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An Investigation of the Profitability of Community Pharmacies and their associated factors in Southeastern Nigeria

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ABSTRACT

BACKGROUND: Community pharmacies in Nigeria play a crucial role in healthcare delivery, serving as accessible points for medicines, health promotion, and primary care services. However, sustaining these services requires financial viability. This study investigated the factors influencing profitability in community pharmacies in Southeastern Nigeria.

METHODS: A cross-sectional study was conducted among licensed community pharmacists using a two-section questionnaire. Principal component analysis employed Varimax rotation with Kaiser normalization and listwise deletion of missing data. Data analysis was performed using the IBM Statistical Package for the Social Sciences (SPSS) version 27. Pearson's correlation was used to determine the association of profitability with pharmacists and pharmacy characteristics. Linear regression explored the predictors of profitability in community pharmacies at 95% confidence interval and a < 0.05 level of significance.

RESULTS: Out of 345 respondents, 52.2% were males, under 30 years old (44.3%), married (48.7%), and had less than five years of experience (45.2%). Retail pharmacies were predominant (95.7%) and pharmacist-owned (78.3%). The mean profit margin was obtained as 33.38 ± 25.92 . Five components of profitability were identified: Internal Operational Excellence and Strategic

Market Adaptability (3.74 ± 1.166), Workforce Service Capacity and Customer Retention (3.90 ± 1.027), Inventory Management

System (4.08 ± 0.966), Value-Added Health Services (3.83 ± 1.175), and Digital Customer Engagement and Promotion (3.82 ± 1.031)

CONCLUSION: Profitability of community pharmacies in Nigeria is influenced by gender, professional experience, pharmacy's years of existence, and workforce composition. Value-Added Health Services and Digital Customer Engagement and Promotion are determinants of profit margins in community pharmacies

KEYWORDS: Community pharmacy, Profitability, Operational efficiency, Digital innovation, Workforce, Southeastern Nigeria.

INTRODUCTION

Community pharmacies constitute a critical component of health systems, particularly in low- and middle-income countries where they function as accessible, first-line providers of medicines, health advice, and preventive services [1,2]. They act as a vital link between formal health systems and people at the community level [3,4]. In Nigeria, community pharmacies frequently serve as the initial point of contact within the healthcare system, bridging gaps in formal service delivery and improving access to essential care [5]. However, their ability to sustain these roles depends fundamentally on their financial viability and profitability. Profitability keeps operations running, motivates staff, and ensures quality care [6,7].

Profitability is the ability of a business to generate earnings relative to its costs, assets, or revenues over a given period [1]. The key indicators of profitability of a business include net profit margin, which is the ratio of net income to total revenue, and operating margin, which measures operating income as a proportion of revenue, reflecting efficiency in core business operations before taxes and financing costs. In community pharmacies, these metrics capture both managerial efficiency and market performance and are widely used in health economics and pharmaceutical market analyses [1,8].

Several factors influence the financial performance of community pharmacies in Nigeria. Efficiency in operations, capacity to retain customers, adoption of value-added health offerings, integration of digital tools, and the competence of the workforce all exert influence [9]. Efficient inventory practices, a well-controlled budget, and appropriate technology reduce waste and leakage [10]. Customer outreach, loyalty schemes, and preventive services create differentiation and retention [11]. And behind all these is human capital: the number, experience, training, and motivation of pharmacists and support staff [12].

The determinants of profitability in community pharmacies can be conceptually understood through the Structure-Conduct-Performance (SCP) model, a foundational framework in industrial organization and health economics. The SCP model posits that market structure (e.g., level of competition, entry barriers, and market concentration) influences firm conduct (such as pricing strategies, service differentiation, and cost management), which in turn determines performance outcomes, including profitability and

efficiency [13]. In pharmaceutical retail markets, structural factors such as supplier concentration, regulatory constraints, and demand patterns shape pricing behavior and service offerings, ultimately affecting profit margins and sustainability [14]. Agency theory in pharmacy settings is where business owners rely on pharmacists and support staff, and misaligned incentives may affect cost control, service quality, and ultimately profitability. Competitive pressures, including price competition and service

differentiation, also play a critical role in determining margins in retail pharmaceutical markets [15,16].

Profitability of community pharmacies is closely linked to cost structures, production processes, and competitive dynamics. Pharmacies operate under a combination of fixed costs (e.g., rent, licensing, equipment) and variable costs (e.g., drug procurement, labor), and their ability to spread fixed costs over higher sales volumes gives rise to economies of scale, thereby improving margins⁸. The production function framework further explains how inputs such as labor, capital, and technology are transformed into healthcare services, with efficiency gains directly influencing operating margins [17].

Health economics studies revealed that pharmaceutical retail markets in low-resource settings are shaped by imperfect information, variable regulation, and fragmented supply chains, all of which influence pricing, mark-ups, and profitability [18,19]. Studies in Nigeria and similar contexts highlight that operational efficiency, inventory management, workforce capacity, and customer-oriented services are key drivers of financial performance in community pharmacies [20,21].

Despite a growing body of literature on pharmaceutical markets and healthcare delivery in Nigeria, there remains limited evidence on the determinants of profitability among community pharmacies, particularly in Southeastern Nigeria. Understanding the profitability dynamics of community pharmacies in this critical segment of primary healthcare. This study, therefore, aims to investigate the factors influencing profitability among community pharmacies in Southeastern Nigeria. By grounding the analysis in microeconomic theory and the SCP framework, this study seeks to provide evidence to inform policy decisions, managerial strategies, and regulatory interventions that strengthen the sustainability and performance of community pharmacies.

METHODS

Study Design

A cross-sectional survey design to investigate the factors that influence the profitability of community pharmacies in Southeastern Nigeria.

Study Setting

A cross-sectional study was conducted between March 2025 and August 2025 in Enugu State and Imo State. Enugu is the capital city of Enugu state and is located in the South-East geopolitical zone of Nigeria. It shares borders with Benue and Kogi to the north, Ebonyi to the east and southeast, Abia to the south, and Anambra to the west. The state comprises 17 local governments and spans about 13,161 km², ranking 29th in size, with a population of approximately 4.69 million (2022 estimate). There is one tertiary hospital, one secondary hospital,

many private hospitals, and about 200 registered community pharmacies in Enugu State.

Imo State is in southeastern Nigeria, bordered by Abia to the east, Anambra to the north, Rivers to the south, and the Niger River/Delta to the west. It comprises 27 LGAs, covers approximately 5,100–5,530 km² with an estimated population of 5.46 million, making it the 13th most populous state in the country. Imo State has Owerri as the state capital, which is a vibrant commercial and cultural hub and one of Nigeria's livelier cities, featuring markets, nightlife, and leisure facilities. There are about 200 registered community pharmacies, one tertiary hospital, one state hospital, and many private hospitals in Imo State.

Participants

All community pharmacies with a registered superintendent pharmacist within the two selected states in Southeastern Nigeria. The list of the registered pharmacies was obtained from the Pharmacists' Council of Nigeria (PCN) office in each of the selected state. The total number of the registered pharmacies obtained from the PCN office was used as the sample population; 230 pharmacies and 270 pharmacies for Enugu and Imo State respectively.

Sample size

The sample size for each state was calculated using Raaosft; an online sample size calculator (www.raaosft/samplesize.com) at 95% confidence interval and 5% error margin. The required sample size was 156 pharmacies for a population of 260 pharmacies and 159 pharmacies for population of 270 respectively pharmacies: Enugu state and Imo state. However, the sample size was inflated by 10% to make up for non-responses Participants were recruited from eligible community pharmacies within the two selected states to participate in

the study. In total 400 questionnaires were administered to the community pharmacists in Enugu and Imo state.

Inclusion and Exclusion Criteria

All superintendent community pharmacists who are residents in Enugu State and Imo State who consent to participate in the study were included in this study. Intern pharmacists, community pharmacists on any form of leave, and pharmacists who do not have a valid license were excluded from the study.

Data Collection Instrument

A panel of assessors consisting of two clinical pharmacists, two community pharmacists, and two public health pharmacists of not less than 10 years' experience was assembled for the development of the questionnaire. All items were discussed by the panel to ensure face and content validity.

A questionnaire that comprised two sections, A and B, was developed and used for this study. Section A obtained information of the community pharmacist and the pharmacy business. Information such as age, gender, educational background, marital status, year of experience, type of pharmacy, location of the pharmacy, profit margin of the business, etc. The profit and profit margin of the pharmacy in the previous year was self-reported.

Section B assessed the influencing factors of the profitability of the pharmacy business. Respondents' responses were anchored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The respondents were to state their degree of agreement with the item questions as follows: Strongly disagree = 1, Disagree = 2, Undecided = 3, Agree = 4, and Strongly agree = 5. Some of the items were negatively worded to prevent mechanical responses. A pilot study was

conducted with 30 community pharmacists from Ebonyi State (not selected for the study) to test the clarity and reliability of the questionnaire. Feedback from the pilot study led to minor adjustments in wording and format. The internal consistency of the item statements was explored through Cronbach's Alpha, resulting in a final version of the questionnaire with satisfactory reliability (Cronbach's $\alpha = 0.85$).

Data Analysis Retrieved and usable copies of the questionnaires were coded and entered in a Microsoft

spreadsheet, cross-checked for accuracy, sorted, and loaded into SPSS 27.0 (Excel SPSS Inc., Chicago, IL) for descriptive statistics, calculations of factor loading, and Cronbach alpha. Principal component analysis employed Varimax rotation with Kaiser normalization and listwise deletion of missing data. Rotation converged in 7 iterations.

Following the determination of communalities, none of the items had a factor loading below 0.4; hence, none of the items was excluded since all the items contributed adequately to the summary scores. A test for normality was conducted on the pharmacies' profit margins, and both the Kolmogorov-Smirnov and Shapiro-Wilk tests were significant. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity were also conducted. Possible associations between the profitability of community pharmacies and pharmacists' sociodemographic characteristics and pharmacy characteristics were explored using Pearson's Chi-square. Kruskal-Wallis' test was used to compare the mean values of the components of profitability of community pharmacies. A linear regression test was used to determine the predictors of profit margin of community pharmacies. All analysis was conducted at a 95% confidence interval and a level of significance of $p < 0.05$.

RESULTS

Socio-demographic Characteristics

Out of 400 questionnaires that were administered, a total of 345 were returned and found usable for data analysis, giving a response rate of 86%. Table 1 shows the characteristics of the community pharmacist. They included 180 (52.2%) male respondents and 165(47.8%) female respondents. Most respondents were under 30 years old, 153 (44.3%), and had less than five years of experience, 156 (45.2%). The majority were married in 168(48.7%) and had a Bachelor of Pharmacy degree 270 (78.3%).

Table 1: Socio-demographic Variables of Respondents

Variables	Frequency (n)	Percentage (%)
Gender		
Male	180	52.2
Female	165	47.8
Age		
< 30	153	44.3
30-40	132	38.3
41-50	39	11.3
>50	21	6.1
Marital Status		
Married	168	48.7
Single	171	49.8
Others	6	1.7
Highest Educational Qualification		
Bachelor of Pharmacy	270	78.3
Doctor of Pharmacy	6	1.7
Masters	54	15.7
PhD	6	1.7
FPCPharm	9	2.6
Years of experience		
< 5years	156	45.2
5-15	153	44.3
16-25	21	6.1
> 25	15	4.3

Pharmacy Characteristics

Retail pharmacies were predominant at 330 (95.7%), with the majority being pharmacist owned 270 (78.3%). About 222 (64.3%) of pharmacies were in urban areas, and 330 (96.5%) reported making a profit in the previous year. (Table 2).

Table 2: Characteristics of the community pharmacy

Variables	Frequency (n)	Percentage (%)
No. of Pharmacists		
1	206	59.7
2	86	24.9
3-5	53	15.4
No of non-pharm. staff		
0	12	3.5
1-5	270	78.3
6-10	48	13.9
11-20	15	4.3
Pharmacy Type		
Retail	330	95.7
Wholesale	15	4.3
Existence of the pharmacy		
< 5 years	159	46.1
5-10 years	147	42.6
11-15 years	24	7.0
> 15 years	15	4.8
Pharmacist Ownership		
Pharmacist owner	270	78.3
Non-Pharmacist Owner	75	21.7
Location		
Urban	222	64.3
Suburban	99	28.7
Rural	24	7.0
Did you make profit last year		
No	15	3.5
Yes	330	96.5

Component Analysis of Profitability Factors

Component 1 accounted for 31.5% of the total variance, indicating a dominant component. The first two components explained 44.8%, showing moderate dimensional reduction, and the five retained components explained 66.8% of the total variance. Table 3 shows the eigenvalues of the components 1, 2, 3, 4, and 5 are 4.725, 2.000, 1.183, 1.082, and 1.029, respectively. The first five components had eigenvalues greater than 1 and should therefore be retained, while the components with eigenvalues

below 1 (Components 6 to 15) will be discarded. Figure 1 shows the scree plot of the eigenvalues against the components of profitability extracted.

The Kolmogorov–Smirnov and Shapiro–Wilk tests indicated that the profit margins were not normally distributed ($D = 0.204$, $p = 0.0001$; $W = 0.887$, $p = 0.001$). The results obtained from the Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that the profit margin significantly deviated from normality ($w = 0.204$, $P = 0.0001$, and $w = 0.887$, $P = 0.001$, respectively).

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.721, indicating good adequacy of the data for factor analysis. Bartlett’s Test of Sphericity was statistically significant ($\chi^2 (105) = 1886.64$, $p < 0.001$), confirming that the correlation matrix was not an identity matrix and that the data were suitable for principal component analysis.

Figure: Eigenvalues against the components extracted.

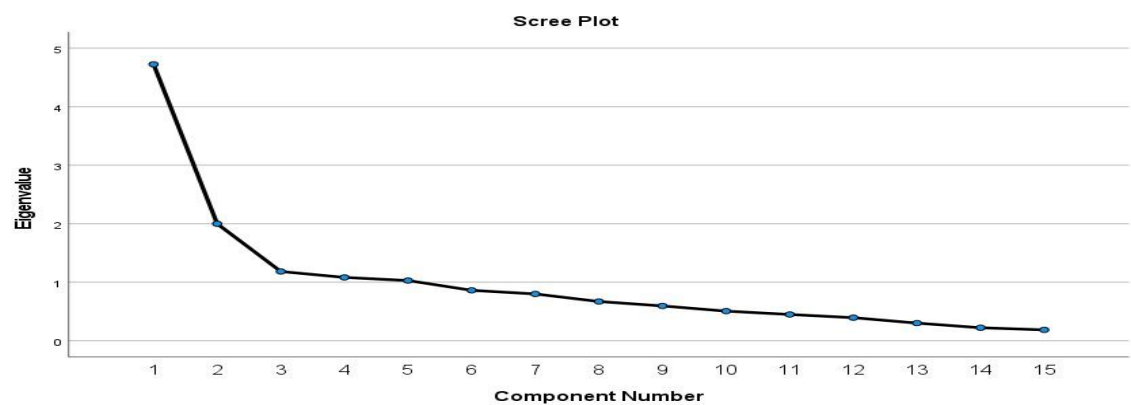


Table 3: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.725	31.498	31.498
2	2.000	13.330	44.828
3	1.183	7.888	52.717
4	1.082	7.214	59.931
5	1.029	6.857	66.788
6	.861	5.741	72.529
7	.799	5.329	77.858
8	.670	4.468	82.327

9	.595	3.964	86.290				
10	.506	3.374	89.664				
11	.448	2.990	92.654				
12	.394	2.625	95.279				
13	.301	2.006	97.285				
14	.222	1.478	98.762	15	.186	1.238	100.000

Extraction Method: Principal Component Analysis.

Components of Profitability in Community Pharmacies

The five extracted components of profitability were named based on the items that are included in each component. The components are namely:

Internal Operational Excellence and Strategic Market Adaptability (Mean $\pm$ SD: 3.74 $\pm$ 1.166), comprising targeted marketing, monitoring of market trends, price monitoring, pricing strategies, technology adoption, staff coordination, and staff duties allocation, and a conducive working environment.

Workforce Service Capacity and Customer Retention (Mean $\pm$ SD: 3.90 $\pm$ 1.027) involved recruiting skilled staff, staff training, staff compensation, and motivation.

Inventory Management System (Mean $\pm$ SD: 4.08 $\pm$ 0.966) includes stock and inventory monitoring, proper documentation practices, and prescription refill rates.

Value-Added Health Services (Mean $\pm$ SD: 3.83 $\pm$ 1.175), provision of services such as immunization and health screenings, blood glucose monitoring, and blood pressure monitoring.

Digital Customer Engagement and Promotion (Mean $\pm$ SD: 3.82 $\pm$ 1.031) uses social media and websites for customer interaction.

TABLE 4: Components of profitability in community pharmacies

Component 1: Internal Operational Excellence and Strategic Market Adaptability	Factor Loading	Mean $\pm$ SD
I do not follow and monitor market trends and adopt strategies accordingly.	0.846	3.75 $\pm$ 1.245
The pharmacy utilizes technology to improve operational efficiency and reduce costs.	0.649	3.89 $\pm$ 1.063
The pharmacy does not invest in new technologies and software to stay competitive and enhance service delivery	0.433	3.65 $\pm$ 1.129
My pharmacy has a strong company culture that fosters collaboration, teamwork, and staff engagement.	0.707	3.65 $\pm$ 1.225

		3.74	±
		1.166	
Component 2: Workforce Service Capacity and Customer Retention			
My pharmacy employs qualified and experienced pharmacists and technicians to ensure quality pharmaceutical care service.	0.741	3.99	±
		1.061	
My pharmacy attracts a high volume of prescriptions from physicians and local communities	0.793	3.68	±
		1.028	
My sales staff are knowledgeable and effective in promoting pharmaceutical products and services.	0.698	3.84	±
		1.171	
My staff motivation and morale are high, contributing to productivity and customer service.	0.546	4.08	±
		0.847	
		3.90	±
		1.027	
Component 3: Effective Inventory Management System			
My pharmacy has a reorder level for each medicine	0.666	3.98	±
		1.097	
		4.17	±
	0.791	0.834	
My pharmacy actively seeks customer feedback and utilizes it to improve service quality.		4.08	±
		0.966	
Component 4: Value-Added Health Services			
My pharmacy provides additional services (Immunization, blood glucose check, blood pressure)	0.732	4.16	±
		1.156	
I do targeted marketing (e.g., Free blood glucose and blood pressure checks) to reach potential customers and increase sales	0.588	3.70	±
		1.160	
My pharmacy establishes and adheres to a budget to ensure financial stability and resource allocations.	0.697	3.64±	
		1.210	
		3.83	±
Component 5: Digital Customer Engagement and Promotion		1.175	

My pharmacy uses social media and websites to connect with customers and promote services.	0.833	3.78 ± 1.036
Prescription refill rates are high, indicating customer loyalty and consistent business	0.624	3.85 ± 1.025
		3.82 ± 1.031

Relationship Between Community Pharmacists' Characteristics and Profitability

The pharmacists' gender ($\chi^2 = 6.506$, $p = 0.011$) and years of experience ($\chi^2 = 32.584$, $p = 0.001$) were significantly associated with profitability of the pharmacy. Higher number of male pharmacists reported having made profits in the previous when compared to their female counterparts. Pharmacists who had practice experience of less than five years and those who had practiced for about five to fifteen years reported that they made profits in the previous year compared to their counterparts who had practiced for about more than sixteen years and twenty-five. Table 5.

Relationship Between Community Pharmacies Characteristics and Profitability

Table shows that community pharmacies that have been in business for less than five years and between 5-10 years made more profits in the previous years compared to pharmacies that had existed for more than 20 years ($\chi^2 = 15.112$, $p = 0.002$). Pharmacies in the urban location made more profits in the previous year compared to the ones in the rural location, although at a slightly significance level ($\chi^2 = 5.978$, $p = 0.050$). A highly significant difference existed in the profit made in pharmacies that had support staff of two or more when compared to their counterparts with no or one support staff ($\chi^2 = 19.785$, $p = 0.011$).

Table 5: Relationship Between Community Pharmacists' Characteristics and Profitability

Variables	Non- Profitable n (%)	Profitable n (%)	Total	χ^2	p-Value
Gender Male					
	3(1.7)	177(98.3)	180(100)	6.506(1)	0.011
Female	12(17.3)	153(92.7)	165(100)		
Age					
<30	6(3.9)	147(96.1)	153(100)	7.470(3)	0.058
30-40	3(2.3)	129(97.7)	132(100)		
41-50	3(7.7)	36(92.3)	39(100)		
>50	3(14.3)	18(85.7)	21(100)		

Marital Status Married					
	6(3.6)	162(96.4)	168(100)		
Single	9(5.3)	162(94.7)	171(100)	0.861(2)	0.650
Others	0(0)	6(100)	6(100)		
Highest Edu. Qual					
B.Pharm	12(4.4)	258(95.6)	270(100)		
PharmD.	0(0)	6(100)	6(100)		
Masters	3(5.6)	51(94.4)	54(100)	1.150(4)	0.886
PhD	0(0)	6(100)	6(100)		
FPCPharm	0(0)	9(100)	9(100)		
Year of Experience <5					
	3(1.9)	153(98.1)	156(100)		
5-15	6(3.9)	147(96.1)	153(100)	32.584(3)	0.001
16-25	6(28.6)	15(71.4)	21(100)		
>25	0(0)	15(100)	15(100)		

Table 6: Relationship Between Community Pharmacies' Characteristics and Profitability

Variables	Non-Profitable	Profitable	Total	χ^2	p-Value
Pharmacy Type					
Retail	15(4.5)	315(95.5)	330(100)	0.713(1)	0.399
Wholesale	0(0)	15(100)	15(100)		
Pharmacy Existence					
<5	12(7.5)	147(92.5)	159(100)		
5-10	0(0)	147(100)	147(100)	15.112(3)	0.002
11-15	3(12.5)	21(87.5)	24(100)		
>20	0(0)	15(100)	15(100)		
Number of Pharmacists					
1	9(4.4)	197(95.6)	206(100)		
2	6(7.0)	80(93.0)	86(100)	3.838(4)	0.428
3	0(0)	32(100)	32(100)		
4	0(0)	8(100)	8(100)		
5	0(0)	13(100)	13(100)		
Pharmacy Location					
Urban	6(2.7)	216(97.3)	222(100)		

Sub-urban	6(6.1)	93(93.9)	99(100)	5.978(2)	0.050
Rural	3(12.5)	21(87.5)	24(100)		
Pharmacy					
Ownership					
Pharmacist	12(4.4)	258(95.6)	270(100)	0.028(1)	0.867
Owned					
Nom-	3(4.0)	72(96.0)	75(100)		
Pharmacist					
Owned					
Number of					
nonpharmacists					
0	3(25)	9(75)	12(100)		
1	0(0)	12(100)	12(100)		
2	3(3.3)	87(96.7)	90(100)		
3	60(6.3)	90(93.8)	96(100)	19.785(8)	0.011
4	3(8.3)	33(91.7)	36(100)		
5	0(0)	36(100)	36(100)		
6	0(0)	48(100)	48(100)		
7	0(0)	9(100)	9(100)		

Relationship Between Profitability components and profitable and non-profitable pharmacies

Table 7 showed that out of the five components, only Component 5 showed a statistically significant difference between profitable and non-profitable pharmacies.

Table 7: Relationship Between Profitability components and profitable and nonprofitable pharmacies

Component	U	Z	P-value
Component 1: Internal Operational Excellence and Strategic Market Adaptability	2844.000	0.983	0.326
Component 2: Workforce Service Capacity and Customer Retention	2268.000	-0.552	0.581
Component 3: Effective Inventory Management System	1962.000	-1.412	0.158

Component 4: Value-Added Health Services 2754.000 0.748 0.455
Component 5: Digital Customer Engagement and 3379.500 2.430
0.015* Promotion

*Significant at $p < 0.05$

Predictors of Profitability of Community Pharmacies

The multiple linear regression model showed low explanatory capacity. The model explained 3.0% of the variance ($R^2 = 0.030$; Adjusted $R^2 = 0.016$). The overall model was not statistically significant at the 5% level, although it approached significance ($F(5, 339) = 2.121$, $p = 0.062$). Component 4 was negatively associated ($p = 0.006$) with estimated profit while Component 5 was positively associated ($p = 0.042$).

Table 8: Predictors of Profitability of Community Pharmacies

Variable	B	SE	Beta	t	p-value	95% CI lower	95% CI upper
Constant	41.429	9.435	—	4.391	0.001	22.869	59.988
Component 1	-2.614	1.957	-0.088	-1.336	0.183	-6.464	1.235
Component 2	2.616	2.257	0.080	1.159	0.247	-1.824	7.055
Component 3	0.345	2.173	0.011	0.159	0.874	-3.929	4.620
Component 4	-5.415	1.976	-0.170	-2.740	0.006*	-9.302	-1.528
Component 5	3.447	1.687	0.124	2.043	0.042*	0.129	6.766

*Significant at $p < 0.05$

Component 1: Internal Operational Excellence and Strategic Market Adaptability

Component 2: Workforce Service Capacity and Customer Retention

Component 3: Effective Inventory Management System

Component 4: Value-Added Health Services

Component 5: Digital Customer Engagement and Promotion

DISCUSSION

This study assessed the profitability of community pharmacies and their associated sociodemographic and practice-related factors in Nigeria. The findings indicate a high level of reported profitability among community pharmacies, suggesting that the sector remains economically viable despite ongoing challenges such as medicine price fluctuations, regulatory constraints, and competition. However, profitability was not uniformly distributed, with significant associations observed for gender, years of experience, pharmacist presence, and number of non-pharmacist staff, while other variables showed no statistically significant relationships.

Gender emerged as a significant determinant of profitability, with male pharmacists more likely to report profitable practice compared to female pharmacists. This disparity may be

attributed to differences in access to financial capital, ownership opportunities, and sociocultural constraints that may limit female participation in pharmacy entrepreneurship. Similar gender-related differences have been reported in studies across Nigeria and Ghana, where male pharmacists are more likely to own pharmacies and control business decisions, thereby influencing profitability outcomes [20,22]. In contrast, studies from high-income settings often report minimal gender differences, suggesting that such disparities are context-dependent and influenced by local economic and cultural dynamics [23,24].

Years of professional experience were also significantly associated with profitability. Pharmacists who had more than sixteen years of professional experience had lower profits. This could be attributed to a lack of training and skills necessary for diversifying pharmaceutical care services, inefficient integration of technology, lack of digital tools adoption, and digital customer retention. Experience predicts performance in clinical tasks and business metrics, yet diminishing returns hit without upskilling; diversification

via tele pharmacy or automation boosts profits for adapters. Nigerian contexts echo this, where operational skills mediate experience's economic payoff [25,26].

Pharmacy location demonstrated a borderline significant association with profitability, indicating that geographic factors may influence financial performance. Pharmacies located in high-density or commercially active areas are more likely to attract higher customer volumes, thereby increasing revenue [27]. This observation is consistent with studies conducted in Nigeria, which reported that urban location and proximity to healthcare facilities are key drivers of pharmacy utilization and profitability [28,29].

The number of non-pharmacist staff was significantly associated with profitability, highlighting the importance of supporting staff in pharmacy operations. Pharmacies with an optimal number of non-pharmacist employees demonstrated better profitability, likely due to improved workflow efficiency and customer service. However, excessive staffing may increase operational costs without proportional gains in revenue, suggesting the need for balanced workforce planning. This finding

aligns with existing literature emphasizing the role of human resource optimization in healthcare business performance [20,30].

The duration of existence of pharmacies was associated with profitability. Pharmacies that had been in existence for five to ten years reported profit in the previous year, suggesting that business maturity improves financial performance over time. Many pharmacies cross into sustained profit after about 3–5 years of operation and perform better by the 5- to 10-year range. This aligns with studies that reported that startup pharmacies typically move from negative or low net profit in the first 2–3 years to positive and higher profitability by years 5–10 [31].

The very low R^2 indicates that pharmacy profitability in south-eastern Nigeria is mostly influenced by external structural factors, rather than internal operational components alone. This aligns with evidence from African health systems showing that medicine pricing regulations, supply chain inefficiencies, currency fluctuations, import dependency, and informal market competition are primary drivers of financial outcomes in pharmacies [32–34]. Supply chain disruptions and high procurement costs significantly reduce margins, particularly for independent pharmacies. In many African countries, medicine mark-ups and reimbursement systems are tightly regulated or inconsistent, limiting the influence of internal managerial strategies on profitability [34–36].

The non-significance of Components 1 to 3 suggests that these factors may have indirect or context-dependent effects, or their impact is overshadowed by macroeconomic and policy constraints. This reflects the broader reality that micro-level interventions alone are insufficient to drive profitability in constrained health systems.

The negative association observed for Component 4 suggests that this factor may represent a cost-intensive factor, such as high overhead costs. Component 5's positive and consistent significance across both regression and non-parametric analysis indicates that it likely captures efficiency-enhancing or revenue-generating practices, such as improved stock management and customer retention strategies

Policy and Practice Implications

The findings highlight the need for targeted interventions to enhance the profitability and sustainability of community pharmacies in Nigeria. Efforts should focus on promoting gender equity in pharmacy ownership and access to financing, strengthening entrepreneurial and business management training in pharmacy education, encouraging pharmacist-led service delivery models, optimizing workforce composition and efficiency, and supporting strategic location planning for new pharmacy establishments

Strengths of the Study

This study has several important strengths that enhance the validity and relevance of its findings on community pharmacy profitability in Nigeria.

First, the study provides context-specific empirical evidence on the economic performance of community pharmacies in a low- and middle-income setting. Second, the use of robust statistical techniques, including chi-square analysis and factor analysis, strengthens the analytical rigor of the study. The adequacy of the dataset for multivariate analysis was confirmed using the Kaiser–Meyer–Olkin (KMO) measure (0.721) and a significant Bartlett's Test of Sphericity, indicating that the data were suitable for identifying underlying relationships among variables.

Third, the study adopted a multidimensional approach, examining both sociodemographic factors and practice-related characteristics. This comprehensive framework provides a more

holistic understanding of the determinants of profitability compared to studies that focus on a single domain

Limitations and Potential Sources of Bias

This study provides important insights into the profitability of community pharmacies in Nigeria; however, several limitations and potential sources of bias should be considered when interpreting the findings.

First, the cross-sectional design limits the ability to establish causal relationships between the identified factors and profitability, as data were collected at a single point in time.

Second, the study relied on self-reported measures of profitability, which may be subject to reporting bias. Respondents may overestimate or underestimate their profitability due to recall challenges, social desirability, or reluctance to disclose accurate financial information.

Third, the study's findings may have limited generalizability beyond the study setting. Variations in regulatory frameworks, economic conditions, and healthcare systems across regions in Nigeria and other African countries may influence the applicability of the results to other contexts.

CONCLUSION

Profitability of community pharmacies in Nigeria is influenced by gender, professional experience, pharmacy's years of existence, and workforce composition. Value-Added Health Services and Digital Customer Engagement and Promotion are determinants of profit margins in community pharmacies. Pharmacy owners should prioritize high-impact operational strategies. Policy reforms should address structural inefficiencies such as pricing and supply chains. Addressing these factors through policy reforms and professional development initiatives is essential for economic viability and resilience of community pharmacy practice in low- and middle-income settings.

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CONFLICT OF INTEREST

Authors declare that there is no conflict of interest

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AUTHORS' CONTRIBUTION

CNI: Conceptualization of the study, Literature review, data collection and analysis, writing of the Manuscript. AWU: Supervision of the study

ETHICAL APPROVAL

Ethical approval for this study was obtained from the research and ethics committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla, with the reference number NHREC/05/01/2008B-FWA00002458-1RB00002323. Verbal consent was obtained from each respondent before they participated in the study, and they were informed that they could withdraw from the study at any time.

AVAILABILITY OF DATA

All datasets used and/or analyzed during the study are included in the manuscript

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