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ORIGINAL ARTICLE

Pattern and predictors of medication use among adults in southwestern Nigeria: A community-based cross-sectional study

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Abstract

Population-based drug utilization studies are scanty in Nigeria. The aim was to determine the pattern and predictors of medication use among adults in the communities of Southwestern Nigeria. A cross-sectional study was conducted among adults selected by multi-stage sampling from Oyo State communities. The questionnaires, adapted from the WHO Students' Drug Use Questionnaire and previous studies, were pretested and interviewer administered. The respondents' socio-demographic characteristics, the pattern of medication use, prescribers, and sources of drug acquisition were obtained. Binary logistic regression was used to determine the predictor of medications used. Of the 999 respondents, 501 resided in rural communities while 498 dwelled in urban areas. The mean (±SD) age of the respondents was 38 ± 15 years. The median (range)% prevalence of medication use were as follows: lifetime use, 58.2 (17.7–81.0); current use, 31.2 (8.9–65.9); and past use, 20.3 (9.2–28.9). Medications were mainly obtained from patent medicine stores, median (range%), 71 (65–80). The commonly used drugs were paracetamol, 626 (67.6); nonsteroidal anti-inflammatory drugs, 174 (18.8); artemether/lumefantrine, 422 (68.2); ampicillin/cloxacillin, 220 (48.6); and chlorpheniramine, 59 (39.9). Factors predictive of current medication use, adjusted odd ratio (95% confidence interval) were as follows: antimalarial [male, 0.7 (0.5, 0.9)]; antibacterial [male, 0.6 (0.4–0.9)]; analgesics [married, 1.5 (1.1–2.2); presence of health facilities, 0.5 (0.3–0.7); and shorter distance to health facility, 1.5 (1.1–2.1)]. Antimalarials, antibacterial, and analgesics were commonly used and inappropriately obtained by adults in Southwestern Nigeria. Factors predictive of current medication use were gender, marital status, the presence of health facilities, and distance to health facilities. There is a need for more extensive countrywide medication use studies and enlightenment programs to ensure the appropriate use of medications.

Abbreviations: ADRs, adverse drug reactions; AMR, antimicrobial resistance; AN, analgesic nephropathy; LGAs, Local Government Areas; PMVs, patent medicine vendors; WHO, World Health Organization.

KEYWORDS
adults, community, determinants, drug use, drugs utilization, medication use, pattern, predictors, self-medication

1 | INTRODUCTION

Medication use in the community may derive from health facility prescriptions, self-prescribed, suggestions from other than health professionals, gifts, and other sundry sources. Community medication use premised on rational drug use should generally not precipitate dire consequences, unlike when medication use results from other than well-defined clinical indications. For example, the emergence and spread of antimicrobial resistance (AMR) and analgesic nephropathy (AN) may be traceable to inappropriate drug use.[1–3] Expectedly, inappropriate use of nonprescription and prescription drugs is more prevalent in the community.[1]

In low middle-income countries, medications are commonly purchased privately without a prescription from pharmacies, patent medicine vendors (PMVs), street vendors, drug hawkers, and marketplaces. For example, Hernandez-Vasquez et al. in Peru reported a 47.2% prevalence of medications purchased without a prescription.[4] Self-medication is practiced worldwide, and it ranges between 2% and 92% in different countries of the world.[5,6] It is worse in the developing countries; for example, the prevalence of between 73% and 80% has been reported in Nigeria.[7,8] Factors identified for high prevalence in developing countries include the over-the-counter (OTC) availability of most drugs, the proliferation of private pharmacies and PMVs, inadequate regulation of distribution and sale of prescription drugs, inadequacy of health facilities, relatively high cost and out of pocket health expenditure, and dissatisfaction with the health professionals.[9,10] When drugs are obtained without the inputs of the respective health professionals or rational basis, the probability of negative impact on public health is high and may include increased incidence of adverse drug reactions (ADRs), predisposition to AMR, treatment failure, and complication of diseases.[11]

Information from drugs use patterns are usually employed in drug use policy and regulation.[12] For example, in changing drug labeling like changing from OTC to prescription-only or restricting use. In Nigeria, there is a dearth of community-based studies on drug use. Few related studies that involved secondary school students as participants suggest a prevalence rate of between 15.3% and 69.2%, and the commonly used drugs were listed to include stimulants, analgesics, antibiotics, alcohol, and cannabis.[13,14] It is believed that drug use patterns in the community in Nigeria would differ from those of the secondary schools because of differences in age and other socio-demographic characteristics, and the reasons for drug use.

In view of the need for a clear understanding of medication use patterns within the community as an important tool for planning and relevant interventions, community-based drug use studies should be considered essential. Identifying sources and types of drugs available in the community are crucial and required by policymakers in designing drug policy and regulation. Therefore, this study aimed to determine the pattern and factors influencing medication use among adults residing in the communities of Oyo State, Southwestern Nigeria.

2 | MATERIALS AND METHODS

2.1 | Study design

A cross-sectional community-based survey between February and April 2017.

2.2 | Setting

The study was conducted in Oyo State, Nigeria. Oyo State is located on the latitude 8°00′N and longitude 4°00′E, Southwest Nigeria. The population of the state was 5 591 589 comprising 2 802 432 males, 2 778 432 females, and adult population of 3 481 190 according to the 2006 National population Census. However, the National Bureau of Statistics estimated population of the state is 7 840 864. There are three senatorial districts in the state, namely, Oyo South, Oyo Central, and Oyo North. The state has 33 Local Government Areas (LGAs) spanning the three senatorial districts and about 1610 settlements. The 33 LGAs may also be described as urban or rural. For example, Ibadan Southwest and Ibadan North LGAs are urban, while Ido and Orire LGAs are classified as rural. In addition to the Yorubas, who constitute a clear majority (70%), other ethnic major groups residing in the state are the Hausas, Fulanis, Igbos, and Urhobos. Of the 1565 health facilities in the state during the study period, 678 were public health institutions comprising 517 primary health care/maternity centers, 45 secondary and six tertiary health centers. The 887 registered private health facilities composed of nursing homes, clinics, and hospitals were spread across the state. Most adult population of the state engage in farming, petty trades and artisan works, while few are civil servants.

2.3 | Participants

They are composed of adults aged 18 years and above, residents of Oyo State selected through a multi-stage sampling technique (Figure 1). Oyo South Senatorial district has five urban LGAs (Ibadan North, Ibadan Northeast, Ibadan Northwest, Ibadan Southeast, and Ibadan Southwest) and four rural LGAs (Ibarapa Central, Ibarapa East, Ibarapa North, and Ido). The district's population was 2343,

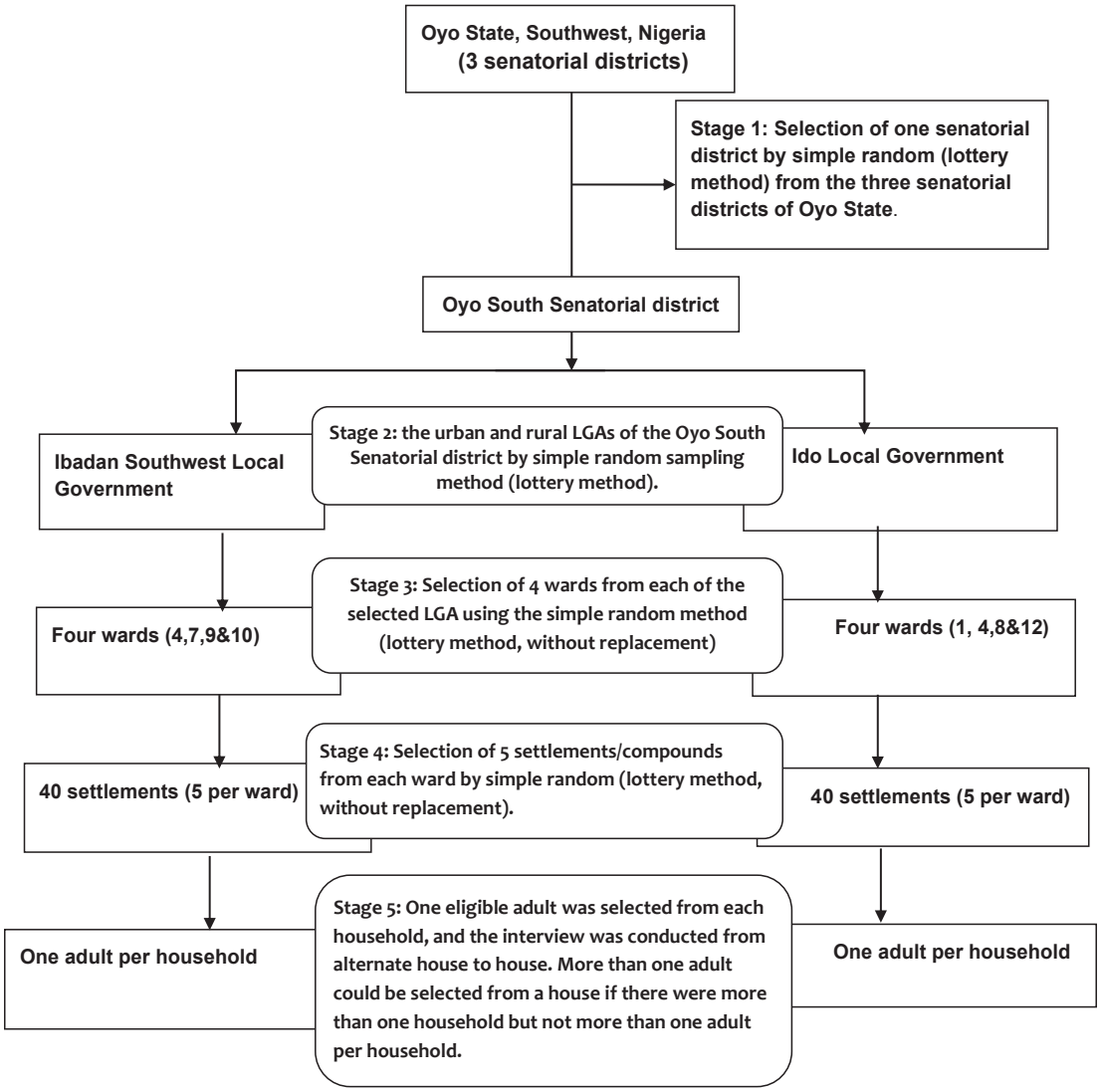

FIGURE 1 Flow chart of the multi-stage sampling procedure for selecting eligible adults from the communities of Oyo State, Southwest Nigeria.

094 according to the 2006 National Census. Participants were drawn from the households of the selected settlements from Ibadan Southwest and Ido LGAs.

2.4 | Sampling technique

The sampling method employed was the multi-stage sampling technique.

2.5 | Data sources/measurement

A semi-structured interviewer-administered questionnaire was adapted from the World Health Organization (WHO) Students' drug use questionnaire, a questionnaire on investigating the use of medicines by consumers,[15] and previous similar studies.[16,17] The questionnaire consisted of two sections. Section A collected the socio-demographic characteristics of the respondents. In contrast, section B obtained information on the pattern of medication use (antimalarial, antibacterial, analgesics, others drugs used by respondents for the sleep-inducing effect and cardiovascular medication). The prevalence of the medication used included lifetime use (ever use medication), current use (within 3 months), and past use (during the last 12 months). Also, the prescribers (who prescribe or recommend the medication) and sources/locations of the medication acquisition were included.

Six research assistants that participated in the study were trained for 1 week: 2 days of the final design of the questionnaire and 5 days after the design of the questionnaire. Training included identifying each variable in the questionnaire, expected and alternate responses. Each of the variables in the questionnaire was discussed to determine appropriate meaning, steps to take in identifying the medications and how to administer the questionnaire on the field. Random selection of the wards and settlements were made together. The visitation of the study sites was done together

with the research assistants. In all, 40 questionnaires were pretested in four settlements selected from two LGAs, one rural and one urban, respectively, Egbeda and Ibadan North LGAs. The observed ambiguities were corrected after a mini-analysis and post-field discussion.

2.6 | Fieldwork

The questionnaire was interviewer administered in the local language (Yoruba) after the respondents had obtained informed consent. It took about 20–30 min to complete an interview. Every questionnaire was checked for completeness at the end of everyday fieldwork.

2.7 | Variables

The dependent variables in the study were the prevalence and patterns of medication use, while the independent variables were as follows: age, gender, marital status, location (rural and urban), educational level, occupation, presence of health facilities in the community, the distance of the health facilities to respondents' residence, alcohol intake, cigarettes smoking, chronic medical illness, and average monthly income.

2.8 | Study size

The sample size was calculated using the formula, $(Z\alpha + Z1\text{-}\beta)^2$ (p1 (1 − p1) + p2 (1 − p2))/(p1 − p2)^2. The prevalence of salicylate analgesic used in a previous study among secondary school students was 48.7%,[13] assuming p1 − p2 = 0.1 (10%), $Z\alpha = 1.96$, the critical value for α at $p < .05$ of 1.96, $Z1 - \beta = 0.84$. After adjustments for the 20% non-response and design effect of 1.5, a minimum sample size of 420 in each group (rural/urban) was obtained.

2.9 | Statistical methods

Data obtained were double entered into SPSS version 22 and cleaned. The categorical variables in the socio-demographics and frequency of medication use (lifetime, current, and past use) were summarized using descriptive statistics (frequency and proportion) and presented in tables. Individual drugs were counted and summarized with frequency and proportion under individual drug classes. Respondents' age was summarized with mean (standard deviation), while the average monthly income was reported with median (range). Chi-square test (bivariate analysis) was used to test the relationship between the dependent (prevalence of current medication use) and independent variables (socio-demographic factors). Variables that were significant statistically ($p < .05$) were included in the multivariate analysis. Binary logistic regression was used to determine the predictor of current medication use. The level of significance was set at 5%.

TABLE 1 Sociodemographic characteristics of the respondents ($n = 999$)

Variables	Frequency (%)
Sex	
Male	319 (31.9)
Female	680 (68.1)
Age group (years)	
<20 years	59 (5.9)
20–29	282 (28.2)
30–39	258 (25.8)
40–49	178 (17.8)
50–59	98 (9.8)
≥60	124 (12.4)
Religion	
Christianity	493 (49.4)
Islam	499 (49.9)
Traditional	7(0.7)
Marital status	
Single	205 (20.5)
Married	736 (73.7)
Widow	58 (5.8)
Ethnicity	
Yoruba	916 (91.7)
Hausa	5 (0.5)
Igbo	33 (3.3)
Others[b]	45 (4.5)
Educational level	
None	99 (9.9)
Primary	208 (20.8)
Some secondary	74 (7.4)
Completed secondary	428 (42.8)
Tertiary	190 (19.0)
Occupation	
Unemployed	89 (8.9)
Students	74 (7.4)
Artisans	265 (26.5)
Trading	471 (47.1)
Farming	27 (2.7)
Civil servant	33 (3.3)
Professionals	29 (2.9)
Others[a]	11 (1.1)

[a]Pastors, Imams, clergypersons.
[b]Urhobos, Fulani, Ibira.

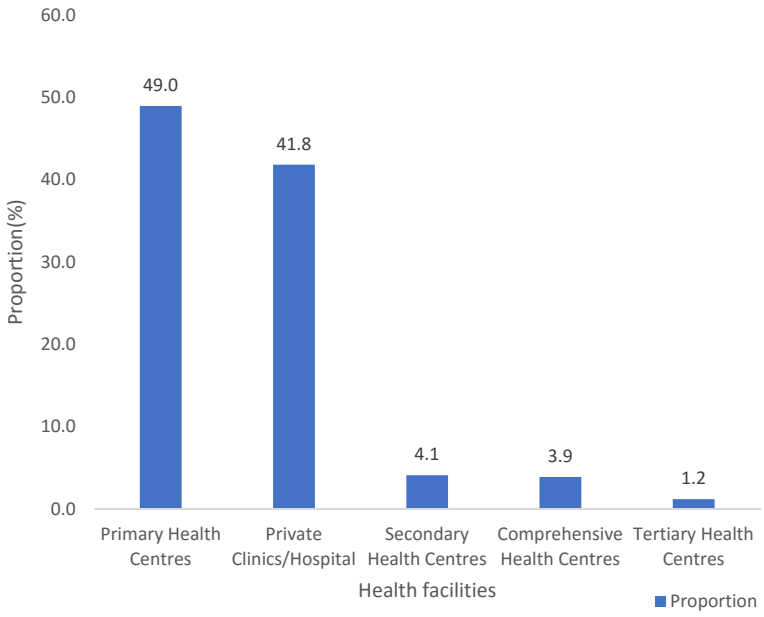

FIGURE 2 The health facilities reported to be present in the communities by the respondents.

TABLE 2 Prevalence of medication use by the respondents

Drug classes	Lifetime use frequency (%)	Current use frequency (%)	Past use frequency (%)
Antimalarial	688 (68.9)	405 (40.5)	289 (28.9)
Antibacterial	474 (47.4)	219 (21.9)	55 (25.5)
Analgesics	809 (81.0)	658 (65.9)	150 (15.0)
Others[a]	177 (17.7)	89 (8.9)	92 (9.2)
Median (range)	58.2 (63.3)	31.2 (57)	20.3 (19.7)

[a]Consisting of drugs used mainly to overcome sleeplessness.

2.10 | Ethical consideration

The approval for the study was given by the Oyo State Ethical Review Committee (AD13/479/400). We obtained permission from the LGAs and the community leaders. Informed consent was obtained from the respondents before the administration of the questionnaire.

3 | RESULTS

3.1 | Socio-demographic characteristics of the respondents

A total of 1020 questionnaires were administered, but 999 were analyzed due to missing data and inconsistencies in 21 questionnaires. The male to female ratio of the respondents was 1:2.1, and the mean age was 38 ± 15.1 years. There were 501 (50.2%) respondents from rural communities. Table 1 shows other socio-demographic characteristics of the respondents. In all, 888 respondents (88.9%) reported the presence of health facilities in their communities. The respondents' most frequently reported health facilities in the communities were Primary Health Care and Private Clinics/Hospitals (Figure 2). More than half, 568 (56.9%), reported less than 5 km distance of the health facilities from their houses. In all, 290 respondents (29.0%) reported non-usage of any of the health facilities for treatment. The median (range) monthly income of the respondents was estimated as 25 000.00 (1200.00–500000.00), and 179 (17.9%) earned an estimated income of less than 10 000.00 per month.

3.2 | The pattern of medication use by the respondents within the communities

The median (range) prevalence for the medication use were: lifetime use, 58.2 (63.3), current use, 31.2 (57), and past use, 20.3 (19.7). Analgesics use had the respondents' highest prevalence of lifetime use, 81.0% (Table 2).

Most of the antimalarial drugs used by the respondents were artemisinin-based combination therapy (ACTs), and artemether/lumefantrine was the most used, 422 (68.2). Penicillin was the most common class of antibacterial used, with ampicillin/cloxacillin been the most used by the respondents, 220 (48.6). Using the WHO AWaRe classification of the antibacterial used, 10 (71.4%) were Access, 3 (21.4%) Watch, and 1 (7.2%) not categorized (Table 3). Ampicillin/cloxacillin, though each drug categorized under Access but not recommended as combination.

Analgesics were the most used medications among the drugs surveyed, and paracetamol was the most regularly used analgesic, 575 (62.1) (Table 4). Chlorpheniramine, an antihistamine, was the most frequently used medication by respondents who wished to overcome sleeplessness (Table 4).

In all, 28 respondents were on antihypertensives (28/999), while 6 (6/999) were on oral hypoglycemic drugs. The commonly used

TABLE 3 Categories of the antibacterial and antimalarial drugs used by the respondents

Drug categories	WHO antibiotics AWaRe classification	ATC code	Frequency (%)
Antibacterial drugs (n = 453)			
Penicillin/penicillin combinations			**338 (74.6)**
Ampicillin and Cloxacillin[a]	Not recommended	J01CA51	**220 (48.6)**
Ampicillin	Access	J01CA01	56 (12.4)
Amoxicillin	Access	J01CA04	50 (11.04)
Amoxicillin and clavulanate	Access	J01CR02	8 (1.8)
Benzylpenicillin	Access	J01CE08	1 (0.2)
Sulfonamides			**31 (6.8)**
Trimethoprim/sulfamethoxazole (Co-trimoxazole)	Access	J01EE01	31 (6.8)
Tetracyclines			**17 (3.8)**
Tetracycline	Access	J01AA07	15 (3.3)
Doxycycline	Access	J01AA02	2 (0.4)
Quinolones			**15 (3.3)**
Ciprofloxacin	Watch	J01MA02	13 (2.9)
Ofloxacin	Watch	J01MA01	2 (0.4)
Macrolides			**6 (1.3)**
Erythromycin	Watch	J01FA01	4 (0.9)
Kitasamycin (Leucomycin^{R})	Not categorized	J01FA	2 (0.4)
Metronidazole			**43 (9.5)**
Metronidazole	Access	P01AB01	43 (9.5)
Others			**6 (1.3)**
Chloramphenicol	Access	J01BA01	6 (1.3)
Antimalarial drugs (n = 619)			
Artemisinin-based combination therapy (ACTs)			**437 (70.6)**
Artemether and lumefantrine	NA	P01BF01	422 (68.2)
Artesunate and Amodiaquine	NA	P01BF03	8 (1.3)
Dihydroartemisinin/piperaquine	NA		7 (1.1)
Monotherapy			**182 (29.4)**
Sulfadoxine/pyrimethamine	NA	P01BD51	86 (13.9)
Artesunate	NA	P01BE03	47 (7.6)
Artemether	NA	P01BE02	16 (2.6)
Dihydroartemisinin	NA	P01BE01	2 (0.3)
Halofantrine	NA	P01BX01	1 (0.2)
Chloroquine	NA	P01BA01	29 (4.6)
Amodiaquine	NA	P01BA06	1 (0.2)

Note: Kitasamycin (Leucomycin^{R})-macrolide used in animals.

Abbreviation: NA, Not applicable.

The bold indicated frequency (%) for drug class.

[a]Individual drug is categorized under access drug, but combination as ampicillin/cloxacillin is not recommended by WHO.

antihypertensives were diuretics, 21 (45.7) and centrally acting drug (methyldopa), 10 (21.7). Of the diuretics, hydrochlorothiazide + amiloride was the most used, 15 (32.6). Biguanides (Metformin), 6 (66.7) and sulfonylurea (Glibenclamide) 3 (33.3) were the oral hypoglycemic agents used by the respondents (Table 5).

3.3 | Initiation and medication acquisition by the respondents in the communities

The majority of the medications used, median (range)% were based on self-prescription, 60 (52–78.4) (Figure 3) and Patent Medicine

TABLE 4 Categories of analgesics and other drugs used by the respondents

Medications	ATC Code	Frequency (%)
Analgesics ($n = 926$)		
Nonsteroidal anti-inflammatory drugs (NSAIDs)		**174 (18.8)**
Aspirin (acetylsalicylic acid)	N02BA01	15 (1.6)
Ibuprofen	M01AE01	95 (10.3)
Diclofenac	M01AB05	48 (5.2)
Piroxicam	M01AC01	16 (1.7)
Paracetamol and combinations		**626 (67.6)**
Paracetamol	N02BE01	575 (62.1)
Paracetamol + Caffeine	N02AJ06	51 (5.5)
Narcotics		**4 (0.4)**
Tramadol	N02AX02	4 (0.4)
Metamizole		**99 (10.7)**
Metamizole	N02BB02	99 (10.7)
"Akapo"[a]	NA	**23 (2.5)**
Others ($n = 148$)[b]		
Antihistamines		**127 (85.8)**
Chlorpheniramine	R06AB02	59 (39.9)
Cyproheptadine	R06AX02	55 (37.1)
Diphenhydramine	R06AA02	13 (8.8)
Benzodiazepine derivatives		**17 (11.5)**
Diazepam	N05BA01	10 (6.8)
Bromazepam	N05BA08	3 (2.0)
Flunitrazepam	N05CD03	4 (2.7)
Opioid		**4 (2.7)**
Tramadol	N02AX02	4 (2.7)

Abbreviation: NA, Not applicable.

The bold indicated frequency (%) for drug class.

[a]"Akapo" combination of many analgesics and other drugs sold together by the patent medicine stores/chemists for pain and other illnesses.

[b]Drugs used by respondents for the sleep-inducing effect.

TABLE 5 Categories of cardiovascular drugs used by the respondents

Medications	ATC Code	Frequency (%)
Antihypertensives ($n = 46$)		
Diuretics	C03	**21 (45.7)**
Hydrochlorothiazide + Amiloride	C0AX01	15 (32.6)
Hydrochlorothiazide	C0AA03	4 (8.7)
Bendroflumethiazide	C03AA01	1 (2.2)
Spironolactone	C03DA01	1 (2.2)
Centrally acting	C02A	**10 (21.7)**
Methyldopa	C02AB	10 (21.7)
Calcium channel blockers	C08	**10 (21.7)**
Amlodipine	C08CA01	5 (10.9)
Nifedipine	C08CA05	5 (10.9)
Angiotensin II receptor blockers (ARTs)	C09C	**4 (8.7)**
Losartan	C09CA01	4 (8.7)
Angiotensin-converting enzyme inhibitors (ACEIs)	C09AA	**1 (2.2)**
Lisinopril	C09AA03	1 (2.2)
Anti-diabetics ($n = 9$)		
Biguanides	A10BA	**6 (66.7)**
Metformin	A10BA02	6 (66.7)
Sulfonylureas	A10BB	**3 (33.3)**
Glibenclamide	A10BB01	3 (33.3)

The bold indicated frequency (%) for drug class.

Stores were the primary sources of the various drugs used by the respondents (Figure 4).

3.4 | Factors associated with medication use by the respondents in the communities

Gender was predictive of current antimalarial (adjusted odd ratio [AOR] = 0.7, 95% confidence interval [CI] = 0.5, 0.9) (Table 6) and antibacterial (AOR = 0.6, 95% CI = 0.4, 0.9) drug use (Table 7) by the respondents.

After multivariate analysis, marital status (AOR = 1.5, 95%CI = 1.1, 2.2), presence of health facilities (AOR = 0.5, 95%CI = 0.3, 0.7), and the distance of the health facilities to the respondents' houses (AOR = 1.5, 95%CI = 1.1, 2.1) were predictors of the current use of the analgesics (Table 8). Residence (AOR = 1.6, 95%CI = 1.1, 2.5) and smoking (AOR = 2.5, 95%CI = 1.1, 5.7) were predictors of ibuprofen use by the respondents (Table 9).

4 | DISCUSSION

The prevalence of medication use, consisting of antimalarial, antibacterial, and analgesics, was high in this study. Sedatives had the least prevalence of use among the respondents. Most of the medications used were self-prescribed, and patent medicine stores were the primary source of acquisition.

The use of antimalarial drugs, mostly ACT, was high. It is noteworthy that a significant proportion of respondents also used monotherapy in the self-treatment of malaria, well over 10 years after the introduction of combination therapy by the National Malaria Control Program in the country. Prior to 2004, Chloroquine and Sulphadoxine-Pyrimethamine were the first-line antimalarial drugs in Nigeria. The use of Artesunate and other artemisinin derivatives as monotherapy in the presumptive treatment of malaria probably has even more serious implications, given the potential for reducing the effectiveness of malaria chemotherapy and chemoprophylaxis. It should further be noted that only in a minority of cases was

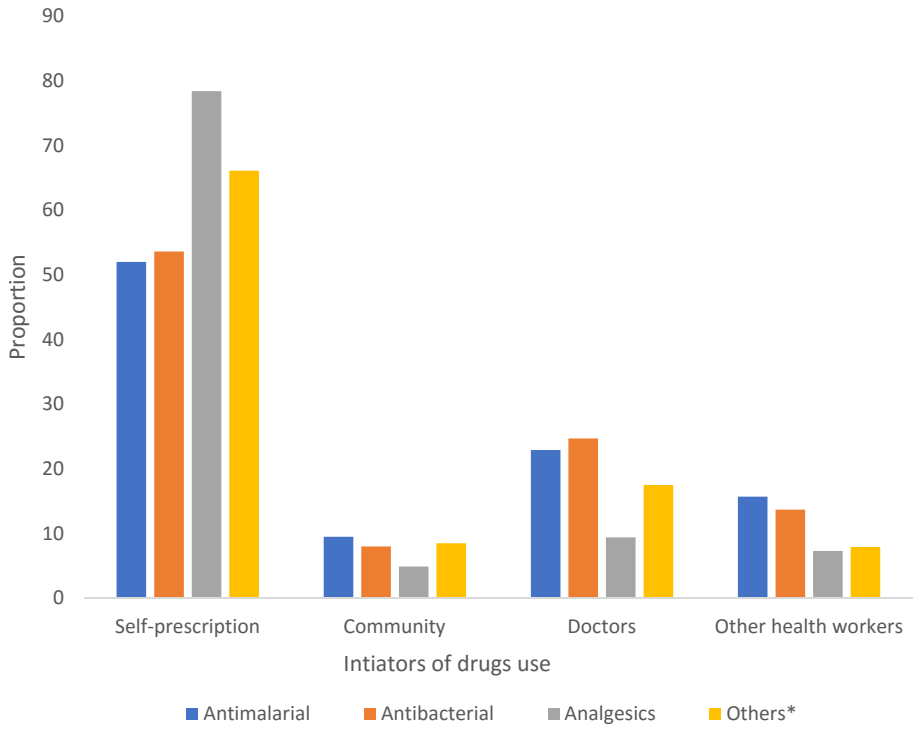

FIGURE 3 Initiation of medications used by the respondents in the communities. Self-prescription: self-decision based on previous drug exposure. *Consisting of drugs used mainly to overcome sleeplessness.

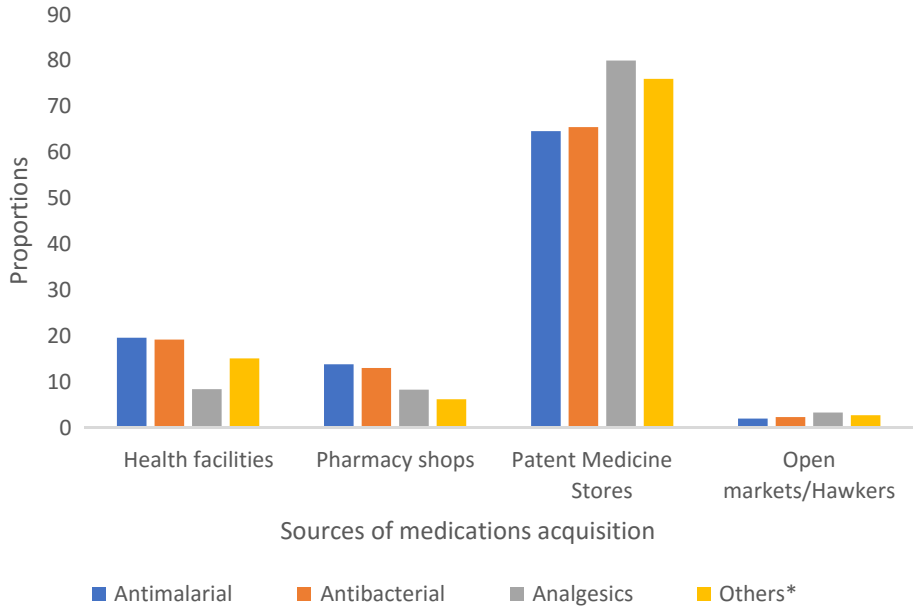

FIGURE 4 Sources of medications acquisition by the respondents in the Communities. *Consisting of drugs used mainly to overcome sleeplessness.

parasitologically confirmed malaria diagnosis made. It suffices to assume that the majority of the antimalarials used may not be necessary, which may amount to wastage of resources and unnecessary exposure to drugs. A study by Ezenduke et al. in Southeastern Nigeria showed a similar pattern of antimalarial use, self-medication practices, and source of drugs acquisition.[18] However, the study was conducted among people who presented at the retail medicine outlets, screening out other residents in the community who did not patronize those outlets. The findings differ from that of Omole and Onademuren in Abeokuta, with lower lifetime, current use, and self-medication with antimalarial drugs.[19] Also, there was a higher rate of use of antimalarial monotherapy than in the present study. The study was conducted a few years after ACTs were recommended and among uneducated respondents.

TABLE 6 Factors associated with the current use of antimalarial by the respondents in the communities

Variables	Total (*N*)	Antimalarial use *N* (%)	C.O.R. (95%CI)	*p*-value	A.O.R. (95%CI)	*p*-value
Gender						
Male[a]	319	108 (26.7)		.003	1	.004
Female	680	297 (73.3)	0.70 (0.50, 0.90)		0.7 (0.51, 0.90)	
Age (years)						
<65[a]	920	377 (93.1)	1.30 (0.80, 2.04)	.336	1	.470
≥65	79	28 (6.9)			0.84 (0.52, 1.4)	
Married or living with a spouse						
Yes	740	306 (75.6)	1.14 (0.85, 1.52)	.378	N.A.	NA
No	259	99 (24.4)				
Residence					N.A.	NA
Rural	501	198 (48.9)	0.92 (0.71, 1.18)	.510		
Urban	498	207 (51.1)				
Educational level (completed secondary education)					NA	NA
Yes	618	256 (63.2)	1.1 (0.85, 1.43)	.47		
No	381	149 (36.8)				
Monthly income (Naira)					N.A.	NA
≥25 000	503	212 (52.3)	1.14 (0.90, 1.47)	.30		
<25 000	496	193 (47.7)				
Presence of Health facilities					NA	NA
Yes	111	36 (8.9)	0.68 (0.44, 1.03)	.065		
No	888	369 (91.1)				
Distance of Health facilities to participant's residence ($n = 774$)					N.A.	NA
<5 km	568	259 (74.6)	1.12 (0.82, 1.55)	.476		
≥5 km	206	88 (25.4)				
Alcohol use					N.A.	NA
Yes	163	64 (15.8)	0.94 (0.67, 1.32)	.717		
No	836	341 (84.2)				
Smoking					N.A.	NA
Yes	41	12 (3.0)	0.6 (0.3, 1.2)	.133		
No	958	393 (97.0)				

Abbreviations: AOR, adjusted odd ratios (95% confidence interval); C.O.R. (95%CI), crude odd ratios (95% confidence interval); NA, not applicable.
[a]Reference categories.

Antibacterials, when used appropriately, are lifesaving, but inappropriate use may lead to some untoward effects, including selection pressure, an important driver of AMR. In this study, many respondents engaged in the self-prescription of antibiotics. This finding also suggests chronic use of antibiotics by the respondents. The antibiotics were mainly obtained from patent medicine stores, similar to a previous observation in the area.[20] Ampicillin/cloxacillin as a combination drug was the most common antibacterial use in this study. Factors that favor the use included wide availability in the country without prescription and inexpensive price. The use of these critically essential antibiotics but with a relatively higher risk of bacterial resistance in the communities portrays great danger to the global action against antibiotics resistance.

Lifetime and current use of analgesics were documented among 81% and 65.9% of the respondents, respectively. Paracetamol was the most commonly used analgesic in this study, either alone or in combination with caffeine. Other analgesics widely used by the respondents include ibuprofen, diclofenac, piroxicam, and aspirin, most of which were self-prescribed without considering untoward effects. In addition, the high prevalence is an indication of inappropriate chronic use of analgesics. Previous studies in the same area observed a similar 'trend' in the overall proportion and spectrum of analgesics. For example, in the survey by Oladele and Atoyebi,

TABLE 7 Factors associated with the current antibacterial use by the respondents in the communities

Variables	Total (*N*)	Antibacterial use *N* (%)	C.O.R. (95%CI)	*p*-value	A.O.R. (95%CI)	*p*-value
Gender						
Male[a]	319	53 (24.2)	0.62 (0.44, 0.87)	.005	1	.004
Female	680	166 (75.8)			0.6 (0.43, 0.85)	
Age (years)					N.A.	NA
<65	920	202 (92.2)	1.03 (0.6, 1.8)	.93		
≥65	79	17 (7.8)				
Married or living with a spouse					NA	NA
Yes	740	161 (73.5)	0.96 (0.7, 1.4)	.831		
No	259	58 (26.5)				
Residence					N.A.	NA
Rural	501	111 (50.7)	1.03 (0.8, 1.4)	.858		
Urban	498	108 (49.3)				
Educational Level (completed secondary education)					NA	NA
Yes	618	141 (64.4)	1.2 (0.8, 1.6)	.39		
No	381	78 (35.6)				
Monthly Income (Naira)					N.A.	NA
≥25000	503	109 (49.8)	0.97 (0.72, 1.3)	.85		
<25000	496	110 (50.2)				
Presence of Health facilities					NA	NA
Yes	111	22 (10.0)	0.9 (0.5, 1.4)	.57		
No	888	197 (90.0)				
Distance of Health facilities to participant's residence (*n* = 774)					N.A.	NA
<5 km	568	139 (75.1)	1.13 (0.8, 1.7)	.54		
≥5 km	206	46 (24.9)				
Alcohol use					N.A.	NA
Yes	163	36 (16.4)	1.01 (0.7, 1.52)	.956		
No	836	183 (83.6)				
Smoking					N.A.	NA
Yes	41	9 (4.1)	1.0 (0.5, 2.2)	.996		
No	958	210 (95.9)				

Abbreviations: AOR, adjusted odd ratios (95% confidence interval); C.O.R. (95%CI), crude odd ratios (95% confidence interval); NA, not applicable.
[a]Reference categories.

paracetamol was found as the most commonly self-prescribed/used analgesic by 46.7%,[21] while aspirin was used by 48.7% in the study by Fatoye et al.[13] Majority of respondents used analgesics to treat pain. However, a reasonable percentage used analgesics 'prophylactically' following their daily chores in 'anticipation' of pain. Studies reported a similar use pattern in the Southern[14] and northern part of Nigeria.[22,23] Carrasco-Garrido et al. in Spain reported a lower prevalence (23.7%) of analgesics self-prescribed use in a demographic survey.[24] A prevalence of nonprescription analgesic use of 1.4% was reported in the USA, though with paracetamol and or combination with hydrocodone or propoxyphene been the most commonly used.[25] Most studies in the developed countries reported a very low prevalence of analgesic use compared to this study.[25–27]

Although the dose, frequency, and duration of use were not assessed in this study, making risk assessment difficult, it may be assumed that this use portrays a dangerous trend. About one-third of the analgesics were nonsteroidal anti-inflammatory drugs (NSAIDs), with ibuprofen being the most commonly used by the respondents. In his review on common analgesics and their role in AN, Yaxley concluded that protracted usage of paracetamol and combination mixtures containing

TABLE 8 Factors associated with the current analgesics use by the respondents in the communities

Variables	Total (*N*)	Analgesics use *N* (%)	COR (95%CI)	*p*-value	A.O.R. (95%CI)	*p*-value
Gender						
Male[a]	319	184 (28.0)	0.59 (0.45, 0.78)	<.0001	1	.056
Female	680	474 (72.0)			0.72 (0.51, 1.01)	
Age (years)					N.A.	NA
<65	920	609 (92.6)	1.20 (0.75, 1.93)	.453		
≥65	79	49 (7.4)				
Married or living with a spouse						
Yes[a]	740	512 (77.8)	1.74 (1.30, 2.33)	<.0001	1	.022
No	259	146 (22.2)			1.53 (1.1, 2.2)	
Residence						
Rural[a]	501	312 (47.4)	0.73 (0.6, 0.90)	.016	1	.143
Urban	498	346 (52.6)			0.79 (0.57, 1.10)	
Educational level (completed secondary education)						
Yes	618	384 (58.4)	0.64 (0.49, 0.85)	.002	1	.103
No	381	274 (41.6)			0.76 (0.54, 1.10)	
Monthly income (Naira)					N.A.	NA
≥25 000	503	341 (51.8)	1.19 (0.92, 1.54)	.196		
<25 000	496	317 (48.2)				
Presence of health facilities						
Yes[a]	111	56 (8.5)	0.5 (0.33, 0.72)	<.0001	1	.001
No	888	602 (91.5)			0.46 (0.29, 0.73)	
Distance of health facilities to participant's residence (*n* = 774)						
<5 km[a]	568	412 (76.7)	1.7 (1.2, 2.4)	.002	1	.026
≥5 km	206	125 (23.3)			1.48 (1.1, 2.1)	
Alcohol use					N.A.	NA
Yes	163	101 (15.3)	0.82 (0.58, 1.2)	.251		
No	836	557 (84.7)				
Smoking					N.A.	NA
Yes	41	28 (4.3)	1.12 (0.57, 2.19)	.740		
No	958	630 (95.7)				

Abbreviations: AOR, adjusted odd ratios (95% confidence interval); C.O.R. (95%CI), crude odd ratios (95% confidence interval); NA, not applicable.
[a]Reference categories.

paracetamol and aspirin probably produced analgesics nephropathy based on the weight of evidence reviewed.[28] Studies have reported paracetamol-induced acute liver failure[29] and a life-threatening skin reaction, Stevens–Johnson syndrome, and cholestatic hepatitis following self-medication with paracetamol.[30] The risk of hepatic failure increases with taking more than four grams of paracetamol daily and consumption of alcohol. Wolf et al. in a community-based study in Chicago, USA, reported a substantial prevalence of unintentional overdose with nonprescription acetaminophen-containing products.[31] In a study in Germany, ibuprofen was reported to be the most commonly used drug, followed by aspirin and paracetamol.[27] Prolong NSAIDs use may be associated with many ADRs, including dyspepsia, and upper gastrointestinal bleeding, especially among the elderly and those with kidney disease. Another factor that may favor analgesic use was the occupation of the respondents. Most were artisans and traders and therefore may resort to frequent use after daily work. Tramadol use was low in this study, and this may result from the gains recorded from the changing of tramadol from OTC to prescription-only drugs. Also, though respondents were assured of the anonymous nature of their responses, they may not disclose the use of drugs that they think may implicate them.

Drugs used to overcome sleeplessness were the least medication used in this study. Chlorpheniramine and cyproheptadine were the most commonly used. Sedative antihistamine is one of the five fundamental groups of OTC medicine abuse globally.[32–34] These drug side effects are put to benefit and are not prone to many problems associated with benzodiazepines, barbiturates, etc., though they have their inherent risks. Roussin et al., in a cross-sectional study in France, reported misuse and dependence on sedative H1 antihistamine by adults.[35] Other drugs used included diazepam, bromazepam, and flunitrazepam (Rohypnol^{R}). These are prescription-only drugs but

TABLE 9 Factors associated with the current use of ibuprofen by the respondents in the communities

Variables	Total (N)	Ibuprofen use N (%)	C.O.R. (95%CI)	*p*-value	A.O.R. (95%CI)	*p*-value
Gender					NA	NA
Male[a]	219	29 (30.5)	1.1 (0.70, 1.80)	.68		
Female	543	66 (69.5)				
Age (years)					N.A.	NA
<65+	701	86 (90.5)	0.81 (0.34, 1.70)	.57		
≥65	61	9 (9.5)				
Married or living with a spouse					NA	NA
Yes	586	72 (75.8)	0.93 (0.56, 1.54)	.78		
No	176	23 (24.2)				
Residence						
Rural	360	55 (57.9)	1.63 (1.10, 2.50)	.03	1	.03
Urban	402	40 (42.1)			1.63 (1.10, 2.52)	
Educational Level (completed secondary education)					NA	NA
Yes	465	55 (57.9)	0.86 (0.56, 1.33)	.50		
No	297	40 (42.1)				
Monthly income (Naira)					N.A.	NA
≥25 000	397	45 (47.4)	0.81 (0.52, 1.24)	.32		
<25 000	365	50 (52.6)				
Presence of Health facilities					NA	NA
Yes	686	86 (90.5)	0.94 (0.45, 1.95)	.86		
No	76	9 (9.5)				
Distance of Health facilities to participant's residence ($n = 611$)					N.A.	NA
<5 km	463	58 (73.4)	0.87 (0.51, 1.48)	.60		
≥5 km	148	21 (26.6)				
Alcohol use					N.A.	NA
Yes	118	17 (17.9)	1.20 (0.69, 2.15)	.49		
No	644	78 (82.1)				
Smoking						
Yes	32	8 (8.4)	2.50 (1.10, 5.70)	.03	1	.04
No	730	87 (91.6)			2.50 (1.10, 5.60)	

Abbreviations: AOR, adjusted odd ratios (95% confidence interval); C.O.R. (95%CI), crude odd ratios (95% confidence interval); NA, not applicable.
[a]Reference categories.

were obtained from patent medicine stores without a prescription. This study's low prevalence may result from non-disclosure since they are prescription-only medicine. A similar prevalence of use of sedatives was reported in previous studies in Nigeria, mainly among students and young people.[13,36,37] A similar pattern of diazepam use was reported among male inmates in Nigeria.[13,38] Flunitrazepam abuse and misuse have been reported in the United States[39] and many other countries. However, our literature review did not reveal any of such in Nigeria before. It is more potent than diazepam. The use of benzodiazepines without prescription portrays great danger from ADRs, drug interactions, and other problems associated with their usage. Also, the risk may increase in those taking alcohol or other drugs that potentiate the effects of the sedatives.

The predictors of current medications used were gender, the presence of health facilities, distance to the health facilities, and marital status. These predictors vary with the different drugs. Females had more odds of using antimalarial and antibacterial than males. Although it may not be an absolute reason, studies in Southwest Nigeria among female undergraduates showed that females used more antibiotics than males. An important factor was the use of antibiotics during menstruation.[40] The use of antibiotics for the so-called "toilet diseases" in females may also account for

increased antibiotic use. Some women mistakenly treat normal vaginal secretion for sexually transmitted infections, especially following the use of unkempt public latrines. Studies have identified gender as an important predictor of drug use. Some reported females having a higher probability of drug use,[41–43] while some reported males having an increased odds of drug use.[44–46] It shows that gender is a significant predictor. However, either male or female depends on each role in a particular society.

The presence of health facilities in the communities was associated with lower odds of current analgesic use. An important reason for not using health facilities is poor Access which can easily be assessed by the absence of such in the communities. Complaints that will necessitate analgesics are taken to the health facilities where appropriate treatment is given. It is sufficient to say that increasing the availability of health facilities will increase Access and reduce inappropriate medication use. However, contrary to what is expected, long distances to the health facilities did not increase the probability of taking more medications in this study. Respondents that stayed at a long distance from the health facilities had lower probabilities of using analgesics. An important reason for this finding may be because a large proportion of the respondents use private health facilities, which, no matter the location, may still be the preferred choice for them whenever they are ill. It also supports the fact that the availability of health facilities is not the only determinant of its utilization. People can travel to any distance to access care if they are convinced of the need to patronize such. In contrast, Ocan et al. in Uganda reported long distances to the health facilities and long waiting times as predictors of antimicrobial self-medication.[47]

Respondents who were married or living with a spouse had increased odds of using analgesics. Behavioral therapy and social support are associated with stable relationships. Studies have shown that quality sleep is associated with good support from a good and cordial relationship.[48,49] However, this study did not enquire whether the relationship (married or living with a partner) was cordial and therefore cannot draw such a conclusion.

4.1 | Limitations

The study is from 2017, and the introduction uses demographic data from the 2006 census (the latest census in Nigeria) in a rapidly growing population. Other limitations of this study included recall bias and withholding of information, especially that of prescription-only drugs. Inability to conduct qualitative research on the PMVs, especially on the constituents of "akapo" that the respondents reported. Moreover, the role of PVMs, community pharmacists, other health professionals, and health facilities were not explored.

5 | CONCLUSION

The prevalence of community usage of antimalarials, antibacterials, and analgesics by adults was moderate to high in Oyo State, Southwestern Nigeria. The predictors of current medications used were gender, marital status, the presence of health facilities, and distance to health facilities. There is a need for more extensive countrywide medication use studies and, possibly, media-powered enlightenment programs aimed at ensuring the appropriate use of medications. This study will provide baseline information for designing interventions to institute measures to refine the activities of PMVs/dealers, which may include incorporating the practice into the primary healthcare system and regulating the sales of antibiotics without prescription.

AUTHOR CONTRIBUTIONS

W. A. A. conceived the study, wrote the research proposal, and was involved in the data collection, analysis, interpretation, and writing of the first draft. M. D. D., P.N., A. O., and F.A.F. were engaged in the research development and supervised the manuscript's data analysis and interpretation and writing. All authors read the manuscript and approved the final version.

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DISCLOSURE

No conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS APPROVAL STATEMENT

The approval for the study was given by the Oyo State Ethical Review Committee (AD13/479/400).

PATIENT CONSENT STATEMENT

All participants gave and signed informed consent before administering the questionnaire.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

CLINICAL TRIAL REGISTRATION

Not applicable.

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