Antimicrobial Prescription Habits among Community Pharmacists and Patent and Proprietary Medicine Vendors in Nigeria: A Rational Use of Drugs Survey

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ABSTRACT

Introduction

Antimicrobial Resistance (AMR) poses a global health threat, exacerbated by the misuse and overuse of antimicrobials. The need to investigate knowledge, attitudes, and practices among Community Pharmacists (CPs) and Patent and Proprietary Medicine Vendors (PPMVs) in Nigeria cannot be overemphasized. This study addresses the gaps in understanding antimicrobial dispensing practices among CPs and PPMVs in Nigeria.

Materials/Methods

A Community-based Antimicrobial Stewardship survey was conducted across five Nigerian states. A total of 384 PPMVs and 135 CPs were interviewed using a well-structured questionnaire covering demographic information, knowledge, attitudes, and practices related to antimicrobial use. The survey utilized descriptive statistics, and the data were analyzed to identify strengths, weaknesses, threats, and opportunities in addressing AMR.

Results

The study revealed inadequate knowledge regarding AMR among both PPMVs and CPs. Despite educational backgrounds, a significant proportion believed antibiotics were the best treatment for fever and diarrhea. Dispensing practices included selling antibiotics without prescriptions and, in some cases, dispensing medicines by proxy. The Safety Net Protocol, involving patient education and follow-up, was often neglected by both PPMVs and CPs.

Conclusion

The findings underscore the importance of enhancing knowledge, attitudes, and practices related to antimicrobial prescription among PPMVs and CPs in Nigeria. Regulatory authorities should enforce strict guidelines to curb non-prescription antibiotic sales. Patient education and follow-up initiatives should be prioritized to mitigate AMR risks. In order to develop strategies to improve antimicrobial dispensing practices we recommend the following: AMR education for PPMVs and CPs, Enforce rules to prevent

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antibiotic sales without prescriptions through regulatory compliance, public awareness on antibiotic risks and prescription importance, implement Safety Net Protocol for post-purchase education to prevent antibiotic misuse and provision of ongoing professional development for PPMVs and CPs with updated practices that will sustain learning.

Keywords: Antimicrobial, Community pharmacies, PPMVs, Knowledge, Attitude, Practice

INTRODUCTION

Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death (WHO, 2021). The two main drivers of antimicrobial resistance as identified by WHO include the misuse and overuse of antimicrobials. Recent Study conducted in 2019 across the globe estimated that 4.95 million deaths were associated with AMR, of which 1.27 million deaths were attributable to bacterial AMR (Murray et al. 2022). This recent study is higher than the earlier reported by O'Neill in 2016. Disparities in antimicrobial dispensing habits exist both geographically and among different categories of healthcare workers due to different factors and determinants (Manga et al., 2021). According to the World Health Organization, approximately 93% of access to antimicrobials comes from community pharmacies (WHO, 2020). From this perspective, pharmacists can be considered the last barrier during the dispensing process, capable of preventing inappropriate use of antimicrobials and the possible health problems that could result from such use (Jamshed et al. 2018).

In Nigeria, AMR prevalence rate of 14.4% was estimated in 2017 which is far higher than the global average of 5.5% (Chikezie & Ebuenyi, 2019; United Nation Office on Drugs and Crimes, 2018).This could be attributed to indiscriminate and inappropriate dispensing/prescribing with absent/weak regulations/guidelines (Manga et al. 2021). Studies have indicated that interaction between pharmacists and patients enables interventions that optimize the use of antimicrobials in community pharmacies (Auta et al. 2019). Despite this, there is little scientific evidence on the panorama of antimicrobial dispensing practices and interventions provided by community pharmacists.

Thus, how the dispensing service has been provided to patients and what pharmacist interventions have been carried out during this service remain a huge gap. This study therefore, focuses on antimicrobial dispensing habits among the community pharmacies with particular emphasis on their behaviors, counseling, and AMS interventions provided to patients. It is our belief that understanding these underlying factors will help in developing strategies that will address the gaps in this service and ultimately improve the dispensing process across community pharmacies in Nigeria.

Therefore, CFID conducted RUD survey among PPMVs and CPs in order to identify Strengths, Weaknesses, Threats and Opportunities among community pharmacy/Patent and Proprietary Medicine Vendors (PPMVs) related to their practices in addressing the threats of AMR in their respective communities with the sole goal of strengthening organizational systems/practices, on drugs procurement, dispensing and prescription practices as it relates to AMS in the community settings.

MATERIALS/METHODS

This was a Community based Antimicrobial Stewardship interventional studies conducted across five states in Nigeria (Taraba, Enugu, Rivers, Nasarawa and Benue). A total of 384 PPMVs and 135 community Pharmacies were interviewed. Data was collected based on KAP with help of a well-structured questionnaire scripted into ODK. The questionnaire were divided into sections: Section 1 – Demographic characteristics, Section 2 – Knowledge on CPs/PPMVs care practice, Section 3 – Attitude towards the practice of CPs/PPMVs care, Section 4 – CPs/PPMVs care practice, Section 5 – Barriers to implementation

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of CPs/PPMVsl care. Descriptive statistics such as simple percentage was used to summaries the data and organize them into groups according to the sections of the questionnaires. It was also designed using point like response format consisting of yes and no and a few open ended questions. Simple percentages were used.

Prior to the commencement of the survey, training was conducted followed by the field work. Survey on Knowledge, Attitudes and Practices of rational use/dispensing of Antimicrobials among PPMVs, Community pharmacists took place between 30th of June, 2022 to 2st of July, 2022 in all the target states.

A total number of 65 participants were trained (the CSOs and their volunteers). The training was virtual which took place on 14thJune 2022; all the volunteers were trained on how to administer the RUD survey tool for PPMVs and Community pharmacists.

RESULTS

Table 1: Summary Analysis of RUD Survey among PPMVs in NIgeria

		Taraba		**Nassarawa**		**Benue**		**Rivers**	
Sex of respondent	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Male	116	67	75	68	19	49	27	43
	Female	56	33	35	32	20	51	36	57
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
Education	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Primary		0	0	0	0	0	1	2
	Secondary	58	34	50	45	10	26	18	29
	Tetiary	109	63	58	53	29	74	40	63
	Others	5		2	2	0	0	4	6
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
Training	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Apprentice	55	32	58	53	13	33	22	35
	CHEW	32	19	16	15	7	18	5	8
	JCHEW	20	12	26	24	8	21	0	0
	Nursing	21	12	2	2	5	13	22	35
	Pharm Tech	24	14	6	5	5	13	7	11
	Others	20	12	2	2	1	3	7	11
	Total	**172**	**100**	**110**	**100**	**39**	**28**	**63**	**100**
Knowledge on antibiotics									
1. Have you ever heard of a type of medicine called an antimicrobial medicine?	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	47	27	16	15	7	18	28	44
	No	125	73	94	85	32	82	35	56
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
2. Have you heard of AMR?	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	54	31	50	45	9	23	28	44
	No	118	69	60	55	30	77	35	56

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	Total	172	100	110	100	39	100	63	100
3. Antibiotics are best used to treat fever.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	77	45	57	52	26	67	25	40
	No	95	55	53	48	13	33	38	60
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
4. Antibiotics are best used to treat diarrhea.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	127	74	34	31	33	85	32	51
	No	45	26	76	69	6	15	31	49
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
5. Skipping one or more doses does not contribute to development of antibiotics resistance.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	86	50	17	15	15	38	30	48
	No	86	50	93	85	24	62	33	52
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
6. Mixing different antibiotics works faster and shortens the duration of treatment and illness.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	71	41	17	15	15	38	26	41
	No	101	59	93	85	24	62	37	59
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
7. Due to side effects, antibiotics can be stopped if patient is getting well.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	115	67	55	50	18	46	32	51
	No	57	33	55	50	21	54	31	49
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
Antibiotics dispensing practice									
1. Do you dispense antibiotics for common cold, catarrh and influenza	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	78	45	63	57	27	69	30	48
	No	94	55	47	43	12	31	33	52
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
2. Do you dispense antibiotics to treat cough and sore throat?	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	122	71	83	75	32	82	45	71
	No	50	29	27	25	7	18	18	29
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
3. Do you add antibiotics to malaria treatment to make patient recovery faster?	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	134	78	81	74	27	69	39	62
	No	38	22	29	26	12	31	24	38
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**

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4. Do you sell antibiotics to patient without prescription?	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	122	71	61	55	33	85	33	52
	No	50	29	49	45	6	15	30	48
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
5. Do you sell part or half card of antibiotics to Patient on their request.	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	79	46	62	56	21	54	42	67
	No	93	54	48	44	18	46	21	33
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
6. Do you provide education to patients after purchase of medicines	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	40	23	11	10	8	21	26	41
	No	132	77	99	90	31	79	37	59
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**
7. Do you provide safety netting protocol to patients after buying medicines (providing information for patient and follow up after contact with patient)	**Responses**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	40	23	11	10	8	21	26	41
	No	132	77	99	90	31	79	37	59
	Total	**172**	**100**	**110**	**100**	**39**	**100**	**63**	**100**

Table 1: Summary Analysis of RUD Survey among CPs in NIgeria

		TARABA		**Benue**		**Nassarawa**		**Rivers**	
Gender	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Female	18	38	20	51	8	26	8	47
	Male	30	63	19	49	23	74	9	53
	Total	48	100	39	100	31	100	17	100
6. Education	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	B. Pharm	28	58	1	20	16	52	10	59
	M. Pharm	6	13	2	40	1	3	4	24
	Others	14	29	2	40	14	45	3	18
	Total	48	100	5	100	31	100	17	100
7. What is your specialization?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Pharmacist with specialty	27	56	4	80	1	3	1	6
	Pharmacist without specialty	21	44	1	20	30	97	16	94
	Total	48	100	5	13	31	100	17	100
8. Do you think that giving antibiotics for cold is a problem?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**

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	Yes	28	58	0	0	18	58	4	24
	No	20	42	5	100	13	42	13	76
	Total	48	100	5	100	31	100	17	100
9. How much percentage of patients would like to purchase a prescribed antibiotic in your pharmacy compared to total prescription drug traffic?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	5%	3	6	0	0	12	39	2	12
	10%	8	17	1	20	16	52	3	18
	15%	10	21	0	0	2	6	3	18
	20%	5	10	1	20	0	0	3	18
	25%	3	6	1	20	0	0	2	12
	>25%	19	40	2	40	1	3	4	24
	Total	48	100	5	100	31	100	17	100
10. How often do you dispense antimicrobials when a patient requires it without medical prescription?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	In 1-5% of all antibiotic purchases	11	23	2	40	10	32	7	41
	In 5-25% of all antibiotic purchases	20	42	1	20	3	10	1	6
	Less than 1% of all antibiotic purchases	5	10	0	0	7	23	3	18
	More than 25% of all antibiotic purchases	11	23	2	40		0	0	0
	Never	1	2	0	0	11	35	6	35
	Total	48	100	5	100	31	100	17	100
11a. My knowledge regarding the pharmacological aspects of antibiotic therapy are appropriate.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	47	98	5	100	31	100	16	94
	FALSE	1	2	0	0	0	0	1	6
	Total	48	100	10	100	31	100	17	100
11b. My knowledge regarding the patomechanism and prevention of infectious diseases are appropriate.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	47	98	5	100	31	100	15	88
	FALSE	1	2	0	0	0	0	2	12
	Total	48	100	5	100	31	100	17	100

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11c. My knowledge regarding bacterial resistance is appropriate.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	22	46	3	40	12	39	6	35
	FALSE	26	54	2	60	19	61	11	65
	Total	48	100	5	100	31	100	17	100
11d. I believe that it is problematic that there are pharmacists who dispense antibiotic when the patient require it without prescription.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	42	88	4	80	28	90	12	71
	FALSE	6	13	1	20	3	10	5	29
	Total	48	100	5	100	31	100	17	100
11e. Have you heard of AMR?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	22	46	3	40	12	39	6	35
	No	26	54	2	60	19	61	11	65
	Total	48	100	5	100	31	100	17	100
11f. Antibiotics are best used to treat fever.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	16	33	2	40	17	55	10	59
	FALSE	32	67	3	60	14	45	7	41
	Total	48	100	5	100	31	100	17	100
11g. Antibiotics are best used to treat diarrhea.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	26	54	2	60	19	61	11	65
	FALSE	22	46	3	40	12	39	6	35
	Total	48	100	5	100	31	100	17	100
11h. Skipping one or more doses does not contribute to development of antibiotics resistance.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	19	40	2	40	7		2	12
	FALSE	29	60	3	60	24		15	88
	Total	48	100	5	100	31	0	17	100
11i. Mixing different antibiotics works faster and shortens the duration of treatment and illness.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	13	27	1	20	2	6	4	24
	FALSE	35	73	4	80	29	94	13	76
	Total	48	100	5	100	31	100	17	100
11j. Due to side effects, antibiotics can be stopped if patient is getting well.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	TRUE	22	46	3	60	15	48	8	47
	FALSE	26	54	2	40	16	52	9	53
	Total	48	100	10	200	31	100	17	100

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11k. Do you dispense antibiotics for common cold, catarrh and influenza	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	9	19	3	60	16	52	6	35
	No	39	81	2	40	15	48	11	65
	Total	48	100	5	100	31	100	17	100
11l. Do you dispense antibiotics to treat cough and sore throat?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	32	67	2	40	18	58	15	88
	No	16	33	3	60	14	45	2	12
	Total	48	100	5	100	32	103	17	100
11m. Do you add antibiotics to malaria treatment to make patient recovery faster?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	31	65	2	40	15	48	12	71
	No	17	35	3	60	16	52	5	29
	Total	48	100	5	100	31	100	17	100
11n. Do you sell antibiotics to patient without prescription?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	39	81	2	40	6	19	9	53
	No	9	19	3	60	25	81	8	47
	Total	48	100	5	100	31	100	17	100
11o. Do you sell part or half card of antibiotics to Patient on their request.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	8	17	3	60	8	26	10	59
	No	40	83	2	40	23	74	7	41
	Total	48	100	5	100	31	100	17	100
12a. Pharmacists should be authorized to perform the task of selecting the therapy in case of proven uncomplicated infections.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	47	98	3	60	24	77	11	65
	Disagree	1	2	2	40	1	3	2	12
	Totally agree					5	16	3	18
	Totally disagree					1	3	1	6
	Total	48	100	5	100	31	100	17	100
12b. The media devotes enough energy to disseminate information on infectious diseases.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	34	71	4	80	25	81	7	41
	Disagree	14	29	1	20	1	3	8	47
	Totally agree					3	10	1	6
	Totally disagree					2	6	1	6

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	Total	48	100	5	100	31	100	17	100
12c. Medicine-related counselling of community pharmacists is just as important as the physician's recommendations.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	41	85	3	60	30	97	7	41
	Disagree	7	15	2	40	0	0	4	24
	Totally agree					1	3	1	6
	Totally disagree					0	0	5	29
	Total	48	100	5	100	31	100	17	100
12d. Pharmacists may also perform the task of administering vaccines (after proper training).	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	16	33	5	100	25	81	10	59
	Disagree	4	8	0	0	1	3	2	12
	Totally Agree	27	56	0	0	4	13	3	18
	Totally Disagree	1	2	0	0	1	3	2	12
	Total	48	100	5	100	31	100	17	100
12e. I agree with the current funding policy of the National Institute of Health Insurance Fund	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	26	54	3	60	29	94	11	65
	Disagree	12	25	1	20	0	0	3	18
	Totally Agree	7	15	1	20	2	6	3	18
	Totally Disagree	3	6	0	0	0	0	0	0
	Total	48	100	5	100	31	100	17	100
12f. Antibiotics are medicines of special importance.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	19	40	3	60	20	65	8	47
	Disagree	0	0	0	0	1	3	6	35
	Totally Agree	29	60	2	40	10	32	3	18
	Totally Disagree	0	0	0	0	0	0	0	0
	Total	48	100	5	100	31	100	17	100
12g. I may be held responsible for the non-prescription dispensing of antibiotics, as this is a public health risk.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	27	56	4	80	25	81	9	53
	Disagree	15	31	1	20	1	3	5	29
	Totally Agree	2	4	0	0	5	16	3	18
	Totally Disagree	4	8	0	0	0	0	0	0

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	Total	48	100	5	100	31	100	17	100
12h. Appropriate patient education would effectively reduce the incidence of AMR.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	26	54	3	60	29	94	11	65
	Disagree	0	0	0	0	0	0	0	0
	Totally Agree	22	46	2	40	2	6	5	29
	Totally Disagree	0	0	0	0	0	0	1	6
	Total	48	100	5	100	31	100	17	100
12i. As I am in direct contact with patients on a daily basis, I have the opportunity to influence their approach to infectious diseases.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	33	69	4	80	28	90	12	71
	Disagree	1	2	0	0	1	3	0	0
	Totally Agree	14	29	1	20	2	6	4	24
	Totally Disagree	0	0	0	0	0	0	1	6
	Total	48	100	5	100	31	100	17	100
12j. Patients are mostly receptive of my advice during dispensing, they welcome it.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	25	52	3	60	25	81	13	76
	Disagree	1	2	0	0	2	6	0	0
	Totally Agree	21	44	2	40	4	13	3	18
	Totally Disagree	1	2	0	0	0	0	1	6
	Total	48	100	5	100	31	100	17	100
12k. Inappropriate antibiotic therapy does not cause significant surplus health costs on an annual basis.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	14	29	1	20	16	52	3	18
	Disagree	27	56	2	40	10	32	11	65
	Totally Agree	2	4	0	0	1	3	0	0
	Totally Disagree	5	10	2	40	4	13	3	18
	Total	48	100	5	100	31	100	17	100
12l. Education regarding antibiotics and antibiotic resistance should be more prominent during university training.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	23	48	3	60	15	48	9	53
	Disagree	3	6	0	0	1	3	6	35
	Totally Agree	21	44	0	0	15	48	0	0

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	Totally Disagree	1	2	2	40	0	0	2	12
	Total	48	100	5	100	31	100	17	100
12m. For patients requesting antibiotics without prescription and are probably not in need of antibiotic therapy, I feel obligated to inform and educate them.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	24	50	2	40	26	84	10	59
	Disagree	2	4.16667	1	20	0	0	0	0
	Totally Agree	21	43.75	2	40	5	16	4	24
	Totally Disagree	1	2	0	0	0	0	3	18
	Total	48	100	5	100	31	100	17	100
12n. There are several occasions when many times more time is needed to educate patients because doctors have not done this properly.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	27	56	3	60	23	74	11	65
	Disagree	1	2	0	0	0	0	2	12
	Totally Agree	19	40	2	40	8	26	3	18
	Totally Disagree	1	2	0	0	0	0	1	6
	Total	48	100	5	100	31	100	17	100
12o. promoters is just as important (or more important) in the development of bacterial resistance as their inappropriate prescription/consumption in health care	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	35	73	3	60	29	94	12	71
	Disagree	5	10	1	20	0	0	3	18
	Totally Agree	7	15	1	20	2	6	2	12
	Totally Disagree	1	2	0	0		0	0	0
	Total	48	100	5	100	31	100	17	100
12p. The personality and behavior of patients significantly influences my dispensing practices.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	37	77	1	20	27	87	6	35
	Disagree	5	10	3	60	3	10	7	41
	Totally Agree	4	8	0	0	1	3	2	12
	Totally Disagree	2	4	1	20	0	0	2	12
	Total	48	100	5	100	31	100	17	100

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12q. Proper use of antibiotics would be greater if pharmacists had time to perform their pharmacological care duties.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	24	50	3	60	20	65	10	59
	Disagree	0	0	0	0	0	0	4	24
	Totally Agree	24	50	2	40	11	35	0	0
	Totally Disagree	0	0	0	0	0	0	3	18
	Total	48	100	5	100	31	100	17	100
12r. During my work as a pharmacist, I not only have to make therapeutic decisions about acute infection, but I also have to provide lifestyle advise to the patient	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	30	63	3	60	27	87	10	59
	Disagree	3	6	1	20	0	0	1	6
	Totally Agree	14	29	1	20	4	13	4	24
	Totally Disagree	1	2	0	0	0	0	2	12
	Total	48	100	5	100	31	100	17	100
12t. I offer probiotics for the patients purchasing a prescribed antibiotic.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	36	75	4	80	28	90	12	71
	Disagree	4	8	1	20	1	3	5	29
	Totally Agree	7	15	0	0	2	6	0	0
	Totally Disagree	1	2	0	0	0	0	0	0
	Total	48	100	5	100	31	100	17	100
12u. I detail the proper use of antibiotics when counselling the patient.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	32	67	3	60	24	77	12	71
	Disagree	1	2	0	0	0	0	1	6
	Totally Agree	15	31	2	40	7	23	4	24
	Totally Disagree	0	0	0	0	0	0	0	0
	Total	48	100	5	100	31	100	17	100
12v. I consider it important to become acquainted with the antibiotics of the current drug pool and those newly licensed on the market.	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	37	77	3	60	30	97	8	47
	Disagree	2	4	0	0	0	0	0	0
	Totally Agree	9	19	2	40	1	3	5	29

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	Totally Disagree	0	0	0	0	0	0	4	24
	Total	48	100	5	100	31	100	17	100
12w. I dispense drugs by proxy	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	22	46	0	0	24	77	9	53
	Disagree	22	46	3	60	6	19	5	29
	Totally Agree	2	4	0	0	1	3	1	6
	Totally Disagree	2	4	2	40	0	0	2	12
	Total	48	100	5	100	31	100	17	100
12x. Do you provide education to patients after purchase of medicines	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	2	4	1	20	0	0	2	12
	Disagree	26	54	3	60	15	48	3	18
	Totally Agree	20	42	2	40	16	52	13	76
	Totally Disagree	0	0	0	0	0	0	1	6
	Total	48	100	6	120	31	100	19	112
12y. Do you provide safety netting protocol to patients after dispensing medicines (providing information for patient and follow up after contact with patient)	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Agree	1	2	0	0	0	0	0	0
	Disagree	25	52	2	40	18	58	13	76
	Totally Agree	22	46	0	0	13	42	2	12
	Totally Disagree	0	0	4	80	0	0	0	0
	Total	48	100	6	120	31	100	15	88
12z. Do you dispense medicines by phone calls?	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Yes	41	85	0	0	11	35	7	41
	No	7	15	5	100	20	65	10	59
	Total	48	100	5	100	31	100	17	100
If Yes to what extend	**Response**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
	Always	15	37	0	0	1	9	2	29
	Often	26	63	0	0	10	91	5	71
	Total	**41**	**100**	**0**	**0**	**11**	**100**	**7**	**100**

Description of Results among PPMVs

A total of 384 respondents (PPMVs) were interviewed, out of which 172 were drawn from Taraba, 39 from Benue State, Enugu State, 110 from Nasarawa State, and 63 from Rivers States, respectively.

Most of the sampled population (PPMVs) had Secondary or tertiary levels of education, and the majority of

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them received their training through apprenticeship, JCHEW, CHEW, Pharmacy technicians, nursing, and others.

Results also show that most PPMVs have not heard about antimicrobials or AMR; for example, 73% in Taraba, 85% in Nasarawa, 82% in Benue, and 56% in Rivers.

The result shows that most PPMVs were of the opinion that antibiotics are always the best treatment options for fever and diarrhea, for example, in Taraba (77%, 74%), Nasarawa (52%, 315), Benue (67%, 85%), and Rivers (40%, 51%), respectively. Respondents (PPMVs) also responded that skipping one or more doses does not in any way contribute to AMR.

PPMVs responded that mixing different antibiotics works faster and shortens the duration of treatment and illness; this was mostly reported in Taraba and Rivers states (71% and 41%, respectively).

Most PPMVs were also said to dispense antibiotics for the common cold, catarrh, and influenza, as well as cough and sore throat, for example, in Taraba (45%, 71%), Nasarawa (57%, 75%), Benue (69%, 82%), and Rivers (48%, 71%).

PPMVs were also of the opinion that when antibiotics are added to malaria treatment, it makes patients recover faster, and these were cut across all states, for example, 78% in Taraba, 74% in Nasarawa, 69% in Benue, and 62% in Rivers states, respectively.

The result shows that most PPMVs sell antibiotics without prescription, and they always sell part or half a card of antibiotics based on clients or patients requests, for example, in Taraba (55%, 46%), Nasarawa (55%, 56%), Benue (85%, 54%), and Rivers (52%, 67%).

The result also shows that most PPMV owners do not provide education to patients after the purchase of medicines or provide them with information and follow up after contact with them (Safety net protocol), for example in Taraba (77%), Nasarawa (90%), Benue (79%), and Rivers (59%).

Results among Community Pharmacists Description

A total of 135 respondents (community pharmacy shop owners) were interviewed, out of whom 48 were drawn from Taraba, 39 from Benue State, 31 from Nasarawa State, and 17 from Rivers States, respectively.

Most of the sampled population (Community pharmacists (CPs)) had a bachelor's degree in pharmacy, among others. Only a few (6%) had a master's in Pharmacy across all the target states. A small number of the sampled pharmacists had a specialty, while others did not.

The community pharmacists were of the view that between 5-25% of patients would like to purchase a prescribed antibiotic in a pharmacy compared to total prescription drug traffic.

Results also show that most CPs had inadequate knowledge regarding bacteria resistance, for example, 98% in Taraba, 100% in Nasarawa, 100% in Benue, and 88% in Rivers.

Most of the CPs believed that it was problematic that there were pharmacists who dispensed antibiotics when patients required them without a prescription. The results also show that most CPs have not heard about AMR, for example, 54% in Taraba, 61% in Nasarawa, 60% in Benue, and 65% in Rivers.

Despite the levels of education acquired by CPs, the result shows that most CPs are still of the opinion that antibiotics are always the best treatment options for fever and diarrhea, for example, in Taraba (33%, 54%), Nasarawa (55%, 61%), Benue (40%, 60%), and Rivers (59%, 65%), respectively. Participants (CPs)

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responded that skipping one or more can contribute to AMR.

Although some CPs responded that mixing different antibiotics does not work faster or shorten the duration of treatment or illness, others agreed that mixing works faster.

Most CPs were also said to dispense antibiotics for the common cold, catarrh, and influenza, as well as cough and sore throat, for example, in Taraba (19%, 67%), Nasarawa (52%, 58%), Benue (60%, 40%), and Rivers (35%, 88%).

Some CPs were also of the opinion that when antibiotics are added to malaria treatment, it makes patients recover faster, and this differs from one state to another, for example, 65% in Taraba, 48% in Nasarawa, 40% in Benue, and 71% in Rivers states, respectively.

The result shows that some CPs sell antibiotics without prescription; however, most do not sell part or half cards of antibiotics based on clients or patients requests, for example, in Taraba (81%, 17%), Nasarawa (19%, 26%), Benue (85%, 54%), and Rivers (53%, 59%).

Most CPs are of the opinion that Pharmacists should be authorized to perform the task of selecting the therapy in cases of proven uncomplicated infections. The CPs also responded that Medicine-related counseling for CPs is just as important as the physician's recommendations. The CPs also agreed that appropriate patient education would effectively reduce the incidence of AMR. However, a significant number of CPs dispense medicines by proxy.

The result also shows that most CPs do not provide education to patients after purchase of medicines or provide them with information and follow up after contact with them (Safety netting protocol), for example in Taraba (54%, 52%), Nasarawa (52%, 58%), Benue (60%, 40%), and Rivers (76%, 76%), respectively.

Results also show that most CPs dispense medicines through phone calls, and this, according to the results, is done most often.

DISCUSSION OF OVERALL RESULTS

The results describe a survey conducted among patent and proprietary medicine vendors (PPMVs) and community pharmacy shop owners in different states and communities of interest in Nigeria. The survey aimed to assess their knowledge, attitudes, and practices regarding antimicrobial resistance (AMR) and the use of antibiotics.

Demographics

A total of 384 respondents (PPMVs) were interviewed out of which 172 were drawn from Taraba, 39 from Benue state, Enugu State, 110 from Nasarawa State and 63 from Rivers States respectively. Most of the sampled population (PPMVs) had Secondary or tertiary levels of education and majority of them received their training through apprenticeship, JCHEW, CHEW, Pharmacy Technicians or Nursing and others. A total of 135 community pharmacy shop owners were interviewed, with 48 from Taraba, 39 from Benue state, 31 from Nasarawa State and 17 from Rivers States respectively. Most of the sampled population (Community pharmacists (CPs)) had Bachelor of Pharmacy and others, and only few had Masters in Pharmacy.

Knowledge and Attitude on Antimicrobial Resistance and Antimicrobial Use

The results indicate that most PPMVs and CPs had inadequate knowledge regarding bacteria resistance and

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that many respondents in both groups have not heard about AMR. However, most of them believed that it is problematic for pharmacists to dispense antibiotics without prescription.

Most PPMVs and CPs were still with the opinion that antibiotics are always the best treatment options for fever and diarrhea. Both groups responded that skipping one or more doses does not contribute to AMR. However, some respondents agreed that mixing different antibiotics works faster and shortens the duration of treatment and illness. Most PPMVs and CPs were also found to dispense antibiotics for common cold, catarrh, influenza, cough, and sore throat. Some respondents were also of the opinion that adding antibiotics to malaria treatment helps patients recover faster.

As relates to the present study, several studies report (Akinyandenu and Adeyini, 2014; Akinyandenu et al., 2014; Adamu et al., 2020; Abubakar et al., 2023) high rates of irrational use and dispensing of antibiotics despite the prescription-only medicines (POMs) law activated in Nigeria. Inadequate education and awareness on rational use are important factors contributing to the irrational use of antibiotics among CPs and PPMVs, which accounts for their attitude. One of the main causes of antibiotic overuse and rising AMR levels is the non-prescription drug distribution of antibiotics. For many people in communities all around Nigeria, PPMVs are their main source of healthcare, offering treatment for a wide range of illnesses in both adults and children. Given the high demand for their services, they engage in the sales of antibiotics which by law they are not supposed to. Antibiotic stocking and sales at PPMV are accompanied by a surge in non-prescription purchases, which in turn fuels additional antibiotic stocking and sales, thus is a vicious cycle. This attitude gives rise to dispensing the wrong antimicrobial agent for the wrong microbe (e.g. giving antibiotics to a patient with a non-bacterial infection). Furthermore, the quest to make quick gain, fearing loss of customer and patient pressure on cutting antimicrobial agents is a huge contributing factor to the irrational attitude of dispensing among CPs and PPMVs which in the end promotes the emergence of AMR.

Practice of Antimicrobial Dispensing

In this study, result shows that most PPMVs and CPs sell antibiotics without prescription, and ome dispense medicines by proxy. This agrees with a study by Abdu *et al*. (2022) who found that two-third (66.70%) of the PPMVs reported that they have sold non-prescribed antibiotics however, a significance variation was noticed between CPs and PPMVs. This could be attributed to poor regulatory enforcement regarding the sale of antibiotics and financial considerations for the PPMVs and CPs to sell antibiotics without prescription. Results also shows that most CPs/PPMV owners do not provide education to patients after purchasing the medicine or provide them with information and follow up after contact with them (safety netting protocol). This study disagrees with that of Ugwu *et al.* (2023) in Nigeria among Community Pharmacists in Abuja whose findings recorded a positive indication that Community Pharmacists know their roles in AMS programs as 62.2% of the community pharmacists agreed to educate patients/clients on the on antibiotics use and its consequent misuse as it relates to resistance. The possible reason for the disagreement could be attributed to differences in the sampling methodology or variations in the scope of practice and roles assigned to PPMVs and CPs.

In Summary, the survey results on the knowledge, attitudes, and practices of PPMVs and CPs regarding antimicrobial resistance and the use of antibiotics in Nigeria are consistent with previous studies on the topic. A systematic review of the role of proprietary and patent medicine vendors in Nigeria found that PPMVs are a main source of medicines for acute conditions and that many of them lack adequate knowledge and training in drug dispensing . Similarly Beyeler & Sieverding (2015), a study on the quality of information offered to women by drug sellers in Nigeria found that many PPMVs dispense misoprostol-containing medication for abortion without providing adequate information or follow-up care.

The results also highlight the need for better education and training of PPMVs and CPs on antimicrobial resistance and appropriate use of antibiotics. This is consistent with the finding of a study on the potential

role of patent and proprietary medicine vendors in Nigeria (Treleaven et al., 2015, Beyeler & Sieverding, 2015), which recommended that PPMVs should be included in efforts to improve antimicrobial use and surveillance. Additionally, the finding that many PPMVs and CPs sell antibiotics without prescription underscores the need for stronger regulation and enforcement of drug dispensing practices in Nigeria. This is consistent with the promising high-impact practice in family planning that focuses on expanding contraceptive choice and access in the private sector (HIPs, 2021), including pharmacies and drug shops, through standards and accreditation programs.

CONCLUSION

The study demonstrates a deficit of knowledge and practice in pharmaceutical care among community pharmacists and Patent and Proprietary Medicine Vendors (PPMVs), as well as a lack of competence. The role of pharmacists in enhancing patient care necessitates regulatory authorities implementing rules and standards that allow them to provide pharmacological treatment in community settings.

RECOMMENDATIONS

The results show clear need to improve knowledge and practices regarding the use of antibiotics and prevention of AMR. For example, there should be more education and training on appropriate use of antibiotics and the dangers of AMR, and regulations should be put in place to prevent the dispensing of antibiotics without prescription. Providing patient education and follow-up after medication use may prevent misuse of antibiotics and contribute to the fight against AMR.

CONFLICTS OF INTEREST

All authors – none to declare**.**

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Ethics approval and consent to participate

Ethics approval was received from the National Health Research Ethics Committee with NHREC Protocol Number: NHREC/01/01/2007-01/11/2021. Informed consent was obtained from each participants prior to the observation of any consultations. Consent was also obtained from Ministries of Health and Education in all the six target states, .

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