of shortage of manpower in the agency and would considerably assuage overhead costs incurred by the agency in terms of salaries and staff training.

The internet, its social networking sites and other related platforms can be fully optimised in strengthening partnerships, and collaborations at the national and international level with sister regulatory agencies elsewhere in the world.

Impact Inventory and Assessment

This point is conceived at two levels. The first deals with compliance of community members and indeed consumers of pharmaceutical products to non-patronage of counterfeit medicines and consequent reporting of same to the pharmacovigilance directorate of NAFDAC, while the second deals with keeping and updating records/statistics of Adverse Drugs Reactions. The issues of better awareness, improved surveillance, monitoring and the mopping up of incidents of counterfeit drugs are also considered here.

At the moment, there is dearth of statistics on the incidence of counterfeit medicines, not only in Nigeria, but on a global scale. What is available are estimates of these incidents. It is therefore important as a starting point in generating data/statistics on counterfeit medicines in Nigeria that NAFDAC should think of establishing effective control systems by establishing and managing databases of counterfeit medicines that have been seized and destroyed in the country within the past 10 years. It is commendable that the agency is already taking steps in this direction with the inauguration of the Federal Task Force on Drug Anti-counterfeiting "meant to come up with effective and multipronged approach in the fight against fake, spurious and sub standard drugs" (NAFDAC News, 2013, p. 19) a feature of which is the State Taskforce on Counterfeit/Fake Drugs and Unwholesome Processed Foods, first inaugurated in Kano on 28th November, 2012. The State taskforce teams could therefore input and update on a regular basis, data and statistics of counterfeit medicines seized or destroyed in their territories. Much more commendable is the formulation of the National Pharmacovigilance Policy and Implementation Framework which was launched in Abuja recently. The policy is aimed at monitoring and managing the adverse effects of drugs.

NAFDAC should also through the Pharmacovigilance directorate, embark on aggressive urban and rural community engagement to keep track of cases of Adverse Drugs Reactions (ADRs) and Contra indications. In addition, NAFDAC may wish to adopt the Indonesia example of what this paper calls *Personnel and Tools* in actualising Impact Inventory and Assessment. In the Indonesian example, referred to, Lee and Chib (2008) noted that mobile phones were distributed to 223 rural midwives in the Tsunami affected region of Aceh Besar and were monitored on the quality of their services. Onus was therefore on the midwives to generate from their communities, medical information of their patients for the purpose of diagnosis and transmit such information through the Short Message Service (SMS) to the central database for action. NAFDAC could therefore equip surveillance teams (*Personnel*) with GSM phones and other multimedia enabled wireless mobile devices (*Tools*) with which data on ADRs, contra indications and general incidents of counterfeit medicines are sent via enabled platforms to central databases that would be created for the purpose of Impact Inventory and Assessment. The public alert system introduced by the Pharmacovigilance directorate for people experiencing ADRs to send a text to 20543 stating their reactions is a step in the right direction.

Vulnerability Assessment

It is proposed under this application that NAFDAC should adopt a strategy akin to the *Mobile Clinic* method, where rural communities and semi-urban areas are availed the services of medical personnel at their doorsteps. NAFDAC could therefore engage in routine community, semi-urban and urban outreaches/checks and deploy the *Truscan* technology to randomly assess medicines on the shelves of pharmacies (in urban and semi-urban areas) and in patent medicine stores in rural communities. It could also deploy the Magic tray technology and the *Mobile Authentication System* which uses *Short Message Service* for the same purpose. The essence should be to assess the extent to which consumers are vulnerable to counterfeit medicines and to mop up counterfeit medicines in circulation, therefore ensuring consumer protection and elimination of vulnerabilities. Interviews, focus groups, discussions, surveys, vox pops, etc could also be organised to measure the level of awareness of consumers of pharmaceutical products on counterfeiting of medicines and how vulnerable they think they are to the menace, and what their responses will be in cases of Adverse Drugs Reactions (ADRs). Outcomes of these surveys could be used to draw up future strategic plans.

Conclusion

Nigeria is reported to have one of the highest incidents of counterfeiting in Sub-Saharan Africa. Studies by Lambo (1990, 1991 & QAMSA, 2008) reported prevalence rates of (54%, 80%, & 64.9%) respectively. The menace of counterfeit and substandard drugs led to the setting up of NAFDAC by the Federal Government in 1993 with a clear mandate of safeguarding the health of the nation through the provision of effective regulation of the food, drug and chemical sector of the economy. In response to its mandate and to the increasingly complex public health problem of medicines counterfeiting, NAFDAC introduced a range of fake drugs detecting technologies - *Truscan*, *Mobile Authentication Service (MAS) using Short Message Service (SMS)*, *Black eye*, and *Radio Frequency Identification (RFID)* to assist NAFDAC inspectors at detecting fake and counterfeit drugs. This paper therefore assessed the extent of utilisation of anti-counterfeiting cutting-edge technologies by NAFDAC in the fight against counterfeiting and the impact these technologies have had on the control and regulation of counterfeiting of medicines in Nigeria. Findings indicate that these technologies are being deployed to a large extent in the fight against counterfeit medicines in Nigeria. Further, the impact of these technologies on the control and regulation of counterfeiting in the country is reported to be positive and massive as recent studies have shown progressive reduction of counterfeit medicines. The recent study on the Quality of Anti-Malaria Medicines in Sub-Saharan Africa (QAMSA) which showed significant decline in the incidence of the counterfeiting of anti-malaria drugs in Nigeria from 64.9 percent (64.9%) in 2008 to 20 percent (20%) in 2012 is a watershed case of success. The strong correlation between the Agency's 2012 National Survey on Quality of Medicines using *Truscan* device and laboratory analysis which put the failure rate of anti-malaria drugs in Nigeria currently at 19.6 percent is again a significant milestone on NAFDAC's path of winning the war against counterfeiting. Holistically, evidence shows that the incidence of counterfeiting has significantly been reduced by the agency via deployment of the anti-counterfeiting technologies. Results from the National Survey on Quality of Medicines across the 36 states of Nigeria and the Federal Capital Territory (FCT) by NAFDAC between January 2010 and April 2012 using *Truscan*, for instance, showed that the incidence of counterfeiting has been reduced to 6.4 percent. The foregoing results by all standards clearly attest to the remarkable successes NAFDAC has achieved in the fight against counterfeiting through the adoption of anti-counterfeiting cutting-edge technologies. The paper also suggested a corpus of applications for other forms of new and social media platforms in the anti-counterfeiting fight. These included: Targeted awareness raising, strengthening policy and operations capacities, impact inventory and assessment and vulnerability assessment.



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