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Landscape of Antimalarial Medicines in Nigeria

Situational Analysis of Substandard and Falsified Antimalarial Medicines in Nigeria

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Acronyms

ACT	Artemisinin-based Combination Therapy
AMFm	Affordable Medicines Facility malaria
CQ	Chloroquine
FMOH	Federal Ministry of Health
MAS	Mobile Authentication Service
MDDC	Mega Drug Distribution Centers
MQM	Monitoring the Quality of Medicines
NAFDAC	National Agency for Food and Drug Administration and Control in Nigeria
NAPPMED	Nigerian Association of Patent and Proprietary and Medicine Dealers
NIFAA	National Inter-Faith Action Association
NMA	Nigeria Medical Association
NMCN	Nursing and Midwifery Council of Nigeria
NMEP	National Malaria Elimination Programme of the Federal Ministry of Health
NYSC	National Youth Services Corps
PCN	Pharmaceutical Council of Nigeria
PMG-MAN	Pharmaceutical Manufacturing Group of the Manufacturer's Association of Nigeria
PSN	Pharmaceutical Society of Nigeria
PPMV	Patent and Proprietary Medicine Vendors
PQM	Promoting the Quality of Medicines
RDT	Rapid Diagnostic Test
SDDC	State Drug Distribution Centers
SFH	Society for Family Health
SP	Sulfadoxine-pyrimethamine
SSFFCs	Spurious, Substandard, Falsified, Falsely-Labeled and Counterfeit Medicines
USP	U.S. Pharmacopeial Convention
WHO	World Health Organization

Introduction

Malaria is a preventable and treatable disease that affects almost half of the world's population. Its impact is especially felt in Nigeria, which reports more malaria-related deaths than any other country. The United States President's Malaria Initiative (PMI) reports malaria is associated with 60 percent of outpatient visits and 30 percent of hospitalizations in Nigeria, as well as 25 percent of infant mortality and 11 percent of maternal mortality (PMI, 2015). Fortunately, the massive scale-up of malaria prevention and treatment programs has improved the global malaria burden, contributing to a 37 percent global reduction in malaria incidence (42 percent in Africa) and 60 percent global reduction in malaria mortality between 2000 and 2015 (World Health Organization or WHO, 2015 Fact Sheet). The Demographic and Health Surveys (DHS) show that Nigeria's under-five mortality rate has dropped from 203 to 128/1,000 between 2003 and 2013 (The DHS Program, 2014).

Unfortunately, the progress seen in Nigeria and around the world is threatened by the widespread availability of poor quality malaria medicines – or "SSFFC" medicines, an acronym for the comprehensive term "substandard, spurious, falsified, falsely-labeled and counterfeit." In some cases, SSFFC medicines (generic or brand name) do not meet the legal standards determined by manufacturers and regulators. In other instances, they carry a false representation, identity or source (IOM, 2013 p.2). No matter what category they fall under, SSFFC malaria medicines create undue harm by causing treatment failure, death and resistance to artemisinin, the active ingredient in the first-line treatment for malaria. They may also negatively affect the public's perception of the quality of their health care and treatment, and their healthcare-seeking behaviors (WHO, 2011; Hajjou et al., 2015).

Prevalence of Poor Quality Antimalarial Medicines

While estimates around the prevalence of poor quality antimalarials vary depending on sampling and analytical methods, a recent meta analysis of quality medicine surveys from 21 countries in sub-Saharan Africa showed that "35 percent of samples failed chemical analysis" (Bassat et al., 2016; Nayyar et al., 2012). Malaria medicines are particularly at risk for quality issues and represent the medicine type with the highest quality failure rate in a recent U.S. Pharmacopeial Convention (USP) Medicines Quality Monitoring (MQM) study in Africa, Asia and South America. An analysis of the medicine samples collected between 2003 and 2013 that were listed in the Medicines Quality Database (MQDB) found that 56.4 percent of all failed samples (i.e., products considered substandard, counterfeit, expired, or those which failed the visual inspection) were antimalarials, which accounted for 6.5 percent of the failure rate, when calculated in proportion to the amount of antimalarials sampled. Antimalarials also represented 52.5 percent of all substandard medicines and 92.6 percent of all counterfeit medicines (Hajjou et al., 2015).

There is some debate over the current prevalence of SSFFC antimalarials in Nigeria. Despite variances, findings highlight the vast improvement which has occurred since 2001, when it was estimated 40 percent of medicines across the country were substandard or fake (Ogundipe, 2011; Bate et al., 2009). Driven by this stark statistic, the National Agency for Food and Drug Administration and Control (NAFDAC) for Nigeria – under its former Director General, Dr. Dora Akunyili, and current Director

General, Dr. Paul Orhii – took hard action against SSFFCs in Nigeria. Activities have involved retraining NAFDAC staff, establishing more NAFDAC state offices, refurbishing drug analysis laboratories, enforcing stricter drug regulations and conducting activities to raise public awareness (e.g., public confiscation and destruction of counterfeit drugs and public awareness communication campaigns). These efforts yielded striking results. According to NAFDAC, the presence of SSFFCs dropped from 40 percent of all drugs before 2001 to 16.7 percent in 2005 (Key informant from NAFDAC, Lettenmaier, HC3 Trip Report 2015; Ogundipe, 2011). These activities were linked to an 80 percent reduction of counterfeit drugs in circulation (according to NAFDAC's 2001 baseline) (Garuba et al., 2009).

Additional findings (listed below) indicate the country has made significant progress in recent years, but there are still areas for improvement. Due to inconsistencies in sampling and analysis methods, the level of representation varies from study to study and findings cannot be compared longitudinally:

- A 2012 NAFDAC report found only 19.6 percent of samples around the country were substandard, with quality issues most common in rural areas (Key Informant from NAFDAC, Lettenmaier, HC3 Trip Report 2015).
- Preliminary results of NAFDAC and USP's first MQM report show that less than 10 percent of medicines were poor quality – the majority of samples were artemisinin-based combination therapy (ACT). This 2015 report did not break down findings by falsified and substandard, but did show medicine quality was the worst in the Northeast.
- A 2015 study in Enugu, Nigeria, found only 9.3 percent of samples to be poor quality, with 6.8 percent substandard, 1.3 percent degraded and 1.2 percent falsified (Kaur et al., 2015).
- A WHO evaluation of six countries in sub-Saharan Africa found Nigerian samples (collected in 2008) to have the highest failure rate at 63.9 percent, compared to 28.5 percent of total samples that failed to comply with quality specifications (WHO, 2011).
- An analysis of samples from six towns in Anambra state, Southeastern Nigeria (three urban and three rural), found that 37 percent of antimalarials tested did not have the required amount of the active ingredient. The failed samples were primarily quinine (46 percent) and sulfadoxine-pyrimethamine (SP) (39 percent); none of the artesunate samples failed (Onwujekwe et al., 2009a).
- A study conducted in 2012 tested samples of 13 brands of artesunate/amodiaquine from urban and peri-urban areas in Lagos, revealing only 15.4 percent of samples had the required amount of both amodiaquine and artesunate (some samples had the proper levels of only one ingredient), and 53.8 percent of samples failed to have the required levels of either amodiaquine and artesunate (Ehianeta et al., 2012).

Factors Influencing SSFFC Prevalence and Impact in Nigeria

A number of factors are associated with the production and sale of poor-quality antimalarials around the world, including "the inaccessibility and high price of quality ACTs, limited regulatory oversight, lack of penalties, self-prescribing practices, poor knowledge about product authenticity, demand for low-cost drugs and a large unregulated private sector for purchasing pharmaceuticals" (Renschler et al., 2015). Nigeria's high rates of SSFFC malaria medicines are also enabled by the country's "porous borders, corruption and technological sophistication to produce [SSFFC malaria medicines]" (Society for Family Health or SFH, 2012).

The situation in Nigeria is unique, as it includes a complex national health system and a population that is both vast and diverse. While the country has a strong public health sector, it also has an active private and informal health sector – some of which is regulated and some of which is not. Health care allocation is skewed toward urban areas, leaving half of Nigeria's population, who live in rural areas, with limited access to health care facilities and pharmacists (SFH, 2012). Nigeria's domestic pharmaceutical production is a growing industry, which represents about 30 percent of the country's pharmaceutical needs – the other 70 percent is primarily imported from China and India (SFH, 2012). Drug traders have also been known to smuggle drugs through Niger and Benin, or repackage expired drugs from neighboring countries (Oluwatuyi and Ileri, 2014). Both domestically and internationally produced medicines come with regulation challenges.

Patent and proprietary medicine vendors (PPMVs), informal owner-operated drug retail outlets, make up a large portion of the Nigerian drug market, with an average of 31 shops per 100,000 people. Yet the majority of PPMVs are not registered and do not have formal training in medicine or pharmacy (Beyeler et al., 2015; SFH, 2015; Anadach Consulting Group, 2015). PPMV use may be associated with limited access to the formal and regulated market, as they are uniquely positioned to reach remote populations (SFH, 2015). However, PPMVs also use lower cost medicines because they are unregulated. Because they are untrained and unregulated, PPMVs are also likely to sell inappropriate or substandard drugs (Chukwuocha, Nwakuo and Mmerole, 2013). Despite the lower quality services and products, 60 percent of mothers reported they "preferred to consult PPMVs rather than other providers for treatment of childhood malaria" (Berendes et al., 2012; SFH, 2014).

A more thorough breakdown of the environmental, political and social factors that influence SSFFC prevalence and customer purchasing patterns begins on the next page.

Environmental and Policy Factors in Nigeria

Availability of Quality Antimalarial Medicines

To understand the availability of quality antimalarial medicines in Nigeria, it is important to consider the different market sources frequented within the country. PPMVs make up a majority (65 percent) of the antimalarial-stocking outlets in Nigeria, and account for 70 percent of all antimalarials distributed (according to data collected at the time of the ACTwatch survey; Population Services International or PSI, 2013). Public and private health facilities, community health workers, pharmacies, general retailers and itinerant drug vendors (mobile drug peddlers) also carry antimalarial medicines, although at significantly lower rates compared to PPMVs (PSI, 2013). Some customers buy from commercial buses or roadside hawkers – sources which are generally considered to have higher rates of SSFFC malaria medicines (Bate et al., 2009). The Affordable Medicines Facility malaria (AMFm) program also dramatically improved the availability of quality-assured ACTs from 2009 to 2013. According to a 2013 outlet survey, "quality-assured ACTs were in stock at the majority of antimalarial-stocking public health facilities (84 percent), private for-profit facilities (76 percent), pharmacies (95 percent) and PPMVs (77 percent)," (PSI, 2013).

A 2015 systematic review of medicine vendors in Nigeria found that "the majority of antimalarial drugs stocked by PPMVs had a NAFDAC number verifying the manufacture information… [and] nationally, only two percent of PPMVs stocked expired antimalarial medications," with regional rates ranging from three percent in Kaduna and Oyo to 15 percent in Enugu. PPMVs were generally found to carry low-quality antimalarials – with chemical analysis studies finding "roughly half of antimalarial drugs stocked by PPMVs were substandard." PPMV shops were generally capable of storing antimalarial medicines properly, but did not have the infrastructure to store medicine requiring temperature controls (Beyeler et al., 2015).

Informal and Open Drug Markets

About half of Nigeria's population lives in rural areas, with limited access to functional health care facilities. They rely on the estimated 20 informal, open drug markets in Nigeria, where both SSFFC and legitimate medicine are sold widely (SFH, 2012). In a study of private sector antimalarial distribution chains in six malaria-affected countries, traditional markets were mentioned most by Nigerian wholesalers and retailers; Benin, Cambodia and Nigeria were the only ones to mention traditional "open air" markets. These traditional markets are located in national and regional commercial hubs; the biggest markets are located in Lagos, Anambra (Onitsha Market), Abia (Ariaria Market), Oyo (Ibadan) and Kano (Kano) States (Palafox et al., 2014; SFH, 2012). A key informant from the Pharmaceutical Council of Nigeria (PCN) cited Onitsha (Anambra State), Kano, Abo and Demoto (Lagos) as the main markets (Key Informant from PCN, Lettenmaier, HC3 Trip Report 2015).

Various efforts have been made to identify and close down these informal drug markets, but nothing has created permanent change. The PCN key informant felt public opinion was a barrier to closing down these markets because the general public sympathizes more with the sellers than the regulators (Key

informant PCN, Lettenmaier, HC3 Trip Report 2015). In 2012, NAFDAC found an illegal drug factory in Onitisha (Anambra State) housing over N20 million in fake drugs and equipment (multi-vitamins, quinine, antimalarials and anti-diabetics). Investigators found sales receipts showing the factory supplied products to Idumota Market, Lagos, Kano and Maidugiru in Borno State (Vanguard, 2012). The Onitsha Bridge market was closed by NAFDAC in 2007, when NAFDAC found and destroyed 104 truckloads of SSFFC medicines, including expired, banned and smuggled drugs worth N6.5 billion (Anyanwu, 2007). NAFDAC and PCN have attempted to shut down all of these informal markets, but they have been unable to do so. Originally, an official declaration was set in place to close all unauthorized open drug markets by June 30, 2014, but it was then postponed until July 1, 2015 (The Guardian, 2015). At the time of this report, these markets are set to close down in 2017 (Pharmanews, 2016).

Regulation, Procurement and Distribution Policies in Nigeria

According to a representative from the Pharmaceutical Manufacturing Group of the Manufacturer's Association of Nigeria (PMG-MAN), malaria drugs are made available through four routes (Lettenmaier, HC3 Trip Report 2015):

- **Donated** (must be WHO and NAFDAC approved, imported by a person with a PCN license and registered with NAFDAC)
- **Imported** (must be NAFDAC approved, imported by a person with a PCN license and registered with NAFDAC)
- **Locally manufactured** (must be NAFDAC approved)
- **Smuggled**

A study by Garuba et al. used key informant interviews to rank system effectiveness and came up with the following insights on the registration, procurement and distribution processes in Nigeria, especially regarding their strengths, weaknesses and vulnerability to corruption:

Registration: NAFDAC is responsible for drug registration in Nigeria, under the Registration and Regulatory Affairs Directorate. The registration process has a well-documented list of registered pharmaceutical products, and well-defined operating procedures for the registration process. No documented or standardized time frames for processing applications have been set. While there were no written guidelines on registration, policy researchers Garuba et al. note the registration terms use WHO's *Good Governance for Medicines Programme* to increase transparency and decrease the potential for corruption (Garuba, Kohler, and Huisman, 2009). The registration process has historically been vulnerable to bribery, which was identified in the study by Garuba et al. as "one of the leading causes of the rampancy of counterfeit medicines" in Nigeria. This problem was so prevalent, Dr. Akunyili dismissed a number of NAFDAC officials when she first became Director General. Preventative measures have been taken to diminish the influence of corruption. For example, registration decisions now require a group, and lab results are used as definitive criteria for registration. However, these measures do not address the issue that non-pharmacists (i.e., PPMVs or untrained wealthy businessmen) primarily control the retail pharmacy market (Garuba et al., 2009).

Procurement: Procurement of pharmaceuticals for government health services falls under Nigeria's Ministry of Health. The country's process is "competitive, documented and well defined" (Garuba et al., 2009). Procurement information and opening of applications for pre-qualifications are made available to the public. Contracts are awarded to bidders based on pre-qualification status, technical evaluation results and cost, where preference goes to the lowest bidder, unless the bidder quotes an unreasonably low cost. A monitoring and evaluation (M&E) unit collaborates with the NAFDAC Inspectorate to ensure products have proper packaging, labeling, potency, etc. Some suppliers have been blacklisted after failing to meet performance standards. Garuba et al. question the procurement process' lack of conflict of interest guidelines and the extent to which the reports are publically available – which affects the level of transparency and possibility of corruption. They add that procurement is affected by challenges in the inspection process. Their key informant interviews cite the inconsistent written mechanisms as an opportunity for regulatory capture, saying "The unethical practice where government officials who are supposed to act in the interest of the public are influenced by those they are meant to be policing and engage in the very same unethical practices or behaviors." This practice seems most common at ports (Garuba et al., 2009).

Distribution: Distribution practices are managed by the Narcotics and Controlled Substances Directorate of NAFDAC. Yearly audits and M&E activities are conducted (e.g., reviewing inventory records, return and disposal of records, etc.), however, distribution to pharmacies, private stores and PPMVs is not well regulated. Weakened infrastructure also creates challenges to drug distribution, as many rural areas lack the electricity, telecommunications networks and technology to properly store medicines, and limited fuel delays the supply chain (Garuba et al., 2009).

According to new guidelines, originally scheduled to go into effect June 2014, manufacturers and importers will now only be able to sell to mega drug distribution centers (MDDCs, private sector), State Drug Distribution Centers (SDDC, public sector) and National Health Programs. All drug retail sources (from both the public and private sector) will be required to register with the PCN (Ojo, 2014). In a 2015 survey of PPMVs, the vast majority (83 percent) felt the new wholesale distribution centers will positively affect how they receive drugs and help ensure medicines are not too expensive (Anadach Group, 2015).

Quality Assurance Practices

Quality assurance practices are shared by NAFDAC and PCN. NAFDAC is responsible for drug quality and PCN is responsible for ensuring drugs are properly and safely stored. PCN also registers and licenses pharmacists and PPMVs, and regulates the practice of retail and wholesale pharmaceuticals. A key informant at PCN disclosed that retail pharmacies are subject to site inspections, which analyze factors like drug storage quality and pharmacists' knowledge and training. The initial inspection is more rigorous and then licenses are renewed through field inspections. PPMVs have to undergo similar inspections every two years. At these times, they must demonstrate they have completed a secondary education, are able to read and write and are "suitable." To pass inspection, PPMVs must also prove their facilities are ventilated, have shelving and meet size and hygiene standards (Lettenmaier, HC3 Trip Report 2015).

The USP has been managing the Promoting the Quality of Medicines (PQM) project in Nigeria, which currently supports three activities influencing malaria drugs. The MQM program assists with the setup of the NAFDAC and the National Malaria Elimination Program (NMEP) monitoring system to test drugs three or four times a year. USP has also supported NAFDAC by helping its Lagos laboratory achieve accreditation (December 2014) and training NAFDAC inspectors in good manufacturing practices. USP is also helping NAFDAC have its five other laboratories accredited. Through the PQM program, USP assisted NAFDAC, the Federal Ministry of Health, WHO and the NMEP to draft a countrywide policy to ensure a quality drug supply – a policy requested by the Global Fund to Fight AIDs, Tuberculosis and Malaria as a condition for funding.

Before 2005, NAFDAC published the lot numbers of counterfeit medicines. However, counterfeiters became more sophisticated, and the packaging became almost identical to the authentic drugs. In response, NAFDAC, in collaboration with PMG-MAN, addressed SSFFCs by implementing the Mobile Authentication System (MAS) in 2010. The MAS allows customers to send a secret code printed underneath a scratch surface to confirm the product is genuine. The customer may also be texted the registration number, manufacturing company, batch number and expiration date (as a means to confirm the validity of the text), as well as a number to call and report any problems. The deadline for all antimalarial manufacturers to comply with MAS has been extended quite a few times – from September 2013 to August 2015 (Ogundipe, 2013). A NAFDAC representative reported a current 80 percent compliance rate among manufacturers. One key informant from the Nigerian Association of Industrial Pharmacists pointed out the need to inform the public about the scratch technology – only about 17 percent of customers scratch the Lonart packets he sells. He feels people think the presence of the scratch pad is evidence the drugs are authentic, despite the instances where his company has discovered packets of Lonart with MAS scratch pads containing only cornstarch (Key Informant, Lettenmaier, HC3 Trip Report 2015).

A key informant also mentioned the local manufacturers have implemented covert anti-counterfeiting devices by marking packages or the drugs themselves, as a means to identify drugs manufactured by them and those manufactured elsewhere.

Time and infrastructure can create challenges to quality assurance activities, as exemplified by Victoria Ojeme, who said:

> “It used to be that, when we were at the port, sometimes we had problems with the Nigerian Custom Service because they wanted the goods to be cleared within a short time, but we did not have a way of finding out whether the medicines that came were fake or genuine, so it would take time… Sometimes, when you take a medicine to the laboratory, it would take weeks or even months because of the backlog… The rural areas often bear the brunt of the consequences of fake drugs because the absence of regulators, whose limited resources and personnel are often spread thin in the discharge of their human mandate” (Oluwatuyi and Ileri, 2014).

Influence of the Affordable Medicines Facility Malaria Pilot Program on ACT Access

In 2008, the Global Fund to Fight AIDS, Tuberculosis and Malaria launched the AMFm pilot program to expand ACT access in seven countries: Ghana, Kenya, Nigeria, Madagascar, Niger, Nigeria, Uganda and Tanzania (mainland and Zanzibar). AMFm works on three levels: price reductions through negotiations with manufacturers of quality-assured ACTs; a buyer subsidy via copayment by the Global Fund to participating manufacturers; and interventions to implement AMFm and promote appropriate antimalarial use (Tougher et al., 2012). Through this program, in an effort to improve the availability and affordability of ACTs and reduce the use of antimalarial monotherapies (such as SP and chloroquine), Global Fund co-paid ACTs for first-line buyers in public and private sectors from 2010 to 2013 (PSI, 2013). In 2013, AMFm antimalarial medicines, marked with a green leaf, accounted for approximately one-quarter of all quality-assured ACTs in Nigeria, and made up most of the quality-assured ACTs distributed by the private sector and PPMVs (23 percent). While the AMFm pilot program contributed to a reduction of the median price, ACTs with the green leaf logo ($1.30) were still approximately 2.4 times more expensive than SP ($0.54). One key informant from the Nigerian Association of Industrial Pharmacists stated Nigerian customers were “brand loyalists,” who were willing to pay the price for a more expensive brand they trusted. His company distributes Lonart, which is not subsidized by the AMFm scheme – the only subsidized brands are Coartem and Argenta (Key Informant, Lettenmaier, HC3 Trip Report 2015).

The AMFm program was not immune to SSFFC medicines. While a 2012 independent preliminary investigation of the AMFm program in Lagos, Nigeria, and Accra, Ghana, found no evidence of falsified medicines among their samples, 40 percent of non-AMFm ACTs and 7.7 percent of AMFm ACTs had less than 75 percent active ingredients. This could mean over 7 million treatments of ACTs are under dosed. The preliminary investigation also identified issues with dissemination – AMFm ACTs were found in pharmacies in Lagos which were not participating in AMFm, as well as in a foreign city (Lome) where AMFm was not operational (Bate et al., 2012). According to a key informant from USAID Nigeria, AMFm packets with the green leaf logo have been found to be counterfeit. The packaging was identical to the manufacturer’s packaging, and could only be identified as substandard by testing the drugs themselves (Lettenmaier, HC3 Trip Report 2015).

Social Factors in Nigeria

Knowledge and Awareness of SSFFCs among the General Public

Information about the extent to which residents are aware of SSFFC medicines is limited (IOM, p. 173). However, a 2010 Gallup poll revealed the majority of the public in 15 of the 17 sub-Saharan African countries surveyed were aware fake medicines were a problem. Results ranged from South Africa (25 percent) and Botswana (32 percent) to Sierra Leone (83 percent) and Cameroon (91 percent). Nigerian participants were found to have a very high awareness of SSFFCs (83 percent) – the researchers associated this with NAFDAC's many national public awareness efforts around SSFFC medicines (Ogisi, 2011). These findings were confirmed in a 2015 survey: 92 percent of respondents in Kano and 100 percent of respondents in Lagos reported they had heard of counterfeit drugs; 88 percent in Kano and 91 percent in Lagos reported they had never bought them (Anadach Group, 2015). They elaborated on this topic in a 2007 household survey, in which respondents defined quality medicine by its effectiveness (62 percent), as well as the presence of a NAFDAC registration number and manufacturing dates (20 percent), a recognizable brand and manufacturer's name (11 percent), cost (5 percent) and whether the medication was sold by a reputable source (4 percent). Similarly, they felt they could identify SSFFC medicines using the presence of a NAFDAC number (43 percent), packaging quality (27 percent) and lack of a manufacturer's name (12 percent) or an expiration date (8 percent). They also named characteristics such as cost, smell, color, taste, durability and location where purchased (i.e., "drugs from Onitsha town") as additional considerations (Adeoye et al., 2007).

While higher levels of awareness of SSFFC medicines is generally a positive indicator, another study, which looked at antimalarial use and the associated factors in rural Nigeria, speculated whether public awareness about the prevalence of SSFFC medicines skewed perceptions of the efficacy of ACTs. Participants rated the efficacy of chloroquine (CQ) and SP above ACT, contrary to available evidence from clinical trials (Efunshile et al., 2013).

Knowledge, Awareness and Practices among Drug Vendors

In general, health practitioners in Nigeria feel SSFFC medicines are a serious threat to healthcare delivery in their country; however, they also feel it is not the most pressing issue. Quackery, product misrepresentation, lack of infrastructure and medical personnel shortages were perceived as more serious (Bate, 2009). They blame the high prevalence of SSFFC medicine on their patients' preference for cheap drugs, lack of funds, government policies toward healthcare delivery and lack of health insurance. In a 2009 survey, the majority of health personnel (i.e., doctors, pharmacists and health workers) reported feeling they could identify SSFFC medicines using the presence of the NAFDAC number, expiry date or physical indicators from its packaging, such as the hologram or the spelling. Additionally, approximately half of the respondents reported coming into contact with SSFFC medicines, but their reported reactions varied depending on their title. For example, doctors were more likely to destroy the drug, pharmacists were more likely to notify NAFDAC and/or the manufacturer or supplier, and healthcare workers were more likely to do nothing (Bate et al., 2009). In a previous survey, PPMVs

suggested arrests and stronger government monitoring and regulation would help prevent and reduce the presence of SSFFC medicines (Adeoye et al., 2007).

Overall, the majority of PPMVs have at least a secondary education. Twenty percent of PPMVs (nine of 28 surveyed) interviewed in a 2015 survey in Lagos had some form of formal health training (Anadach Consulting Group, 2015). Knowledge of ACTs as the first-line treatment has improved among providers from public health facilities (from 38 percent who could cite the first-line treatment in 2009 to 92 percent in 2013) and among PPMVs (14 percent in 2009 to 67 percent in 2013) (PSI, 2013). Researchers suggest addressing the availability of malaria blood testing among PPMVs, who provide the majority of treatment in Nigeria, but frequently do not have rapid diagnostic tests (RDTs) (PSI, 2013). Two studies on malaria found that PPMVs comply with prohibitions on conducting RDTs, but do not comply with rules against giving injections – close to half of PPMVs in Lagos reported administering injections for malaria treatment (Berendes et al., 2012). A systematic review of the role of PPMVs in Nigeria found that the majority of PPMVs could recognize malaria symptoms. Most PPMVs in Enugu and Lagos states could identify malaria symptoms, compared to eight percent of PPMVs in Anambra state. PPMVs from across Nigeria (65 to 69 percent) could list at least one malaria danger sign requiring referral to a health facility, with smaller studies finding a range, from 14 percent in Jigawa to 71 percent in Anambra (Beyeler et al., 2015).

Improved communication with PPMVs seems to influence their service quality. One study in Jigawa, Nigeria, found PPMVs may not have been adhering to new national guidelines because the approved drug list given to PPMVs upon registration and licensing had not been revised since 2003, and therefore did not reflect any updates to policies. This list mentioned CQ and SP, but not ACTs, as drugs approved for malaria treatment (Berendes et al., 2012).

PPMVs' interactions with customers are heavily influenced by their demand for specific drugs. In fact, customers usually tell the PPMV what drugs they want, and PPMVs suggest drug options to only a minority of their customers (31 percent of encounters); a majority (58 to 69 percent) of PPMVs sold drugs without asking the customer any questions about who or what the drugs were for. Qualitatively, PPMVs also admitted their decisions about drug type and dosage were influenced by their perceptions of a customers' ability or willingness to pay (Berendes et al., 2012). Research on providers working in "hospitals" and "non-hospitals also found that a majority of respondents considered patients' ability to pay bills (35.2 percent), existing relationships (9.4 percent) and perceived ill-health appearance of the patient (35.2 percent) before providing malaria treatment services. Providers were also influenced by pressure from wholesalers to repay the cost of supplied drugs when determining what type of drug to prescribe (Onwujekwe et al., 2009b). Willingness and ability to pay are especially important, as out-of-pocket expenditures represent 95.9 percent of all private expenditures on health. Research has shown, when it comes to health purchasing habits, Nigerians are price sensitive, but they also want to buy the best quality when possible (Anadach Group, 2015).

Care-Seeking Practices of General Public

Several studies examined the care-seeking practices of adults and child caretakers in Nigeria. Home-based care and self-prescribing were common practices throughout the literature, with patients often starting self-treatment with drugs from the commercial sector and then turning to the formal health providers, if needed (Onwujekwe et al., 2009b). For example, in a 2015 study of caregivers whose children (aged 6 to 60 months old) presented with severe malaria in a tertiary facility, 70 percent of caregivers studied were considered to have poor health-seeking behavior. Some (96.5 percent) of those categorized as poor health seeking administered the wrong malaria medications or doses before seeking professional care, and 3.5 percent did nothing. Most people practicing home-based care consulted PPMVs (79.3 percent), as well as neighbors and traditional healers (20.7 percent) (Nwaneri and Sadoh, 2015). Researchers studying care-seeking behavior among caretakers of children with cerebral malaria in Northwestern Nigeria found some caretakers turned to formal health facilities, but many also referred to patent medicine sellers (36.4 percent), home treatment (30.3 percent) and herbal concoctions (18.2 percent) (Eseigbe et al., 2012). In contrast, a study examining malaria knowledge, attitudes and practices among rural communities in Aliero (Northern Nigeria), found the majority of caretakers (70 percent) sought hospital care for febrile children. However, their knowledge of first-line treatment for malaria was limited. Many (56.7 percent) felt CQ was the best antimalarial therapy (Singh et al., 2014).

Research demonstrates that obtaining a prescription before purchasing antimalarial drugs is not common practice, and some of those who do obtain them from illegal sources, like health workers and pharmacists – Nigerian law only allows qualified doctors to prescribe drugs (Bate, 2009). In a study surveying customers exiting retail drug shops in Nasarawa State, caretakers of sick children were more likely to obtain a prescription prior to attending a drug retailer, waited a shorter time before seeking care and purchasing an ACT (less than half of the respondents purchased an ACT) than adults seeking care for themselves (Liu, Isiguzo and Sieverding, 2015). Another study looking at the effects of knowledge and perceptions of PPMVs in Imo State found caretakers of sick children were more likely (11.9 percent) than sick adults (5.9 percent) to obtain a prescription before going to a drug shop. Men and customers of rural shops were also less likely to obtain a prescription (OR= 0.521 and OR= 0.048 respectively) (Chukwucho et al., 2013). Furthermore, an evaluation of behaviors in the Enugu urban region (Southeast Nigeria) also found that 46.5 percent of men and 45.6 percent of women practiced self-treatment, compared to prescription (17.9 percent and 18.5 percent respectively) and recommendation by a retail outlet (35.6 percent and 35.9 percent) (Ezenduka et al., 2014).

Studies also reveal low uptake in RDT use before treatment. Research from Nasarawa State found very few clients were tested before being treated for malaria, with only 14 percent of adults and 27 percent of children seeking antimalarial medicines reporting testing positive for malaria (Liu et al., 2015). These findings are in line with other studies around the country, which found only 13.6 percent of care seekers in Abuja pharmacy customers tested positive, 32.1 percent of febrile children brought to an Oyo tertiary hospital tested positive and 3.9 percent of participants purchasing antimalarial drugs at retails drug shops in Oyo State tested positive (Liu et al., 2015).

Influential Partners and Activities

Partners

- **Nigerian Association of Industrial Pharmacists:** An association under the umbrella of the Pharmaceutical Society of Nigeria, with members who are licensed through PCN.
- **National Inter-Faith Action Association (NIFAA):** An association of Christian and Muslim religious groups in Nigeria. NIFAA is currently working on malaria-related activities in six states using World Bank funding, 10 to 11 states with Global Fund funding and two states with HC3 funding.
- **National Malaria Elimination Programme of Federal Ministry of Health (NMEP)**
- **Nursing and Midwifery Council of Nigeria (NMCN)**
- **Pharmaceutical Council of Nigeria (PCN):** The regulatory authority of all pharmacists and PPMVs nationwide – licenses and regulates the practice of retail and wholesale pharmacists and PPMVs.
- **Pharmaceutical Manufacturing Group of the Manufacturing Association of Nigeria (PMG-MAN):** Nigerian association of pharmaceutical manufacturers. Membership is not mandatory, but it is required to do business in Nigeria. Approximately 80 percent of pharmaceutical manufacturers are paid members. Partners with NAFDAC to implement MAS.
- **United States Pharmacopeial Convention (USP):** USP manages the PQM project, which supports: (1) monitoring the quality of medicines, (2) NAFDAC support, (4) quality assurance policies and (5) public education (eventually).
- **Pharmaceutical Society of Nigeria (PSN):** An advocacy group that protects pharmacists and the profession, as well as consumers. All pharmacists in Nigeria automatically become members of PSN when they register with PCN. PSN has four technical groups: Association of Community Pharmacists of Nigeria, Association of Hospital and Administrative Pharmacists, Association of Industrial Pharmacists and National Association of Academic Pharmacists of Nigeria.
- **National Agency for Food and Drug Administration (NAFDAC):** This government organization is authorized to regulate and control the importation, exportation, manufacturing, advertisement, distribution, sale and use of regulated products. NAFDAC's SSFFC medicine public awareness activities are described on the next page.
- **Nigerian Medical Association (NMA):** An association of approximately 70,000 doctors, which influences laws, funds research and administers examinations for doctors to become licensed in Nigeria.
- **Nigerian Association of Patent and Proprietary and Medicine Dealers (NAPPMED):** This organization aims to help PPMVs improve their practices and keep abreast of new health policies and strategies. Approximately 10,000 PPMVs are NAPPMED members, however, an estimated 200,000 PPMVs are practicing in Nigeria, many of whom are not licensed by PCN.
- **National Association of Industrial Pharmacists:** This association falls under the umbrella of PSN. Its members are involved in trading or manufacturing drugs (both foreign and local).

*Lettenmaier, HC3 Trip Report 2015

NAFDAC's Public Enlightenment Campaigns

NAFDAC has implemented a number of public awareness campaigns in collaboration with the United Nationals International Children's Emergency Fund (UNICEF), WHO and USP, with the intention to improve attitudes and behaviors related to the purchase and use of drugs and food products. Some of the formal and informal means of communication include (Lettenmaier, HC3 Trip Report 2015):

- A weekly 30-minute television program called "NAFDAC and Your Health"
- A radio program, jingles and spots
- Newspaper articles and press releases/briefings (especially whenever a conviction or capture of counterfeiters occurs)
- Consumer Safety Clubs in secondary schools/syllabus for secondary schools
- Workshops/training for members of the National Youth Services Corps (NYSC)
- Activities for faith-based organizations, civil society organizations, traditional rulers and entertainers
- Social media (e.g. Facebook, YouTube and Twitter)
- Consumer hotline

Other Interventions Aimed at PPMVs

Additional outreach activities include those by SFH, which partners with the NAPPMED to run sensitization workshops to improve PPMV knowledge and skills to educate consumers. In 2012, SFH and Nigeria's National Malaria Control Program (NMCP) partnered on activities to train PPMVs and other vendors who assist in the distribution of RDT kits and ACTs (SFH, 2012).

A systematic review of PPMVs yielded six studies evaluating the impact of interventions targeting PPMVs, the majority of which focused on training activities. While all interventions were associated with improved knowledge, there is debate as to their effects on improving practice. For example, a training intervention in Kebbi increased PPMV knowledge of first-line symptoms, but did not improve malaria treatment dispensing. Additionally, a training program on pharmacovigilance in Ekiti state showed improved knowledge of adverse drug reaction reporting, but did not study the effects on PPMV practices (Beyeler et al., 2014). PPMVs cited fears of indictment (61.3 percent), poor public knowledge (88.7 percent) and poor training (92.5 percent) as reasons for poor reporting of adverse drug reactions (Awodele et al., 2012).

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