Drug Use in Nigeria

An informal survey of doctors, pharmacists, healthcare workers in Lagos, Ondo, and Ogun, and a pilot quality assessment of essential drugs from Lagos pharmacies

**Africa Fighting Malaria, the American Enterprise Institute and the Initiative for Public Policy Analysis
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Abstract:

For decades, Nigeria has been plagued by counterfeit and poor-quality medicines, yet little information exists on the extent to which healthcare personnel are aware of counterfeit and substandard medicines, and how this influences their behavior.

Field researchers administered informal questionnaires to 211 healthcare personnel in Lagos, Ondo, and Ogun states of Nigeria about patient behavior and their own awareness of, and exposure to counterfeit and substandard medicines.

There appeared to be evidence of irrational drug use. Healthcare personnel reported that some patients acknowledge purchasing medicines from unregistered channels, and without valid prescriptions. Respondents frequently cited the high cost of medicine as explanation for the proliferation of poor-quality drugs. Most healthcare personnel were aware of the problem, but their ability to identify and respond to poor-quality medicines differed widely.

Researchers also procured a small sample of essential medicines from pharmacies in Lagos to assess basic drug quality within the city. 18% of drugs failed thin-layer chromatography and/or disintegration tests. These results support findings, including earlier research by some of the authors, that the prevalence of poor-quality medicines may be decreasing in Nigeria—possibly because of improved policing and prosecution of counterfeiters by the National Agency for Food and Drug Administration and Control. Government, industry, and the public health community can work together to improve consumer and healthcare worker awareness, and increase access to low-cost, high-quality pharmaceuticals.

And while Nigeria still has problems to overcome, it is well ahead of other African nations in combating the scourge of substandard drugs. Indeed, it could be viewed as a model for other countries in Africa – as such, the bar should be set high for combating poor-quality drugs in Nigeria.

Introduction:

For decades, Nigeria was plagued by counterfeit and poor-quality medicines. In 2002, the World Health Organization reported that 70 percent of drugs in Nigeria were fake or substandard; the National Agency for Food and Drug Administration and Control (NAFDAC) estimated that 41 percent of drugs alone were counterfeit (Yankus, 2006; Akunyili, 2007). Throughout the late 1990s and early 2000s, other peer-reviewed studies estimated the number between 36 and 48 percent (Shakoor et al., 1997; Taylor et al., 2001). Like many other developing countries, corruption in the healthcare sector was rife: drugs were routinely "leaked" from public facilities into the private market. Plum healthcare positions were bought and sold (Lewis, 2006; Gupta et al., 2004). Intellectual property rights remained among the world's most poorly enforced. According to the International Property Rights Index 2009, Nigeria ranked 94th out of 115 countries (Property Rights Alliance, 2009).

Fake and substandard drugs levied a heavy cost in both economic terms and in lives lost. In 1990, 109 children died after being administered fake paracetamol. Reports in the Nigerian media suggested that there was growing resistance to common first-line antimalarials likely driven by both irrational drug use (patients using the wrong medicines, in the wrong way) and the prevalence of substandard medicine (Reef, 2008).

Improvements have been made in the past decade, driven in part by the leadership of a reinvigorated NAFDAC, under then Director General Dora Akunyili (current Minister of Information), which improved policing and prosecution of counterfeiters. By 2006, the number of substandard and counterfeit medicines circulating in Nigeria's market had fallen to around 16 percent, NAFDAC reported, and Nigerians were consistently ranking NAFDAC as among the most effective of Nigeria's government agencies (Bate, 2008; NOI-Gallup, 2007-2008).

But problems remained. Fifty-one percent of Nigerians told Gallup-NOI in November 2008 that corruption in the country was higher than it had been five years earlier (NOI-Gallup, 2008). Thirty-two percent of a small sample of antimalarial drugs collected from Lagos area pharmacies in September 2007, as a part of a study of six African countries, failed thin-layer chromatography (TLC) and/or disintegration tests (Bate et al., 2008). Eighty-four children reportedly died between late 2008 and early 2009 from diethylene glycol-contaminated teething medicine "My Pikin Baby Teething Mixture" distributed by the NAFDAC-licensed Barewa Pharmaceuticals (Polgreen, 2009). Nigeria's drug distribution system remains largely informal (Chiejina, 2009), and it is common knowledge that consumers routinely buy drugs from unregistered sources.

While analysts have explored institutional answers to the problem of counterfeit and substandard drugs—improving laws, increasing criminal penalties for counterfeiters, and making enforcement stronger and more consistent— few have explored consumer demand (Erhun et al., 2005; Wong, 2004). It was often assumed that consumers would purchase counterfeit and substandard drugs because they were cheaper—product appearance, prestige associated with use, perceived quality, a consumer's general attitude toward counterfeiting, and prescription

requirements were generally not considered even though some evidence suggested these variables were important (Lai et al, 1999; U.S. Food and Drug Administration, 2007).

The aim of this study was to assess the extent healthcare personnel in Nigeria are aware of the problem of counterfeit and substandard medicines, and how this influences their professional behavior. In addition, researchers explored how these attitudes contribute to, or else impede official regulatory initiatives to eliminate counterfeit and poor-quality drugs.

Methods:

Between September and November 2008, Nigerian field researchers administered informal questionnaires to 211 healthcare personnel in Lagos, Ondo, and Ogun states in Nigeria about their awareness of, and exposure to counterfeit and substandard medicines, as well as general patient and prescribing behavior (See Appendix 1). Participants were informed that they were being asked questions to "better understand the production and distribution of essential drugs in Nigeria". In all, 41 respondents self-identified as doctors (19%), 58 as pharmacists (27%), 111 as another kind of healthcare worker (53%), and one respondent did not specify.

Lagos, Ondo, and Ogun were selected to include primarily urban (Lagos), semi-urban (Ogun), and rural (Ondo) areas. Pharmacies were randomly selected in townships the field researchers considered representative of each state. They approached pharmacy personnel, including doctors, pharmacists, and healthcare workers, and requested that they complete a questionnaire "on the spot"; if they could not, or would not, field researchers offered to retrieve the questionnaire several days later. 63% (133 of 211) of those who completed the questionnaire responded immediately and 37% (78 of 211) requested that the field researcher return to pick it up. For 29% (61 of 211) of the questionnaires, field researchers assisted respondents by guiding them through the form. This was done when the respondents indicated that they had questions or did not understand what was being asked. 19% (48/259) of healthcare personnel refused to fill out the questionnaire, with some saying that they would first need clearance from their superior.

In order to assess the quality of drugs sold in Lagos-area pharmacies, researchers developed a simple sampling protocol in line with similar studies (Bate et al., 2008; Lon et al., 2006). Drugs were obtained by Nigerian field researchers from three randomly selected private pharmacies in urban and peri-urban areas of Lagos in October 2008. The drug sampling was independent of the questionnaires discussed above, although the field researchers were the same. They posed as customers and were instructed to purchase a sample lot of antimalarial, antibiotic, and antimycobacterial drugs, which included artemisinin-based combination therapies (ACTs), sulfadoxine/pyrimethamine (SP) and artemisinin monotherapies, ciprofloxacin, erythromycin, isoniazid, and rifampicin. Not all drugs were available in all pharmacies, field researchers requested treatments for tuberculosis, malaria and bacterial infections without specifying a desired drug type or brand. Once purchased, treatment packs were maintained as they had been sold (either in the manufacturer's original packaging or loose) and were shipped to the United States for preliminary spectrometry testing, then to Africa Fighting Malaria's Minilab in India and the United Kingdom (UK) for TLC and disintegration testing respectively.

Preliminary testing using the TruScan handheld Raman spectrometer took place in the United States from January to February 2009 on a subset of drugs. Because reference standards for the Raman spectrometer were not available for most of the drugs collected, the results were not recorded and are not presented in this study, with the exception of two treatment packs of ciprofloxacin discussed later.

The Global Pharma Health Fund e.V. Minilab® was used to run semi-quantitative TLC and disintegration tests on each drug to determine the presence and relative concentration of active ingredients. Each test was run in duplicate, with the generous assumption that the result more consistent with the reference was recorded. The Minilab® protocols award a product a "pass" if it has 80% or more of the labeled active ingredient(s) (note there is no upper-bound limit). For fixed-dose combination artemether-lumefantrine and SP, a "pass" was awarded only if both active ingredients met this standard.

TLC testing took place in India in April 2009 and disintegration testing took place in the UK in June 2009. The researchers acknowledge that the movement of drugs to different locations for testing may have influenced the results and as such, they are indicative only. Furthermore, given that multiple field researchers administered the questionnaires in different locations it is possible unforeseeable biases occurred here too; therefore, these results should also be considered indicative only.

Results:

Healthcare Personnel Questionnaire

Diagnosis & Prescription

More than two-thirds (68%, 144/211) of healthcare personnel respondents indicated that patients did not "only buy drugs based on prescription." Of these, 70% (101/144) said that patients knew which drugs were "appropriate to buy" because they had used them before, 63% (90/144) because they asked the pharmacist, and 53% (77/144) because they had seen the drug advertised. 62% (130/211) of all healthcare personnel reported that patients said they had bought an ineffective drug; of those, 28% (36/130) said that the patient bought the same drug again. When asked why drugs may have been ineffective, healthcare personnel said that patients did not use the drug as prescribed (68%, 88/130), the ailment was misdiagnosed (50%, 65/130), and/or the drugs were substandard or fake (41%, 53/130) or did not contain the right amount of active ingredient (28%, 36/130). 18% (23/130) said drugs were not effective because they were expired.

Eighty-five percent (94/111) of healthcare workers acknowledged writing a prescription for a patient, as did 91% (53/58) of pharmacists.

Consumer Awareness & Purchasing

Healthcare personnel reported that most patients bought their drugs from well-established vendors: "patient medicines stores" (70%, 148/211), which are required to obtain patent and proprietary vendor licenses to operate, or "approved pharmaceutical stores" (67%, 141/211),

which are licensed by the Pharmacists Council of Nigeria (PCN). 43% (90/211) said that patients bought drugs from public hospitals.

Approximately one-third said that patients bought drugs from commercial buses or other forms of public transport (37%, 79/211), "unapproved" pharmaceutical stores (30%, 64/211) or roadside hawkers (28%, 59/211)—all places which healthcare personnel later identified as more likely to peddle substandard or fake drugs. Commercial buses, unapproved pharmaceutical stores, and roadside hawkers, were also identified as the most likely sources of "cheap" drugs. Overall, 86% (181/211) of healthcare workers said that patients bought drugs from unapproved places, generally because they were cheaper (64%, 116/181) and/or more convenient (47%, 85/181). When asked what was responsible for the spread of substandard or fake drugs, 74% (156/211) responded yes to "patients' preference for cheap drugs." Respondents also blamed the people's "poor economic situation/lack of funds" (30%, 64/211), government policies toward healthcare delivery (17%, 35/211), and a lack of health insurance for most Nigerians (15%, 31/211). 90% (190/211) of respondents said that patients complained that the cost of pharmaceuticals were high.

Source of Counterfeit and Substandard Drugs

While most participants indicated that substandard and fake drugs was a severe problem in healthcare delivery (64%, 136/211), few indicated that it was the "most important" problem. Respondents cited "quackery," "the deliberate misrepresentation of the ability of a substance for the prevention or treatment of disease," (32%) and a lack of infrastructure (27%) as the most significant problems, followed by a shortage of medical personnel, and then substandard and fake drugs.

Seven percent (14/211) of healthcare personnel said that they were aware of manufacturers that produced and sold counterfeit or substandard drugs. Pharmacists (14%, 8/58) were more likely than doctors (7%, 3/41) and healthcare workers (3%, 3/111) to say they were aware of these manufacturers. Of those who responded to the question "where are the manufacturers located," 19/24 (75%) indicated within Nigeria, and 5/24 (25%) indicated outside of Nigeria (one participant indicated both). Participants overwhelmingly said that substandard or fake drugs were more likely to be sold in rural (58%, 122/211) rather than urban (24%, 51/211) areas (14% or 30/211 participants indicated both).

Participants reported that the most common types of drugs to be substandard or fake were those in high demand (80%, 169/211) and drugs for common diseases like malaria (60%, 127/211).

Healthcare Personnel Awareness and Response

Pharmacists (88%, 51/58) were most likely to say that they knew how to or had been trained to identify a counterfeit or substandard drug, followed by healthcare workers (68%, 75/111) and doctors (44%, 18/41). When asked how they identified substandard or fake drugs, most healthcare workers volunteered that they looked for a NAFDAC number (69%, 100/144) or expiry date (42%, 61/144), or assessed physical packaging by looking for a hologram or ensuring

correct spelling of the drug name (33%, 47/144), whether or not they had been trained. Very few volunteered that they conducted any physical tests (8%, 12/144).

Fifty-two percent (111/211) of all healthcare personnel said they had come into possession of a counterfeit or substandard drug. Interestingly, doctors were the most likely to say they had come into possession of a counterfeit or substandard drug (63%, 26/41) and were most likely to destroy the drugs (88%, 23/26) when they did so. Pharmacists were the most likely to alert NAFDAC (44%, 14/32) or to report the incident to the manufacturer or supplier (34%, 11/32). Healthcare workers were the most likely to do nothing (38%, 20/52). Interestingly, only 2 of 111 healthcare personnel who came into possession of a counterfeit or substandard drug alerted the police, and only 17% (19/111) reported the incident to NAFDAC, compared to 55% (61/111) who destroyed the drugs.

Drug Quality Testing

140 treatment packs of selected antimalarial, antibiotic and antimycobacterial drugs were collected, of which 115 were tested producing 144 sample results. The difference between the number of tests and the number of results is explained in that co-packaged, but not co-formulated combination therapies were tested as individual monotherapies. Twenty-five samples could not be tested: ten samples had formulations that could not be tested using the Minilab and the remaining fifteen samples were not tested because they had passed their expiry date by the time of testing (indeed two of these expired the month they were purchased).

One sample, sold loose in a small plastic bag, was not labeled and lacked an expiry date. During preliminary testing, the "discover method" of the Raman spectrometer identified the drug as isoniazid. Two other samples of isoniazid were sold loose and lacked expiry dates. All three samples were tested and all three passed TLC and disintegration testing.

Overall, 11% (16/144) of tested samples failed only TLC tests, 3% (4/144) failed only disintegration tests, and 4% (6/144) failed both TLC and disintegration tests (See Table 1). Of the specific pharmaceutical types, failure by TLC and/or disintegration occurred in 19% (23/122) of all antimalarial drugs, including 14% (4/29) of SP, 17% (4/23) of amodiaquine, 0% (0/4) of mefloquine, 24% (12/50) of artesunate, 17% (2/12) of dihydroartemisinin, and 25% (1/4) of fixed-dose combination artemether-lumefantrine. Failure by TLC and/or disintegration occurred in 23% (3/13) of antibiotics, including 17% (1/6) of ciprofloxacin and 29% (2/7) of erythromycin. Failure by TLC and/or disintegration occurred in 0% (0/9) of antimycobacterials, comprising isoniazid (3 samples, all sold loose, without expiry dates) and rifampicin (6 samples).

Table 1: Thin-Layer Chromatography and Disintegration Testing of Drugs from Lagos Pharmacies

	# TESTED	# FAILING TLC	# FAILING DISINTEGRATION	# FAILING TLC AND DISINTEGRATION	%FAILING TLC AND/OR DISINTEGRATION
ANTIMALARIAL DRUGS	122	15	4	4	19%
SP	29	3	0	1	14%
Amodiaquine	23	2	1	1	17%
Mefloquine	4	0	0	0	0%
Artesunate	50	8	2	2	24%
Dihyrdoartemisinin	12	1	1	0	17%
Artemether-lumefantrine	4	1	0	0	25%
ANTIBIOTICS	13	1	0	2	23%
Ciprofloxacin	6	0	0	1	17%
Erythromycin	7	1	0	1	29%
ANTIMYCOBACTERIAL DRUGS	9	0	0	0	0%
Isoniazid	3	0	0	0	0%
Rifampicin	6	0	0	0	0%
ALL DRUGS	144	16	4	6	18%

During preliminary testing, a subset of drugs was examined using a TruScan handheld Raman spectrometer. Since the researchers had few established reference standards for most of the drugs, analysis was primarily a subjective evaluation of spectra against known required active ingredients. The ciprofloxacin failure, which TLC testing indicated contained no measurable active ingredient, was found to be composed mostly of baby powder, according to the TruScan "discover report". The tablets and drug packaging looked similar but identifiably different from what appeared to be a legitimate version also sampled. The probable counterfeit package was larger, had slightly different printing color and design, and lacked a hologram, as compared with the packing of the likely legitimate drug (See Image 1). Both drugs had the same NAFDAC number. The researchers informed the Indian producer and NAFDAC about this probable counterfeit drug. Both acknowledged awareness of Ciprotab® counterfeiting and confirmed that measures had been put in place to help identify counterfeit versions as well as those responsible for their production. Upon receiving photographs of the two drugs side-by-side, the producer responded that although they could not "authoritatively confirm the genuinety of the product" from just photographs "the product failing, is fake".

Image 1: Ciprofloxacin Samples. *Tablets sampled from the box/blisterpack on the left (#1 sticker affixed by researchers) failed TLC, disintegration and spectrometry testing, while tablets from the box/blisterpack on the right (#3 sticker affixed by researchers) passed all three tests.*

Photograph by Jennifer Moretta

Discussion:

Findings suggest that there may be irrational use of drugs in Nigeria. Pharmacists report that some patients acknowledge purchasing medicines without valid prescriptions, and from unregistered channels. Nearly 90% of both healthcare workers (85%) and pharmacists (90%) acknowledge writing a prescription for a patient, even though Nigerian law only permits qualified doctors to prescribe drugs to patients.

Given that unregistered channels—such as roadside hawkers or commercial buses—were cited by respondents as the most likely sources of poor-quality medicines, it is reasonable to infer that some patients may be exposed to poor-quality medicines. Nigerian law requires that every pharmacy have a qualified pharmacist, registered with the PCN, to oversee day-to-day operations.

The overall observed failure rate of 18% appears to support NAFDAC's assertions that the prevalence of substandard medicines has declined notably in recent years (World Health Organization, 2006), although given the small sample size, more research is needed.

The number of healthcare workers indicating that they would not do anything when they discovered a counterfeit or substandard drug is worrying because most Nigerians access drugs through their neighborhood "chemist," particularly when they are poorly educated (NOI-Gallup, 2008). The number who indicated that they would not report the incident to NAFDAC or the police may owe to the perception that corruption is widespread in the country, or that reporting the incident could jeopardize their personal safety or economic well-being. As Minister of Information Akunyili has noted, "The first line of action by drug counterfeiters is to compromise

regulators. When this fails, they fight back with intimidation, harassment, blackmail, and threats" (Bate, 2008).

Some healthcare workers blame domestic companies for producing substandard and counterfeit medicines—a fact which may be surprising, given that Minister of Information Akunyili consistently blamed Indian and Chinese companies for the influx of counterfeit and substandard drugs into the Nigerian market. Of course, government ministers may be reluctant to criticize their own countries' companies' products and, as the "My Pikin" controversy of late 2008 and early 2009 illustrates, domestic drug companies also make and trade in counterfeit and substandard drugs. Furthermore, because all outside manufacturers are required by law to "be represented in Nigeria by a duly registered company or individual with facilities to effect a recall of the product when necessary," it might be said that all legal pharmaceutical companies are locally connected (NAFDAC Nigeria, 2002-2007).

While the questionnaire highlighted NAFDAC's strengths in registering a large number of drugs in the country, it also hinted at some imperfections in the process. A NAFDAC number can be easily faked; bureaucracy, internal politics, and the inability of some small and medium enterprises to meet the cost of registration may delay or even deny certifications to some companies. Furthermore, it is unclear the extent to which NAFDAC monitors drugs and companies after initial certification.

NAFDAC also has separate registration schedules for domestic- and internationally-produced drugs—which differ in their expense and ease of use (Table 2). For over-the-counter drugs, it will cost an importing company approximately $13,500 to register their drug compared to less than $1,000 for a domestic company. Of the 64 healthcare personnel who responded to the question "do you only sell drugs with a NAFDAC number," ten acknowledged that they sold drugs without a number. Nearly two-thirds (6/10) of them volunteered that they did so because some drugs were "imported" or "not produced in Nigeria;" one participant said that some drugs unregistered "may be certified by enforcement agencies of some other countries." One participant volunteered that there were some unregistered drugs that were "essential." It should be noted that the question was directed at pharmacists only but other healthcare personnel answered it as well.

Table 2: NAFDAC Schedule for over-the-counter drugs[i] (separate schedules for different drug classes like orphan drugs, "ethical drugs," vaccines and biologicals)

	IMPORTED DRUG	DOMESTIC DRUG
Flat Fee	1,000,000 N (approx $6760)	70,000 N (approx $475)
Permit to import	10,000 N	None
Processing fees	890,000 N	50,000 N
Registration	100,000 N	20,000 N
Renewal	60% of total cost of registration	50% of total cost of registration
TOTAL EXPENSE (excl. renewal)	1,990,000 N (approx $13,514)	140,000 N (approx $971)

i. NAFDAC Nigeria – The National Agency for Food, Drug Administration and Control (2002-2007). Tariff Charges. Available: http://www.nafdacnigeria.org/tariffs.html

The reluctance of some healthcare personnel, particularly healthcare workers, to complete the questionnaire posed a challenge to the field researchers. Respondents may have feared that they were working for the police, NAFDAC, or other regulators, and were afraid that any response would render them culpable for any drug failures (even if he or she was not immediately aware of those failures). When field researchers explained the purpose of the questionnaire and emphasized that they were not regulators or police, several respondents who had initially declined opted to participate[4].

Some participants also had difficulty understanding the questions. In some cases, field researchers guided participants through the questions verbally, expanding and explaining questions when wording was unclear. Even so, some responses were contradictory—a respondent would indicate that a patient had never reported to them that a drug he/she had bought was ineffective, but then would answer the following question that stipulated "if yes".

Despite these problems, it was believed the views of those who filled in the questionnaires were representative of healthcare personnel awareness and opinion.

To crack down on the number of counterfeit and substandard drugs and irrational drug use in Nigeria, then, healthcare worker and patient awareness must increase. Patients must be educated on the potential dangers of self-prescription; pharmacists, on the importance of buying and distributing only high-quality drugs that have not passed their expiry date.

Regulatory bodies like NAFDAC can work to intercept more suspect drugs, conducting more on-going monitoring of the drugs they register and also encouraging healthcare personnel to report any incidents of poor-quality medicines. NAFDAC might also consider adopting credentialing systems beyond the widely used NAFDAC number, which can be easily counterfeited. These systems may include barcodes, scratch-off labeling, or e-pedigree systems (U.S. Food and Drug Administration, 2006).

One of the most often cited explanations for the prevalence of counterfeit and substandard drugs, as well as the irrational use of drugs is the high cost of available alternatives. By lowering its

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[4] None of those from whom drugs were procured were informed that drugs were being tested for quality.

registration fees for foreign drugs to the same level as those for domestically produced drugs, NAFDAC could drive down cost by encouraging higher levels of importation. Because counterfeiters will always be able to make less expensive drugs however (because they need not adhere to the same quality standards as original drugs), improving regulatory oversight, pharmacist accountability, and patient awareness are essential to cracking down on the irrational use of drugs in Nigeria.

All this being said, Nigeria is well ahead of other African nations, as a result of NAFDAC's work. Nigeria could be viewed as a model for other countries and hence it is important it continues to aim high in combating the production and distribution of substandard and counterfeit drugs.

Appendix 1:

Doctors, Healthcare Workers & Pharmacists Survey

This questionnaire has been designed to better understand the production and distribution of essential drugs in Nigeria. Your responses to these questions will be made confidential and mainly for research purpose.

This Questionnaire is answered by:

Interviewer.....Yes/No

Interviewee..... Yes/No

1) Sex: ☐ Male   ☐ Female

2) Type of Work: ☐ Doctor   ☐ Healthcare Worker   ☐ Pharmacist

3) Years of Work Experience: ☐ 1-5   ☐ 6-10   ☐ 11-20   ☐ 21-30   ☐ Above 30

> If Doctor or Healthcare Worker, answer questions 4-26
> If Pharmacist, answer questions 4-26 and 1 additional question at the end

4) How many patients do you see per day?
☐ 1-5   ☐ 6-10   ☐ 11-20   ☐ 21-30   ☐ Above 30

5) What is the most common ailment you come across in patients? (check one)
☐ Malaria   ☐ Waterborne-related diseases (Typhoid)   ☐ Diarrhea   ☐ Weakness of the body
☐ Cough/TB   ☐ Other, Specify: _____

6) Have you ever written a prescription for a patient?   ☐ Yes   ☐ No

7) Do patients only buy drugs based on a prescription?   ☐ Yes   ☐ No
  a) If No, how do patients know the appropriate drugs to buy? (check all that apply)
    ☐ Used the drug before   ☐ Ask the pharmacist   ☐ Respond to advertisement
    ☐ Other, Specify: _____

8) Has a patient ever reported to you that the drugs he/she bought were not effective?
☐ Yes   ☐ No
  If Yes,
  a) Did the patient buy the same drug again?   ☐ Yes   ☐ No
  b) Did the patient buy a different drug?   ☐ Yes   ☐ No
  c) What are some likely reasons that the drugs were not effective? (check all that apply)
    ☐ Drugs were expired
    ☐ Patients didn't use the drugs as prescribed
    ☐ Drugs did not contain the right amount of active ingredient
    ☐ Drugs were sub-standard or fake
    ☐ Ailment was misdiagnosed

9) Do patients buy drugs from unapproved places?   ☐ Yes   ☐ No
  a) If Yes, why? (check all that apply)
    ☐ Drugs are cheaper   ☐ It is more convenient   ☐ It is the only place they know
    ☐ Other, Specify: _____

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10) Where do most patients buy their drugs? (check all that apply)
   ☐ Patient medicines stores
   ☐ Roadside hawkers
   ☐ Approved pharmaceutical stores
   ☐ Unapproved pharmaceutical stores
   ☐ Public hospitals
   ☐ Commercial buses or other form of public transport
   ☐ Other, Specify: _____

11) Do patients complain that the cost of drugs is high?   ☐ Yes   ☐ No

12) Do patients prefer to buy cheap drugs over brand name drugs?   ☐ Yes   ☐ No

13) Where can patients buy cheap drugs? (check all that apply)
   ☐ Patient medicines stores
   ☐ Roadside hawkers
   ☐ Approved pharmaceutical stores
   ☐ Unapproved pharmaceutical stores
   ☐ Public hospitals
   ☐ Commercial buses or other form of public transport
   ☐ Other, Specify: _____

14) Do you know of manufacturers that produce and sell sub-standard or fake drugs?
   ☐ Yes   ☐ No

   If Yes,
   a) Where are the manufacturers located? (check one)
      ☐ Within Nigeria
      ☐ Outside of Nigeria

   b) Where do they distribute sub-standard or fake drugs? (check all that apply)
      ☐ Patient medicines stores
      ☐ Roadside hawkers
      ☐ Approved pharmaceutical stores
      ☐ Unapproved pharmaceutical stores
      ☐ Public hospitals
      ☐ Commercial buses or other form of public transport
      ☐ Other, Specify: _____

15) Where are sub-standard or fake drugs most likely to be sold? (check one)
   ☐ Rural areas
   ☐ Urban areas
   ☐ Other, Specify: _____

16) Patients are most likely to buy sub-standard or fake drugs from: (check all that apply)
   ☐ Patient medicines stores
   ☐ Roadside hawkers
   ☐ Approved pharmaceutical stores
   ☐ Unapproved pharmaceutical stores
   ☐ Public hospitals
   ☐ Commercial buses or other form of public transport
   ☐ Other, Specify: _____

17) What types of drugs are most commonly sub-standard or fake? (check all that apply)
   ☐ Drugs for common diseases like malaria etc.
   ☐ Drugs that are expensive regardless of the disease
   ☐ Drugs that are in high demand
   ☐ Drugs that are not common
   ☐ Other, Specify: _____

18) Do you know, or have you ever been trained, how to identify a sub-standard or fake drug?
   ☐ Yes   ☐ No

   a) If Yes, explain how you identify a sub-standard or fake drug:
   _____
   _____
   _____
   _____

19) Have you ever come into possession of a sub-standard or fake drug?   ☐ Yes   ☐ No

   a) If Yes, what did you do? (check all that apply)
      ☐ Reported to superior officer/management
      ☐ Alerted police
      ☐ Alerted NAFDAC
      ☐ Reported to manufacturer/supplier
      ☐ Destroyed the drugs
      ☐ Did nothing

20) Have you treated or come across a patient suffering complications as a result of taking a sub-standard or fake drug?   ☐ Yes   ☐ No

21) How serious is the problem of sub-standard or fake drugs in healthcare delivery? (check one)
   ☐ Not a problem   ☐ Mild problem   ☐ Moderate problem   ☐ Severe problem

22) Has patients' preference for cheap drugs contributed to the spread of sub-standard or fake drugs?
   ☐ Yes   ☐ No

   a) If No, what is responsible for the growing trade in sub-standard or fake drugs?
      (check all that apply)
      ☐ Heavy taxes/VAT on drugs
      ☐ Government policies toward healthcare delivery
      ☐ Poor economic situation/lack of funds
      ☐ Lack of health insurance for most Nigerians
      ☐ Other, Specify: _____

23) Could sub-standard or fake drugs be eliminated if the patent rights of the original drug manufacturers were respected?   ☐ Yes   ☐ No

24) What measures could be put in place to check the incidence of sub-standard or fake drugs? (check all that apply)
☐ Seizure of consignments
☐ Life jail sentence
☐ Death sentence
☐ Closure of sale outlets
☐ Fine
☐ Withdrawal of licenses
☐ Freezing of assets/bank account
☐ Other, Specify: _____

25) Rank how best to tackle the problem of sub-standard or fake drugs:
(1 is the best way, 5 is the worst way)
_____ Reduction of tariff/VAT on essential drugs
_____ Prosecution of unregistered pharmacies and stores
_____ Mass education on sub-standard/fake drugs
_____ Introduction of stiffer penalty for offenders
_____ Ban on all sales medium that help self-medication

26) Rank the following problems with the healthcare system in order of importance:
(1 is the most important, 7 is the least important)
_____ Lack of infrastructure
_____ Sub-standard and fake drugs
_____ Shortage of medical personnel
_____ Lack of health insurance for most Nigerians
_____ Corruption in healthcare delivery
_____ Shortage of hospitals
_____ Quackery

If Pharmacist, answer question 27

27) Do you only sell drugs with a NAFDAC Number?   ☐ Yes   ☐ No
   a) If Yes, why?

   _____
   _____
   _____

   b) If No, why not?

   _____
   _____
   _____

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