Perceptions of Law Enforcement Personnel and Public Health Professionals on Synthetic Drug Use in Nigeria

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Citation | Agwogie, M. O., & Kliewer, W. (2025). *Perceptions of law enforcement personnel and public health professionals on synthetic drug use in Nigeria. Adiktologie, 25*(2), pp–pp.

BACKGROUND: Nigeria is one of the countries in the world severely impacted by synthetic drug production and use, yet lacks fundamental understanding of the synthetic drug market, how many people use, and how much they use. **AIMS:** The aims of this study were to (1) assess the level of knowledge of law enforcement personnel and public health professionals regarding synthetic drugs; (2) assess the perception of the two groups on the risk of synthetic drug use (SDU); (3) compare reports of the two groups on the commonly used synthetic drugs, common users, and sources of these drugs; (4) assess perceived underlying reasons for SDU; (5) assess the perception of the two groups on legalization of SDU and naloxone to prevent overdose related consequences. **METHODS:** Both open and closed-ended questions were used to survey law enforcement personnel (*N = 70*) and public health professionals (*N = 70*) in six states across the six geo-political zones in Nigeria and the federal capital territory. **RESULTS:** All participants had heard of synthetic drugs. Majority of the sample described SDU as “extremely risky”. Consequences fell into four categories: physical health problems, mental health difficulties, consequences related to substance misuse, and societal consequences. Both groups identified youth as the main users of synthetics. Individual-level factors, economic forces, peer influences, other social environmental factors, and media were noted as risk factors for SDU. Endorsement for the legalization of synthetic drugs was low, and beliefs that naloxone should be available to those on the front lines of the synthetic drug crisis were variable. **CONCLUSION:** This data may be used to inform preventive interventions and policy to reduce SDU in Nigeria.

Keywords | Synthetic drugs - law enforcement - public health care providers – Nigeria

Submitted | 5 June 2025 **Accepted |** 12 August 2025

Grant affiliation | Funding to support data collection for this article was provided by the United States Department of State and the Institute of International Education (IIE).

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1 INTRODUCTION

Synthetic drugs have become significant global public health and law enforcement concerns (Napoletano et al., 2022; United Nations Office on Drugs and Crime [UNODC], 2021a); this is particularly true in Nigeria (Agwogie, 2022; Mehanovic et al., 2020; UNODC, 2018). Areas of concern include the proliferation, speed of production, and difficulties in identifying synthetics, limited information on their health and social consequences for clinical and policy interventions, money laundering associated with synthetic drug trafficking, the increasing role of virtual assets, limited law enforcement and public health capabilities to address this growing threat, the dual use nature of many precursor chemicals, complexity in global supply chains and resourcse constraints (Agwogie, 2016; Beardsley & Zhang, 2018; Global Programme on Cybercrime, 2024; UNODC, 2024a). Like many countries, Nigeria's domestic synthetic drug markets are diversifying in substances, and evolving in complexity (UNODC, 2024a). This is challenging the relevance of traditional policy response measures as singular responses are becoming ineffective with these evolutions.

Nigeria is faced with the challenges of drug/substance misuse which has become a significant threat to public health, national stability, peace, security and economic development. According to the first comprehensive national drug use survey conducted in Nigeria, 14.3 million individuals aged 15-64 (14.4%) used at least one psychoactive substance (excluding alcohol and tobacco) in the previous year (UNODC, 2018). This figure is considerably higher than the 2016 global annual prevalence rate (5.6%) of all substances used among the adult population. In addition, among this 14.3 million people, 20% have substance use disorders (SUDs), a figure that exceeds the global average by 11%. One in five persons who use psychoactive substances injects them, using needles and syringes; pharmaceutical opioids account for the most injected substance with 4.7% opioid use prevalence (UNODC, 2018). Nigeria accounts for 14% of the world's population who misuses pharmaceutical opioids making it one of the countries in the world with the highest number of people who misuse tramadol and cough syrups containing codeine or dextromethorphan (Agwogie, 2022). Reports have shown that Nigeria has the highest level of ingenuity in substance use in the world with the use of complex mixtures and unimaginable substances which has become a major challenge in drug use prevention and treatment (Agwogie, 2016; 2022). As of 2013, Nigeria was one of the countries in the world that had not officially reported the emergence of synthetic drugs (UNODC, 2013). However, in 2017 and 2018, Nigeria reported the largest annual quantities of tramadol seizures worldwide with 96 and 22.6 tons, respectively due to high demand and non-medical use of tramadol capsules with dosages of up to 500mg (UNODC, 2020). A survey among construction workers in Adamawa State reported a 85% prevalence of non-medical use of tramadol during work (Oraegbune et al., 2017).

Reports have also shown that since 2016, Nigeria is one of two countries in Africa where methamphetamine clandestine laboratories have been dismantled and as major destination markets (UNODC, 2020) with increased availability for local consumption. The prevalence of methamphetamine use in 2017 was estimated at 0.6% (UNODC, 2018). Other synthetic drugs that have been reportedly used include cough syrup containing codeine (2.4%), tranquilizers and sedatives (0.05%) (UNODC, 2018).

1.1 Synthetic Drugs

Synthetic drugs, also known as new psychoactive substances (NPS), have become major threats in the global drug production, marketing and consumption arenas (Hagan & Smith, 2017). Data from law enforcement activities across the globe confirms this growing threat. For example, since 2008, there have been significant increases in the number of seizures of synthetic drugs reported across Europe (European Monitoring Centre for Drug and Drug Addiction [EMCDDA], 2015). Since 2009, over 1200 synthetic substances have been reported to UNODC by 142 countries and territories (UNODC, 2024b). Synthetic stimulants constitute the largest group with 34 per cent, followed by synthetic cannabinoid receptor agonists with 29 percent, hallucinogens 14 percent and synthetic opioids having a significant increase between 2015 and 2021 representing the fourth-largest group (UNODC, 2022).

The definition of synthetic drugs differs across countries based on national legislation and political interest as against chemical compositions and classifications (Shafi et al., 2020). However, synthetic drugs refer to a group of complex and varied substances that are usually described as synthetic, designer drugs or legal highs (Luethi & Liechti, 2020; Peacock et al., 2019; Shafi et al., 2020). UNODC defines synthetic drugs or NPS as pure or prepared narcotic or psychotropic substances that are not covered by either the 1961 Single Convention on Narcotic Drugs or the 1971 Convention on Psychotropic Substances but may pose a risk to public health (UNODC, 2016). Though defined as substances designed to reproduce the effects of conventional drugs such as cannabis, cocaine, heroin, ecstasy and amphetamines, synthetic drugs usually are more potent than their counterparts with more significant effects (Hagan & Smith, 2017). For example, synthetic cannabinoids are associated with respiratory and cardiovascular complications, renal injury and cerebrovascular accidents including strokes (Graya et al., 2021; Shafi et al., 2020; Winstock et al., 2015; Zimmer et al., 2019). A self-reported survey of people who use drugs (PWUD) revealed that those who used synthetic cannabinoids, for example, were 30 times more likely to end up in an emergency department than users of traditional cannabis (Winstock et al., 2015).

Similarly, there is the increasing practice in the use of synthetic stimulants to enhance sexual drive, with multiple partners and the combination of gamma-hydroxybutyrate (GHB) and mephedrone (Trouiller et al., 2020). The effects of Lysergic acid diethylamide (LSD) have been identified to include inability of the body to maintain normal body temperature, cardiovascular irregularities, difficulties in concentration and exhaustion (Dolder et al., 2016). Also, synthetic opioids are associated with mild impairment including itchy skin, nausea, vomiting, constipation and dizziness to more severe health conditions such as respiratory and central nervous system depression (Beardsley & Zhang, 2018; Helander et al., 2017; Siddiqi et al., 2015). An estimated loss of 12 million years of "healthy" life resulting in

premature death and disability is attributable to global opioid abuse (UNODC, 2017). Laboratory testing for synthetic drugs in clinical and forensic settings can be a complex task and the validity and reliability of test kits varies considerably in detecting the various compounds (Awuchi et al., 2023; Shafi et al., 2020).

Synthetic drugs are not currently controlled under the International Drug Control Conventions. However, the Commission on Narcotic Drugs has placed 68 NPS under international monitoring (UNODC, 2021b). Therefore, countries use generic and chemical similarities to conventional drugs to legislate or regulate the use of synthetic drugs (UNODC, 2021b). Countries also rely on information provided by the UNODC in the identification and reporting of synthetic drugs under the UNODC Early Warning Advisory (EWA) on synthetic drugs (UNODC, 2016). EWA helps countries to have better understanding of synthetic drugs, their distribution, and harm, and as a platform for the provision of technical assistance to nations (UNODC, 2016, 2021b). The scheduling of synthetic drugs by convention may require resolving some of the peculiarities of synthetic drugs. Different from the cultivation of poppy plants and coca leaves for heroin and cocaine respectively, the manufacturing of synthetic drugs is not defined by land space and the process is different from extraction of active constituents from plants.

Operationally, synthetic drugs may be grouped under cannabinoids, depressants, stimulants, and hallucinogens, with some intersecting functional groups linked to their chemical structures, psychological and pharmacological preferences (Miliano et al., 2016; Shafi et al., 2020; Tracy et al., 2017). In Nigeria, synthetic drugs may be more complex beyond the classifications and categories due to the high level of ingenuity (Agwogie, 2016) and the "non-classical packaging" (Dumbili et al., 2021). Therefore, not much is known about the evolving synthetic drugs, nor the attitudes and practices of law enforcement personnel (LEP) and public health professionals (PHP) on synthetic drugs. Similarly, there has been a challenge sampling major stakeholders for better insight into SDU due to stigma and the cost of conducting large scale surveys. Regrettably, most studies on synthetic drugs have excluded the African region, including Nigeria (Dumbili, et al., 2021). One of the few studies that have included Africa identified synthetic cathinones as one of the commonly used non-conventional mind-altering substances in Northern and Eastern African countries (Feng et al., 2017). Thus, there is a dire need to advance knowledge on the attitudes and practices relating to synthetic drugs in Nigeria towards its prevention and policy development. This knowledge may help other countries as they combat the problem of new synthetic drugs.

1.2 First Lines of Defense in Combatting Synthetic Drug Misuse

The policy approach of each country to address synthetic drugs related issues can be characterized along a continuum between law enforcement and public health approaches. Both law enforcement and public health personnel are prominent as front liners in the control of synthetic drugs and first responders to the consequences of SDU (Gladden et al., 2016; Rudd et al., 2016; Warren et al., 2017). Generally, law enforcement and public health professionals have different perceptions and approaches to drug control (Standring, 2017). While the law enforcement approach is basically attributed to the "War on Drugs", the public health approach focuses on providing epidemiologic data and supporting the use of evidence-based policies and practices (Babor et al., 2018; Csete et al., 2016; Johnson et al., 2022, Petrocelli et al., 2014). For example, the initial response by the United States government to the emergence of synthetic cannabinoids was a ban with laws that prohibited the production of any synthetic chemical compound that could be identified as a cannabinoid receptor agonist or found to mimic the pharmacological effects of naturally occurring cannabinoids (Mathai et al., 2016). While this approach changed the pattern of SDU, it did not change the burden of abuse due to the Internet and online retailers (Mathai et al., 2016). The historical context of primarily a law enforcement approach to drug control may have shaped perception and attitudes towards synthetic drugs in countries of the world including Nigeria. In particular, Nigeria has had its own fair share of draconian and repressive drug laws as opposed to public health approach (Johnson et al., 2022; Nelson and Obot, 2020). However, this is gradually changing (Johnson et al., 2022).

Among issues that shape the perception of first line responders to synthetic drugs are symptoms related to exposure in overdose response calls, potential or accidental exposures, and limited educational guidance on available interventions (Thompson et al., 2021). In a study on perceptions of opioids and other illicit drug exposure, Thompson and colleagues surveyed 5,955 first responders, including law enforcement and public health professionals, and reported that 15% of respondents believed they had been exposed to opioids, and of those, about 1% reported experiencing health effects from perceived exposure (Thompson et al., 2021). More than half (51%) of respondents reported being either very or somewhat concerned about developing health effects from exposure to opioids. Half of respondents reported being unaware of guidelines for preventing occupational-related opioid exposures (Thompson et al., 2021).

Rudd and colleagues emphasized the collaborative role of public health and law enforcement responses which includes improving access to and use of prescription drug monitoring programs, enhancing naloxone distribution and other harm reduction approaches among people with opioid use disorders, increasing SDU treatment capacity, improving linkage into treatment, and supporting strategies to reduce the illicit synthetic drug supply (Rudd et al., 2016). Similarly, studies have illustrated the critical importance of using data from multiple public health and public safety sources to inform substance use prevention and policy interventions (Slavova et al., 2017). Data from Nigeria would contribute to the global push for using data from across sectors of society to address substance misuse prevention policy.

1.3 The Current Study

Reports suggest that Nigeria is one of the countries in the world severely impacted by synthetic drug production and use (Global Initiative Against Transnational Organised Crime, 2023). It is

assumed that Nigeria lacks fundamental understanding of the synthetic drug market, as well as knowledge of how many people in Nigeria use synthetic drugs, what they use, and how much they use. The present study was designed as a rapid assessment of knowledge about and perceptions of SDU among law enforcement and public health professionals in Nigeria. Research questions were: (1) What level of knowledge do law enforcement personnel and public health professionals have regarding synthetic drugs? Do these two groups differ in their stated knowledge? (2) How risky do law enforcement personnel and public health professionals believe synthetic drugs to be? Do these two groups differ in the perceived risks? (3) What do law enforcement personnel and public health professionals report as the commonly used synthetic drugs in their area, common users of synthetic drugs, and the sources of these drugs? Do these two groups differ in their reports of the drugs being used, users, or sources? (4) What do law enforcement personnel and public health professionals perceive as the underlying reasons for SDU? Do these reasons differ across law enforcement personnel and public health professionals? And (5) Do law enforcement personnel and public health professionals believe synthetic drugs should be legalized and/or naloxone (to prevent overdose related consequences) be made available to various groups? Do these attitudes differ across law enforcement personnel and public health professionals? How do perceptions of the riskiness of synthetic drugs, availability of synthetics in their region, whether the drug is commonly used in their area, and reasons for use correlate with attitudes toward legalization and naloxone availability? Both open- and closed-ended responses were used to address these questions. Responses to these questions were anticipated to inform efforts to develop interventions to prevent or curb synthetic drug misuse and to inform policy directions, both in Nigeria and in other countries facing similar problems with new synthetic drugs.

2 METHOD

2.1 Study Design and Procedure

This was a cross-sectional study aimed at assessing the knowledge, attitudes, and practices of law enforcement personnel (LEP) and public health professionals (PHP) regarding SDU in Nigeria. A structured questionnaire was administered to LEP and PHP. Respondents were sampled from six states (Lagos, Enugu, Kaduna, Borno, Bayelsa and Kwara) representing each of the six geo-political zones. The Federal Capital Territory (FCT) also was included. Random sampling procedures were used to select the six states out of the 36 states in Nigeria. Thus, six distinct regions were included in the sampling plan. Ten respondents were sampled from each of the two groups (LEP, PHP) bringing the total sample size to 140. Convenience sampling was used to select the 140 respondents. All participants were adults, 18 years and older, residing in any of the six regions included in the study. Participation was voluntary. For the LEP, participants were eligible if they worked in a law enforcement agency. Similarly for PHP, participants were eligible if they worked in the field of drug demand reduction in a health-related discipline. While convenience sampling was used, use of random sampling to generate the regions sampled bolsters confidence in the study findings.

Survey administrators were recruited from each of the six regions and trained to ensure understanding of the research study and the questionnaire. They also were trained to be consistent in the questionnaire administration process, to provide prompts and interaction with the respondents, and to make clarifications where required. Each interviewer was calibrated during the training to ensure inter-examiner reliability. The survey administrators underwent training from the lead investigator. Sessions included obtaining informed consent, questionnaire administration, and basics of substance use services. Ethical approval was obtained from the Ethics Committee of the Lagos State University Teaching Hospital (LASUTH).

Prior to administering the survey, the questionnaires were piloted with LEP and PHP outside the sampled states for simplicity, clarity, validity and reliability. They were also subjected to review by experts before they were fully administered. Necessary modifications were made based on the outcome of pilot study and experts' reviews.

The questionnaires were self-administered. The process started with self-introductions and a brief description of the purpose of the survey. The respondents were then asked if they fully understood or required further clarifications. Completed questionnaires were collected and submitted by the interviewers to the lead investigator. The survey was administered in English.

2.2 Survey Instrument

Given the uniqueness of the topic, experts in the field of addiction were consulted in the development of the survey instrument. The areas covered by the survey included knowledge regarding synthetic drugs, risk assessment, commonly used drugs and descriptions of users, underlying reasons for SDU, and attitudes toward legalization and naloxone availability.

2.3 Knowledge regarding synthetic drugs

Four test items were used to assess the knowledge of respondents on synthetic drugs (e.g., "Have you ever heard of synthetic drugs or new psychoactive substances (NPS)?") with response options of yes or no with a follow up question, "If yes, from which of these sources did you first hear of synthetic drugs?". Options were *friends, school, social media, news, law enforcement, drug treatment facilities and others (please specify)*. Participants were also asked to name the synthetic drugs commonly used in their communities/areas (e.g., "Can you name the synthetic drugs commonly used in your community/area?") and what synthetic drugs were designed to do (e.g., "Do you know what synthetic drugs are designed to do?". Response options ranged from 0 (*I do not know at all*) to 4 (*I know very well*), with higher scores indicating higher perceived knowledge of what synthetic drugs are designed to do. Difference between synthetic drugs and traditional drugs was assessed (e.g., "Do you know the differences between synthetic drugs and traditional illicit drugs?"), with

response options ranging from 0 (*I do not know the difference at all*) to 4 (*I know the difference very well*) where higher scores represent higher knowledge of the difference.

2.4 Risk assessment

Risk associated with synthetic drugs use was assessed with three test items (e.g., "Do you believe synthetic drugs have any medical or recreational benefits?"). Response options ranged from 0 (*not at all*) to 4 (*I am very sure*), higher scores indicating higher medical or recreational benefits of synthetic drugs. Another item was, "How risky do you think it is to use synthetic drugs?" with response options ranging from 0 (*not risky*) to 5 (*extremely risky*), higher scores indicating higher risk associated with SDU. A sixth option I don't know was provided to avoid missing any information. The third item was open ended (e.g., "Can you identify some of the potential risks or side effects associated with SDU?").

2.5 Commonly used drugs and descriptions of users

Commonly used drugs and descriptions of users were assessed using three open-ended items (e.g., "What are the commonly used synthetic drugs in your community or area?", "Who are the common users of the synthetic drugs?", and "What is your perception about the use of these synthetic drugs?").

2.6 Underlying reasons for SDU

Underlying reasons for SDU was assessed using an open-ended question (e.g., "What are the major reasons why people use synthetic drugs?".).

2.7 Attitudes Toward Legalization and Naloxone Availability

Attitudes toward legalization was assessed first by establishing participants knowledge of the position of the laws on synthetic drugs (e.g., "Are synthetic drugs covered by the most recent Narcotics/Drug Laws in Nigeria?" with response options of *yes, no* and *I don't know*. Followed by, "Do you support that synthetic drugs should be legal?", with response options of *yes, no* and *why* for either of the options? Naloxone availability to reverse opioid use overdose in Nigeria was assessed (e.g., "Is naloxone available to reverse opioid use overdose in Nigeria?"). The response options were *yes, no* or *I don't know* with follow up items (e.g., "If yes, who readily has access to its use?"). Response options were public *health practitioners, medical personnel, law enforcement personnel, general population and others (please specify)*. Similarly, "If naloxone is not available in Nigeria to reverse opioid use overdose, would you recommend its availability?". Options were *yes, no* and *undecided*. If recommended, a follow up question was, "If yes, who would you recommend should have access to naloxone in Nigeria?". Response options were *public health practitioners, medical personnel, law enforcement personnel and general population.*

2.8 Data Management and Plan of Analysis

Data entry, cleaning, sorting and coding of open-ended responses on the survey was carried out weekly to check for completeness in order to ascertain good quality data. All analyses were conducted using IBM SPSS Statistics v29. Descriptive information on the sample was calculated first, and law enforcement and public health personnel were compared using chi-square analyses and *t*-tests. Next, both quantitative and qualitative approaches were used to address questions of knowledge of synthetic drugs, perceptions of the riskiness of synthetic drugs, reports of commonly used synthetic drugs in their region, perceptions of users of synthetic drugs, and reasons underlying SDU. For the quantitative analyses, regression analyses were used to compare law enforcement personnel and public health professionals on the relevant dependent variables. These analyses controlled for participant age, gender, years of experience in the field of drug control or demand reduction, level of education, and full- versus part-time employment. Open-ended responses were summarized within group and responses were compared. Binary logistic regression analyses were used to assess associations between attitudes toward legalization and naloxone availability and perceptions of the riskiness of synthetic drugs, availability of synthetics in their region, whether the drug is commonly used in their area, and reasons for SDU.

3 RESULTS

3.1 Sample

A total of 70 law enforcement personnel and 70 public health professionals participated in the study. See Table 1 for demographic information on the sample. Public health professionals were older than law enforcement personnel, $t(138) = -2.57$, $p = .011$ ($M_{\text{law enforcement}} = 36.7$ years, $SD = 9.0$; $M_{\text{public health}} = 40.7$ yrs, $SD = 9.5$), and a greater percentage had a Master's or doctoral degree, $X^2(1) = 21.03$, $p < .001$ (54.3% vs. 17.1%). However, the two groups did not differ on the proportion of males and females who participated [$X^2(1) = 0.49$], years of experience [$X^2(4) = 1.90$], full-time employment [$X^2(1) = 2.47$], or geographic location [$X^2(1) = 0.39$].

3.2 Knowledge regarding synthetic drugs

All respondents indicated that they had heard of synthetic drugs, also called new psychoactive substances (NPS). In terms of knowing what synthetic drugs are designed to do, 71.5% of respondents said that they knew what synthetic drugs were designed to do; only 14.6% of the sample did not know or did not know at all the purpose behind synthetic drugs. A regression analysis controlling for participant age, gender, years of experience in the field of drug control or demand reduction, level of education, and full- versus part-time employment revealed no differences in law enforcement personnel compared with public health professionals on the purpose behind synthetic drugs (B = -.16, SE B = .14, 95%CI = -.43, .12). However, individuals working less than full-time (7.9% of the sample) reported a lower level of knowledge about the purpose behind synthetic

Table 1 | Demographic information on the study sample (N = 140)

	M (SD) or %
Gender (% male)	62.9%
Age	38.7 years (9.5 years) Range = 18 to 57
Highest level of education	
Secondary School	1.4%
Higher education certificate or first degree	62.9%
Master's degree or equivalent	29.3%
Doctoral degree	6.4%
Full-time employment	94.9%
Urban (vs rural) work setting	85.3%
Work settings	
Hospitals	37.1%
Law Enforcement	55.3%
Schools / educational settings	3.8%
Clergy	0.8%
Other	3.0%
Years of experience in the field of drug control or drug demand reduction	
0-5 years	48.2%
6-10 years	21.6%
11-15 years	10.8%
16-20 years	10.8%
21-25 years	6.5%
26 or more years	2.2%

drugs than individuals working full-time (B = .49, SE B = .23, 95%CI = .04, .94, p = .032). Most respondents (81.8%) reported knowing the differences between synthetic drugs and traditional illicit drugs well or very well. As in the previous analyses, after accounting for covariates there were no differences in law enforcement personnel compared with public health professionals on knowledge regarding differences in these types of drugs (B = .02, SE B = .13, 95%CI = -.24, .28). Older individuals (B = .02, SE B = .01, 95%CI = .01, .04, p = .012) and men (B = -.25, SE B = .12, 95%CI = -.49, -.01, p = .038) reported greater knowledge than younger individuals and women, respectively. In terms of sources of information about synthetic drugs, respondents most frequently mentioned law enforcement (33%) as their first source of information about synthetic drugs, followed by drug treatment facilities (30%), social media (18%), school (16%), friends (10%) and the news (9%). Compared with public health professionals, law enforcement personnel reported first hearing about synthetic drugs more frequently from the social media (24% vs 11%, t(138) = 2.00, p = .047) and from law enforcement (56% vs 10%, t(138) = 6.54, p < .001). In contrast, compared with law enforcement personnel, public health professionals reported first hearing about synthetic drugs more frequently from school (23% vs 9%, t(138) = -2.35, p = .02) and from drug treatment facilities (41% vs 19%, t(138) = -3.03, p = .003).3.3

3.3 Risk assessment

Overall, respondents were quite varied in their beliefs about whether synthetic drugs had any medical or recreational benefits. A minority of the sample (9.9%) did not believe that synthetic drugs had any benefits, while 32.8% were not sure, and 57.3% said they were somewhat or very sure there were benefits. After accounting for age, gender, years of experience in the field of drug control or demand reduction, level of education, and full- versus part-time employment, there were no differences between law enforcement personnel and public health professionals regarding perceived benefits (B = -.29, SE B = .23, 95%CI = -.74, .17). When asked to assess the riskiness of using synthetic drugs, the majority of the sample (75.2%) said using synthetic drugs was "extremely risky"; only 2.9% said they did not know the risk level. Perceived riskiness did not differ across law enforcement personnel and public health professionals (B = .08, SE B = .11, 95%CI = -.14, .30).

Participants were asked to respond to an open-ended question regarding some of the potential risks or side effects associated with SDU. Responses generally fell into four categories as seen in Table 2. Analysis comparing responses from law enforcement personnel and public health professionals revealed differences in mentions of risks or side effects. Law enforcement personnel were much more likely than public health professionals to note physical health consequences associated with SDU. In contrast, public health professionals were much more likely than law enforcement personnel to mention substance-use related consequences. Both groups of respondents mentioned mental health consequences to a similar degree. Only public health professionals noted consequences to society of SDU.

Table 2 | Consequences of SDU mentioned

Category of Consequences	Specific Mentions
Short- and long-term physical health problems	Agitation Constipation Sleep difficulties Brain damage Damage to specific organs HIV Seizures Sudden death Shortened lifespan Memory loss
Mental health difficulties	Mental illness Anxiety Psychosis Paranoia Depression Hallucinations Hyperactivity
Consequences related to substance misuse	Intoxication Dependence Addiction Overdose
Societal consequences	Low productivity Poverty Disorder

3.4 Commonly used synthetic drugs and descriptions of users

Open-ended questions were used to assess respondents' perceptions of synthetic drugs commonly used in their area, the sources of these drugs, and descriptions of users. As a group, law enforcement personnel identified eight unique synthetic drugs commonly used in their area, while public health professionals identified 11 unique synthetic drugs commonly used. Six substances were mentioned by both groups: benzodiazepines, codeine cough syrup, colorado (spice), methamphetamines, rohypnol, and tramadol. Ephedrine and morphine were noted by law enforcement personnel but not by public health professionals; cathinones, fentanyl, K2, LSD, and pentazocine were mentioned by public health professionals but not by law enforcement.

The overwhelming response to the question of "who are the common users of synthetic drugs in your community/area?" was youth, young people, or adolescents. Although other users were mentioned a few times (e.g., students, adults, the wealthy, laborers), the number of mentions paled in comparison to the perception of youth being the primary users. This perception was similar across both group of respondents.

3.5 Underlying reasons for SDU

Participants answered an open-ended question about the major reasons people use synthetic drugs. These responses generally could be categorized into six domains, in order of frequency of mentions: individual-level factors, peer influences, economic influences, other social environmental influences, factors related to the drugs themselves, and media influences. See Table 3 for a full description of reasons mentioned. Analysis comparing responses from law enforcement personnel and public health professionals revealed differences in perceptions of why people use synthetic drugs. Public health professionals were about twice as likely than law enforcement personnel to note individual-level factors and drug-related factors as reasons for SDU. However, the two groups of respondents were very similar in their mentions of peer influences, economic factors, and other social environmental factors as reasons underlying SDU. Only law enforcement personnel mentioned media influences in noting reasons people use synthetic drugs.

3.6 Attitudes toward legalization and naloxone availability

In response to the question about whether synthetic drugs should be legal, 11.1% of the respondents said "yes." This percentage did not differ by participant group, Chi-square (1) = 0.83, $p > .05$. Regarding whether naloxone should be available to various groups, 33.6% of the sample indicated that public health practitioners should have access to naloxone. The percentages were 58.6% for medical personnel, 13.6% for law enforcement, and 1.4% for the general public, and these percentages did not differ by participant group, all Chi-squares (1) < 1.

Table 3 | Major reasons cited for SDU

Category of Reason	Specific Mentions
Individual-level factors	Pleasure seeking Getting high Sexual enhancement Energy Depression Low self-esteem Frustration Responses to abuse Responses to trauma Responses to stress Responses to pressure Responses to pain Genetic influences Poor emotion regulation
Peer influences	Peer pressure Bad influence of peers
Economic influences	Poverty Unemployment
Other social environmental influences	Family issues Generic environmental factors such as neighborhoods
Factors related to the drugs themselves	Increased production of synthetics Accessibility Affordability
Media influences	

Binary logistic regression was used to assess correlates of attitudes toward legalization of synthetic drugs. Predictors in the model included (1) perceived riskiness of synthetic drugs, (2) whether heroin or (3) fentanyl were commonly available in the region, whether (4) heroin or (5) fentanyl were commonly used in the area, and whether participants endorsed (6) individual-level, (7) economic, or (8) peers as reasons underlying use. In this analysis, the only significant correlate of endorsement of legalization of synthetic drugs was whether participants listed economic factors (poverty, unemployment) as a reason underlying SDU ($p = .034$).

Four separate binary logistic regressions were used to assess correlates of attitudes toward naloxone availability for public health practitioners, medical personnel, law enforcement, and the general public. Predictors in these models were the same as in the analysis above. For attitudes toward naloxone availability for public health personnel, medical practitioners, and the general public, there were no significant predictors. However, in the model assessing correlates of attitudes toward naloxone availability for law enforcement, both low levels of perceived riskiness of synthetic drugs ($p = .006$) and endorsing individual-level factors as reasons for SDU ($p = .04$) were associated with believing that law enforcement personnel should have access to naloxone.

4 DISCUSSION

The purpose of this study was to conduct a rapid assessment of knowledge about and perceptions of law enforcement and public health professionals on SDU in Nigeria given the severity of the synthetic drug problem in the country. The majority of the participants reported a good amount of knowledge regarding synthetic drugs, and there were no differences across participant groups. This finding may be connected with efforts to improve public awareness by stakeholders, including the law enforcement and public health professionals on the consequences of SDU and build capacity for its control (Agwogie, 2022; UNODC, 2023) as well as the evolving public health approach to drug control in Nigeria (Johnson et al., 2022). Interestingly, the two participant groups differed on the *sources* of information about synthetic drugs. Perhaps not surprisingly, law enforcement personnel were more likely than public health professionals to note learning about synthetics from law enforcement and also from social media; conversely, public health professionals were more likely to say they learned about synthetics from school and drug treatment facilities. These differences may reflect occupational exposure or educational attainment. Public health professionals, on average, were more educated than law enforcement personnel.

Although the perceived riskiness of synthetic drugs did not differ by participant group, analyses comparing responses from law enforcement personnel and public health professionals revealed differences in mentions of risks or side effects. Overall, short- and long-term physical health consequences were mentioned most frequently by both groups of participants. However, law enforcement personnel were much more likely than public health professionals to note physical health consequences associated with SDU. This finding may reflect differences in exposure (i.e., when an individual is likely to encounter an individual who has been using synthetic drugs). Mental health consequences of SDU were mentioned equally frequently by both groups. However, consequences associated closely with substance misuse, including intoxication, dependence, addiction, and overdose were noted more frequently by public health professionals relative to law enforcement. The difference may be due to their line of duties. For example, public health professionals are more likely to have longer duration of contact with PWUD during treatment interventions to observe these consequences compared to the law enforcement. Only public health professionals noted consequences to society of SDU, which included low productivity, poverty, and disorder. This may not be unconnected with the broad perspectives of public health professionals to drug use and support systems compared to the law enforcement which tend to focus more on enforcing drug laws and dealing with crime related consequences of drug use.

Public health professionals identified a few more unique synthetics compared with law enforcement personnel, but both groups were similar in their assessment of common users of synthetics: youth. The perception of youth as the primary users of synthetics is consistent with other literature (Jatau et al., 2021; UNODC, 2018). Responses to the question about why people use synthetic drugs were categorized into six domains: individual-level factors, peer influences, economic influences, other social environmental influences, factors related to the drugs themselves, and media influences. These responses are consistent with other studies that have found that the reasons for drug use mostly commonly mentioned are individual-level factors or peer influences (Agwogie et al., 2023). Similarly, studies have established social environmental influences, such as social disapproval of substance use (how wrong is it to use specific substance) and perceived harm linked to use as significant factors in substance use (Agwogie, 2024 et al.; Grigsby et al.,2016; Lipari, 2013; Nawi et al.,2021; UNODC/ World Health Organization [WHO], 2018). These factors shape the belief, value system, attitude and substance use behaviors (Colombo Plan Drug Advisory Programme, 2019).

Interestingly, although the two groups of respondents were similar in their mentions of peer influences, economic factors, and other social environmental factors as reasons underlying SDU, public health professionals were about twice as likely than law enforcement personnel to note individual-level factors and drug-related factors as reasons for SDU. Among other factors, psychological reasons such as depression, low self-esteem, frustration, and responses to abuse, trauma, stress, pressure, or pain, as well as genetic influences and poor emotion regulation also were cited as individual-level reasons for SDU.

Most participants did not endorse legalization of synthetic drugs. This may not be unconnected to the riskiness associated with SDU. In particular, studies have shown that law enforcement is averse to drug decriminalization (Petrocelli et al., 2014). Lastly, most participants did not favor having naloxone available to public health practitioners, law enforcement, or the general public. Just over half of the sample indicated that naloxone should be available to medical personnel. This attitude contrast with countries that have taken a more active stance toward harm reduction approaches and may reflect more conservative attitudes in Nigeria toward harm reduction. Even though harm reduction has been adopted as part of the drug control strategies in Nigeria (National Drug Control Master Plan [NDCMP], 2021), there is low level of awareness on the concept and application (Nelson and Pates, 2018). Moreover, one of the major drug control laws, which is yet to be amended, criminalize drug use (National Drug Law Enforcement Agency [NDLEA] Act, 2004). These conflicting drug policies may be responsible for this response.

4. 1 Strengths and Limitations

This study was the first of its kind to assess perceptions of synthetic drugs among law enforcement personnel and public health professionals. In addition to the innovativeness of the study, the inclusion of participants from different areas in Nigeria was a strength. Despite these strengths, there were a number of limitations of the study. First, given that the sampling plan only included six states and the FCT, the findings are not generalizable to the entire country. Second, the sample size was small. Third, given the self-report nature of the data, there was a potential that participants might have overreported knowledge or risk perceptions.

Fourth, the methodology did not allow for extensive probing of participant's responses to the open-ended questions. Fifth, although the survey contained both open- and closed-ended responses, the survey was not designed to be truly mixed-method, with open-ended responses informing closed-ended responses or vice versa. And six, the study did not examine the accuracy of participants' knowledge of synthetic drugs nor how knowledge and perceptions of synthetic drugs and those who use them was associated with participants' attitudes and actions.

5. CONCLUSION

5.1 Recommendations for Future Research

Research in this area might be advanced in several ways. One strategy would be to conduct a more comprehensive quantitative survey with a larger sample to enable findings to be generalized. A second strategy would be to conduct in-depth qualitative studies that are able to probe participants' perceptions of SDU as well as ideas for prevention and intervention would further inform efforts to prevent the misuse of synthetic drugs. Third, building on the findings of this study, mixed-methods investigations of perceptions of synthetic drugs could be designed whereby quantitative findings could be further interrogated in follow-up qualitative studies. Conversely, focus groups or in-depth interviews could be used to identify aspects of SDU, which then could be investigated systematically in a large quantitative survey.

5.2 Recommendations for Policy and Practice

The adoption of evidence-based synthetic drug control policy responses require stakeholders' collaboration, particularly law enforcement and public health professionals. This includes joint capacity building, information sharing, development of prevention strategies and referral for treatment interventions. There is the need for the Nigeria government to develop a strong national early warning system, liaise with and foster international cooperation and information sharing. As evidence indicates that naloxone is a successful harm reduction tactic, the use of naloxone as opioid overdose reversal should be made available and accessible to public health and medical practitioners and strengthen the implementation of harm reduction policies.

Acknowledgements: We thank Dr. Robert Balster, Dr. Randy Koch, Thom Browne, Dr. Kasirye Rogers, Mr. Mutaawe Rogers and Mr. Mawouena K. Bohm. for their expert inputs into the survey design. Additional thanks go to the GISA team, particularly Faith Martin Agwogie, Nneka Helen Nwafor and Dr. Adetolu Isaac Olatunde for their administrative inputs.

Statements and Declarations

Competing Interests: The authors declare that they have no competing interests.

Data Availability: The data that support the findings of this study are available from the corresponding author on reasonable request.

Author Contributions: Martin Agwogie conceptualized the sampling strategy for the study, designed the survey instrument, supervised data collection and data entry, wrote portions of the manuscript, and interpreted the findings. Wendy Kliewer provided feedback on the survey instrument, conceptualized the analytic plan, performed the data analysis, interpreted the findings, and wrote portions of the manuscript. Both authors read and approved the final version of the manuscript.

Ethical Approval: The study was approved by the Lagos State University Teaching Hospital Health Research Ethics Committee. The manuscript does not contain clinical studies or patient data.

Consent to Participate: All participants in this study were informed of the purpose of the study and provided their consent to participate.

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