

Financial Management Practices among Patent and Proprietary Medicine Vendors (PPMV) in Kaduna and Lagos States, Nigeria: A Mixed-Methods Study

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Abstract

Background

Patent and Proprietary Medicine Vendors (PPMVs) provide important healthcare access in rural and underprivileged communities in Nigeria. They are often considered the first line of call for illnesses. PPMVs would need sound financial management practices to actualize sustainable growth. This study investigated the financial management practices of PPMVs in selected Local Government Areas (LGAs) of Kaduna and Lagos states.

Method

We employed a mixed-methods explanatory sequential design. First, quantitative data were collected from PPMVs in sixteen LGAs of Kaduna and Lagos States, Nigeria, focusing on their business practices, financial management, inventory, and client engagement. This was followed by a qualitative cross-sectional study to contextualize the quantitative findings. Quantitative data were analyzed using descriptive statistics, bivariate tests, and regression models while qualitative data were analyzed thematically.

Result

Only 32.3% of PPMVs keep financial records, with the majority relying on paper-based systems (94.2%) and minimal use of digital tools, which was exclusive to Lagos (0% vs. 100%) and Tier 1 PPMVs (100%), citing challenges related to digital competency. Awareness of loan opportunities was low (13.9%), and only 19.6% of PPMVs have applied for loans, with business tax payment being a significant predictor of loan success (AOR = 2.53; $p = 0.045$). Kaduna PPMVs were more likely to keep financial records. In both states, except for the use of notebooks in record keeping, there were varying differences in relationships between sociodemographic variables and the operational/financial practices. Generally, Tier 1 PPMVs were more likely to adopt formal financial practices than Tier 2.

Conclusion

This study underscored the gap in financial practices and operations in PPMVs; these were shaped by gender, tier, and region. The use of digital financial tools was more in Lagos, females and the upper tier of categorization. To close these gaps, strategies should target capacity building and digital tool adoption, in order to catalyse improved access to financial services within these contexts for better sustainability of the PPMVs.

INTRODUCTION

Patent and Proprietary Medicine Vendors (PPMVs) provide important healthcare access in rural and underprivileged communities in Nigeria [1, 2]. PPMVs are often licensed individuals who sell over-the-counter (OTC) medications to the lay public [2], and to many of these people, they serve as their primary healthcare provider, especially for those who do not have access to primary healthcare facilities [3]. They are often considered the first line of call for illnesses such as malaria, cough, gastrointestinal diseases, and other common illnesses, as well as for family planning services in many localities [4]. They have become an indispensable part of the health system, and very little has been done in these settings to assess the financial practices of PPMVs, which will subsequently impact their sustainability and service delivery [5].

In order to keep appropriate stock levels, reinvest in their business capital when necessary, and grow other aspects of the services they offer, the PPMVs would need sound financial management practices to actualize sustainable growth [5]. On the other hand, bad financial management can result in stockouts, poorer service delivery and, ultimately, fewer healthcare services with fewer commodities for the communities served [6]. It has been observed that committed financial management also ensures that PPMVs would stay in business and cushion market challenges such as fluctuating drug prices, compliance costs and rising capital constraints [7].

Notably, limited access to credit and financing options increases the financial management challenges that PPMVs experience [8]. Most PPMVs could hardly get loans or microcredit from financial institutions as they do not have good record-keeping and financial documentation. Not having sufficient capital limits their ability to grow, satisfy customer demand consistently, and address the health care needs in their communities [6]. This, therefore, becomes a greater albatross to sustainable health care delivery in the communities of service.

PPMVs are therefore expected to have sound financial management in the discharge of health care services. Indeed, good financial management, which includes maintaining proper books of accounts and tracking sales, is important for business sustainability [7, 9]. These practices not only assist vendors in managing their cash and tracking their performance but also increase their credibility with financing partners [10]. Vendor access to credit resourcing, such as microcredit or loan schemes, is often dependent on the vendor being able to show retrospective management history and perspective skills in good financial management. Yet, it seems that most PPMVs are lacking basic skills in managing their finances, which could limit their business development and, as such, impact their potential and the overall quality of care they provide to the community [10].

Access to capital for working, microcredit or loans is a critical sustainability pathway for PPMVs and their ability to grow and replenish stock. Loan applications for financial institutions usually require clean financial records that most PPMVs may not easily provide owing to their weak record-keeping practices. The lack of access to credit also restricts their growth potential and ability to respond to unforeseen financial challenges, leaving them susceptible to market fluctuations or economic crises at times threatening their very survival [10].

However, the density and distribution of PPMVs differ by state, and an evaluation of some financial management practices in Lagos and Kano States can illustrate to what extent financial barriers or enablers may impact PPMVs' capacity to operate effectively. Such disparities in economic and regulatory settings across these states may also help to differentiate between important opportunities and constraints unique to PPMV operations of interest. This knowledge allows policymakers and planners to identify practices where improvement is needed and facilitate improving the economic robustness of PPMVs to serve as ongoing providers of health care services in their various communities. The Pharmacy Council of Nigeria (PCN) has implemented an accreditation system for PPMVs that is three-tiered to enhance regulation and service quality. This system categorizes PPMVs based on their educational background and healthcare qualifications, defining the scope of services they are authorised to provide [1].

Tier 1 describes:

- **Eligibility:** Individuals without formal health qualifications, typically possessing at least a secondary school certificate.
- **Scope of Services:** Authorized to market over-the-counter medications and care for common illnesses. Family planning services include providing condoms, cycle beads, emergency contraceptives, and pill refills (but not initiation). They may also offer counselling and referrals.

Tier 2 describes:

- **Eligibility:** Individuals with health-related qualifications such as a diploma or degree in nursing, midwifery, or as Community Health Extension Workers (CHEWs), recognized by the PCN.
- **Scope of Services:** In addition to Tier 1 services, Tier 2 PPMVs can use Rapid Diagnostic Test kits, administer medications like amoxicillin dispersible tablets, conduct HIV self-testing, provide self-injectable contraceptives, and initiate and administer long-acting reversible contraceptives (e.g., implants) if appropriately trained.

And Tier 3 is classified as:

- **Eligibility:** Individuals qualified as Pharmacy Technicians.
- **Scope of Services:** Similar to Tier 2, with the added authorization to provide selected primary healthcare services in line with the Federal Ministry of Health Task Shifting and Task Sharing policy for essential health care services in Nigeria.

This tiered accreditation system aims to ensure that PPMVs operate within their competencies, thereby improving access to quality healthcare services, especially in underserved areas.

This study investigates the financial management practices of PPMVs in selected Local Government Areas (LGAs) of Kaduna and Lagos states. The key objectives are mainly to identify the gaps in financial management practices, including record-keeping and sales tracking, among PPMVs in the selected LGAs and explore the relationship between financial management practices and access to microcredits or loans for PPMVs.

METHODS

Study design

This study adopted a mixed-methods design integrating quantitative and qualitative approaches to provide understanding of the financial and operational practices of PPMVs. The quantitative component employed a cross-sectional survey of PPMVs across urban and rural LGAs in Lagos and Kaduna States. The qualitative component followed an explanatory sequential approach, involving eight focus group discussions (FGDs) conducted across both states to generate deeper contextual insights and complement the survey findings.

Study setting

Two states, namely Lagos and Kaduna are quite popular states in Nigeria. They are characterized by distinctive socio-economic and geographical traits that significantly reflect on their healthcare systems. Lagos State, is located in the southwestern region of Nigeria, is the second most populous state, a former capital of the country, which still serves as a major economic hub of the nation. Lagos, which is home to an estimated 21 million people, is a significant hub for innovation, trade, and business in West Africa. It is an important player in the national economy, with a diversified economy that accounts for around 30% of Nigeria's GDP [11, 12, 13]. Lagos has a strong but diverse healthcare system that includes both public and private facilities. The Lagos State Ministry of Health supervises health service delivery in the state, across the three tiers of care namely; primary, secondary, and tertiary care levels. A key operational initiative in the health sector is the Lagos State Health Scheme (LSHS), branded as "Ilera Eko," and launched in 2015 to ensure affordable and equity in healthcare for all residents. This scheme, administered by the Lagos State Health Management Agency (LASHMA), focuses on universal health coverage and equitable access to services [12, 14, 15]. Regulatory oversight in the Lagos healthcare delivery system is carried out by several agencies, the Health Facilities Monitoring and Accreditation Agency (HEFAMAA), the key agency which ensures that health

facilities meet established standards of care in their operations. This regulatory framework aims to enhance service quality and accessibility across the state [12, 15].

Kaduna State is situated in northwestern Nigeria, with a population of about half that of Lagos State, is renowned for its cultural diversity and historical significance as a political centre. The state operates with a more decentralized healthcare system compared to Lagos, reflecting its unique socio-economic landscape. The healthcare system in Kaduna also has three distinct categories namely primary, secondary, and tertiary care levels. The "Primary Health Care Under One Roof" (PHCUOR) policy is a noteworthy and enthusiastic endeavour that seeks to integrate primary healthcare services for increased efficiency. To guarantee that each ward has at least one operational primary healthcare facility, the state is implementing the nation strategy of "One Functional PHC Centre per Ward". These programs are managed by the Kaduna State Primary Health Care Development Agency (SPHCDA), which is dedicated to improving community health outcomes. Non-Governmental Organisations (NGOs), private companies, government agencies, and foreign donors are some of the stakeholders involved in healthcare delivery in Kaduna. While federal institutions are funded by the federal government, state governments provide health services through state-owned facilities. This collaborative approach aims to address gaps in service delivery and improve health indices [14, 16].

But generally, in Lagos and Kaduna, PPMVs are an essential part of the health care system in these states. Often found in both urban neighbourhoods and in remote communities, PPMVs typically provide some care services for people seeking quick, affordable treatment for common health issues. In addition to over-the-counter medications, their typically modest and well-known local stores offer some basic health advice and assistance. In these states, as in other parts of Nigeria, PPMVs play a crucial role in the health system due to their accessibility, local knowledge, and community trust, even though the majority of them lack formal training as health professionals. Over the years, they have become recognized in this role, and there is considerable government and partner effort to make them safer and more effective. The revision of the Task-Shifting and Task-Sharing (TSTS) policy of the Federal Government of Nigeria now allows PPMVs to provide some essential family planning services like injectable contraceptives and implant insertion in Nigeria [1].

Study population

This study population were PPMVs who were operating within selected LGAs in Kaduna and Lagos States within the country. The selection of PPMVs was made to ensure that the sample of PPMVs represented both demographic and geographical diversity. The inclusion criteria for selected PPMVs required that participants were actively operating in the LGA at the time of the survey, registered with the PCN, or were in the process of renewing their licenses with the council. PPMVs that were not aligned with the goals of the Promoting Accreditation for Community Health Services (PACS) project were not prioritised in order to maximize representativeness, as well as considerations of security and efficiency.

Sample size

The quantitative sample was derived using a census-based enumeration of eligible PPMVs within purposively selected LGAs, ensuring comprehensive coverage of operationally active providers within the defined geographic clusters. A total of 914 PPMVs (280 in Lagos and 634 in Kaduna) were included in the study. For the qualitative component, eight FGDs (two urban and two rural per state) were conducted with a total of 63 participants, with each FGD comprising 6 to 9 participants. This group size is consistent with qualitative research standards and was considered sufficient to achieve thematic saturation while maintaining balanced representation across urban and rural contexts.

Sampling Technique

For each state in the study, a total of four urban and four rural LGAs were identified and chosen. Equity, representativeness, and practical relevance are the major factors taken into account when choosing LGAs.

The following eight LGAs were chosen from each state: Igabi, Giwa, Kudan, Kaduna North, Zaria, Sabon-Gari, Chikun, and Kaduna South while Badagry, Oshodi-Isolo, Ikorodu, Ifako-Ijaiye, Ibeju-Lekki, Epe, Ojo, and Alimosho were the LGAs in Kaduna State and Lagos State, respectively.

Several important factors were integrated into a structured LGA selection process. These included the geographic distribution of rural and urban areas, the security status of the LGAs, and the density of PPMVs within them. In prioritisation of LGAs for selection, LGAs with a higher percentage of female-owned PPMVs were considered in the interest of inclusivity.

Despite being purposeful, the selection procedure was carefully matched with the goals of the PACS project, guaranteeing contextual security, operational viability, and representativeness of the states under study. Among the requirements for eligibility were:

1. *IntegrateE partner PPMVs*: To ensure efficiency and alignment with ongoing private-sector health system strengthening initiatives, priority was given to LGAs with PPMVs participating in the IntegrateE project – a national programme led by the Pharmacy Council of Nigeria that accredits and integrates PPMVs into the formal health system through structured training, supervision, and routine health data reporting. This approach leveraged existing, functional PPMV networks within the selected states.
2. *Security status*: To ensure the safety of field teams and study participants, security considerations influenced the selection of LGAs. This decision was based on the Kaduna Security Report (September 2023), which identified insecure LGAs and enabled their exclusion from the study.
3. *PPMV density*: LGAs with a higher concentration of PPMVs were prioritised in order to guarantee robust and representative selection such that the data collected can accurately reflect the target population.
4. *Gender considerations*: Areas with a higher proportion of female-owned PPMVs were selected in order to manage gender inclusivity and highlight the importance of acknowledging women-led businesses in the healthcare sector.
5. *Geographical distribution*: The process ensured an even distribution between urban and rural LGAs to enhance equitable representation and logistical convenience. The proximity to state capitals was also considered to streamline project operations.

Only eight LGAs were chosen in Kaduna using these criteria out of the initial pool of 23 LGAs. Similarly, only 8 LGAs were chosen from the initial pool of 20 LGAs in Lagos (see Fig. 1).

Data Collection Procedure

Data were collected using two instruments developed specifically for this study: (1) a structured, interviewer-administered questionnaire for PPMVs and (2) a semi-structured FGD guide for PPMVs. Both instruments were designed by the research team based on the study objectives, a review of relevant literature, and consultation with subject matter experts in private sector health service delivery, regulatory compliance, and financial inclusion. The tools were developed in English and have not been previously published. English-language versions are provided as supplementary files.

The PPMV structured questionnaire (Additional File 1) comprised 47 items organized into four thematic sections: (i) background characteristics; (ii) regulatory compliance; (iii) operational health (including inventory management,

financial record-keeping, and service provision); and (iv) readiness and willingness for interventions (including awareness of and access to business loans, branding, and accreditation incentives).

A team of 24 trained field enumerators conducted the quantitative surveys over a three-month period (December 2023 – February 2024). Enumerators completed a three-day training programme covering study objectives, ethical conduct, informed consent procedures, and proficiency in the electronic data capture platform (SurveyCTO). Role-play simulations and a field pilot test were conducted to ensure consistency and clarity of questionnaire administration.

Eligible PPMV outlets within the sampled LGAs were visited by enumerators. Following a standardised introduction to the study and the attainment of verbal informed consent, the questionnaire was administered face-to-face in English, Hausa, or Yoruba, depending on participant preference. Responses were captured directly on Android tablets using the SurveyCTO application. Where participants provided additional consent, photographs of relevant documentation (e.g., PCN licences, financial ledgers, temperature monitoring charts, stock records) were captured and uploaded via the platform.

Qualitative data were collected through 8 FGDs with PPMVs, conducted concurrently with the quantitative survey. An FGD guide (Additional File 2) was developed to explore in-depth perspectives across four thematic domains: (1) regulatory compliance; (2) operational health; (3) community reach and impact; and (4) willingness and readiness for interventions. The guide contained 23 open-ended questions with corresponding probe prompts to facilitate detailed, nuanced responses. Participants were purposively selected from the pool of PPMVs who had completed the quantitative survey, ensuring representation across gender, years of operation, and accreditation status.

FGDs were facilitated by a trained qualitative moderator, supported by a dedicated note-taker. Sessions were held in neutral, private venues within each community and lasted between 60 and 90 minutes. All discussions were audio-recorded with participants' explicit verbal and written consent. The moderator followed the semi-structured guide while permitting flexibility to pursue emergent themes. Field notes were taken to capture non-verbal cues, group dynamics, and contextual observations.

Data quality assurance

Rigorous quality assurance measures were implemented throughout data collection. For the quantitative surveys, supervisors conducted daily reviews of submitted data for completeness, logical consistency, and timeliness. Automated validation checks were programmed into the SurveyCTO platform to minimise entry errors. Spot checks and back-check interviews were conducted for a randomly selected subset (10%) of respondents to verify data accuracy. For qualitative data, audio recordings were transcribed verbatim within 24 hours of each FGD, and transcripts were independently cross-checked against the original recordings to ensure accuracy and completeness.

Data management

All quantitative data were captured electronically and uploaded to a secure central server with restricted, role-based access. Regular server backups were conducted to prevent data loss. Multiple quality assurance procedures were implemented throughout the data management process. Supervisors routinely reviewed submitted data for completeness and accuracy, and discrepancies were promptly addressed through feedback and clarification with field teams. Dedicated communication platforms were used to provide real-time technical support, resolve protocol-related issues, and address field challenges as they arose. Following completion of data collection, quantitative datasets were cleaned using Microsoft Excel 2019. Missing values, duplicates, and inconsistencies were identified and

resolved prior to analysis. Cleaned datasets were subsequently exported to IBM SPSS version 26 for statistical analysis. Qualitative audio recordings were transcribed verbatim, and transcripts were cross-checked against the original recordings to ensure accuracy and completeness.

Data analysis

Quantitative and qualitative data were analysed using complementary analytical approaches. Quantitative analysis was conducted using IBM SPSS version 26. Descriptive statistics were used to summarise key variables, with results presented as frequencies and percentages. Bivariate analyses were performed using chi-square tests to assess associations between categorical variables, with statistical significance set at $p < 0.05$. Multivariable logistic regression models were developed to identify predictors of key outcomes, with adjusted odds ratios (AORs) and 95% confidence intervals reported to account for potential confounders. This multivariable approach provided deeper insights into the enabling and constraining factors influencing financial inclusion among PPMVs.

Qualitative data were analysed thematically using NVivo version 12. Transcripts were coded using a combination of deductive codes informed by the study objectives and inductive codes emerging from the data. Themes were refined through iterative team discussions to ensure analytical consistency. Integration of quantitative and qualitative findings was achieved through triangulation, enabling qualitative insights to contextualise quantitative results and provide a comprehensive interpretation of the study findings.

RESULTS

Demographic characteristics of respondents

As shown in Table 1, most respondents were from Kaduna (69.4%), female (64.8%), aged 35–44 years (36.1%), and based in urban areas (79.3%). The majority had post-secondary education (75.3%), nearly half had operated for over 10 years (49.5%), and respondents were fairly distributed across tiers, with no respondents in tier three categorization.

Table 1
Distribution of Socio-demographic variables

Variable	Category	N (%)
State	Kaduna	634 (69.37%)
	Lagos	280 (30.63%)
Sex	Male	322 (35.23%)
	Female	592 (64.77%)
Age	26–34	182 (19.91%)
	35–44	330 (36.11%)
	45–54	267 (29.21%)
	55–73	135 (14.77%)
Settlement	Urban	725 (79.32%)
	Rural	189 (20.68%)
Education	Completed Primary and Secondary	226 (24.7%)
	Post-secondary	688 (75.3%)
Tier	Tier 1	430 (47.05%)
	Tier 2	484 (52.95%)
Years of Operation	Less than 5 years	235 (25.71%)
	6–10 years	227 (24.84%)
	More than 10 years	452 (49.45%)
PCN Registration	Yes	840 (91.9%)
	In process	55 (6.02%)
	No	19 (2.08%)
Completed Accreditation	Yes	722 (78.99%)
	In process	93 (10.18%)
	No	25 (2.74%)

Distribution of Financial management practices in Lagos and Kaduna State

Table 2 presents the results of financial and operational practices among PPMVs. It shows that 32.28% of respondents admit to keeping financial records, with a predominant use of paper-based systems (94.24%) and minimal adoption of digital systems (1.36%) or a combination of both (4.07%). In terms of stock management, 96.05% of respondents do not utilize digital tracking, while 79.06% engage in physical stock counting, 31.69% use notebooks, and 11.51% rely on bin/stock cards. Cash is the most preferred payment method (99.89%), followed by bank transfers (81.07%) and point of sale (POS) systems (29.21%). Although only 21.01% of respondents have corporate bank

accounts, the majority (79.1%) report paying business taxes, indicating a strong reliance on traditional operational systems within the PPMVS, with limited integration of digital tools.

Table 2
Distribution of Financial Management Practices

Variable	Category	N (%)
Keeping financial records	Yes	295 (32.28%)
	No	619 (67.72%)
Type of financial records	Paper-based	278 (94.24%)
	Digital systems	4 (1.36%)
	Both	12 (4.07%)
Type of stock tracking		
Digital check	Yes	36 (3.95%)
	No	876 (96.05%)
Physical stock counting	Yes	721 (79.06%)
	No	191 (20.94%)
Bin card/Stock card	Yes	105 (11.51%)
	No	807 (88.49%)
Notebook	Yes	289 (31.69%)
	No	623 (68.31%)
Payment methods used by clients		
Cash	Yes	913 (99.89%)
	No	1 (0.11%)
Point of sale (POS)	Yes	267 (29.21%)
	No	647 (70.79%)
Bank Transfer	Yes	741 (81.07%)
	No	173 (18.93%)
Ownership of corporate bank account	Yes	192 (21.01%)
	No	722 (78.99%)
Payment of business tax	Yes	723 (79.1%)
	No	191 (20.9%)

Gender differences in financial and operational practices among PPMVs

Table 3 presents the gender-based differences in financial and operational practices among PPMVs. There was a significant difference in the use of POS systems (p -value = 0.049), with more females using them than males. Bank

transfer usage also showed a significant difference (p-value = 0.003), with more females using it than males. Additionally, there was a significant difference in business tax payment (p-value = 0.001), with males more likely to pay business tax. There was no significant difference in financial record-keeping, the method of keeping financial records, commodity/stock tracking, physical stock counting, bin/stock card usage, notebook usage, and the method of payment (cash).

Table 3
Association of financial management practices across gender (both states)

Financial Management Practice	Category	Gender		Chi-square	p-value
		Male	Female		
Financial record keeping in PPMVs	Yes	106 (35.9%)	189 (64.1%)	0.094	0.759
	No	216 (34.9%)	403 (65.1%)		
Method of record-keeping by PPMVs	Paper-based	101 (36.3%)	177 (63.7%)	2.633	0.452
	Digital systems	1 (25%)	3 (75%)		
	Both	3 (25%)	9 (75%)		
Tracking of stock by PPMVs					
Digital Check	No	310 (35.4%)	566 (64.6%)	0.064	0.800
	Yes	12 (33.3%)	24 (66.7%)		
Physical stock counting	No	63 (33%)	128 (67%)	0.571	0.450
	Yes	259 (35.9%)	462 (64.1%)		
Bin card/Stock card	No	279 (34.6%)	528 (65.4%)	1.656	0.198
	Yes	43 (41%)	62 (59%)		
Notebook	No	223 (35.8%)	400 (64.2%)	0.205	0.651
	Yes	99 (34.3%)	190 (65.7%)		
Methods of Payment used by PPMVs					
Cash	No	0 (0%)	1 (100%)	0.545	0.461
	Yes	322 (35.3%)	591 (64.7%)		
Point of sale (POS)	No	215 (33.2%)	432 (66.8%)	3.88	0.049*
	Yes	107 (40.1%)	160 (59.9%)		
Bank Transfer	No	44 (25.4%)	129 (74.6%)	8.974	0.003*
	Yes	278 (37.5%)	463 (62.5%)		
Ownership of corporate	Yes	74 (38.5%)	118 (61.5%)	1.168	0.280
	No	248 (34.3%)	474 (65.7%)		
Payment of tax by PPMVs	Yes	274 (37.9%)	449 (62.1%)	10.792	0.001*
	No	48 (25.1%)	143 (74.9%)		

Bold with * indicate statistical significance at $p < 0.05$

Association of financial management practices across states & Tiers

Table 4 shows the association of financial management practices across states and tiers for PPMVs. Across both states, significant differences in financial management practices were observed. More respondents in Kaduna keep financial records (56.3% vs. 43.7%, $p < 0.001$) and use paper-based methods (57.9% vs. 42.1%, $p = 0.032$), while digital systems are exclusive to Lagos (0% vs. 100%). The use of digital checks is lower in Kaduna (70% vs 30%, $p = 0.028$), and bin card usage is also significantly lower (11.4% vs. 88.6%, $p < 0.001$). POS usage is higher in Lagos (40.8% vs. 59.2%, $p < 0.001$), as are corporate bank accounts (55.2% vs. 44.8%, $p < 0.001$). Conversely, bank transfers are more common in Kaduna (64.8% vs. 35.2%, $p < 0.001$). No significant differences were observed in physical stock counting, notebook usage, cash payments, or business tax payments.

Also, Table 4 presents the association of financial management practices across Tier 1 and Tier 2 PPMVs as categorized by the Pharmacy Council of Nigeria. There was a significant difference in keeping financial records ($p < 0.001$), with more Tier 1 PPMVs keeping records (58.6% vs. 41.4%) compared to Tier 2. The use of digital checks also showed a significant difference ($p < 0.001$), with more Tier 1 PPMVs adopting this method (83.3% vs. 16.7%). Additionally, the use of bin cards/stock cards differed significantly ($p = 0.001$), with higher usage among Tier 2 PPMVs (68.6% vs. 31.4%). Payment practices also varied significantly. More Tier 1 PPMVs utilized Point of Sale (POS) systems (60.7% vs. 39.3%, $p < 0.001$), while bank transfers were more common among Tier 1 PPMVs (51.6% vs. 48.4%, $p < 0.001$). A significant difference was observed in the possession of corporate bank accounts ($p = 0.002$), with more Tier 1 PPMVs having accounts (56.8% vs. 43.2%). Business tax payment also showed a significant difference ($p < 0.001$), with Tier 1 PPMVs more likely to pay taxes (51.5% vs. 48.5%).

Table 4
Association of Financial Management Practices Across States and Tiers

Financial Management Practice	Category	State		Tier					
		Kaduna n(%)	Lagos n(%)	χ^2	p-value	Tier 1 n(%)	Tier 2 n(%)	χ^2	p-value
Financial record keeping	Yes	166 (56.3%)	129 (43.7%)	35.147	< 0.001*	173 (58.6%)	122 (41.4%)	23.52	< 0.001*
	No	468 (75.6%)	151 (24.4%)			257 (41.5%)	362 (58.5%)		
Methods of financial record keeping	Paper-based	161 (57.9%)	117 (42.1%)	8.795	0.032*	164 (59.0%)	114 (41.0%)	5.679	0.128
	Digital Systems	0 (0.0%)	4 (100.0%)			4 (100.0%)	0 (0.0%)		
	Both	4 (33.3%)	8 (66.7%)			5 (41.7%)	7 (58.3%)		
Method of stock tracking by PPMV									
Digital Check	No	613 (70.0%)	263 (30.0%)	4.808	0.028*	400 (45.7%)	476 (54.3%)	19.693	< 0.001*
	Yes	19 (52.8%)	17 (47.2%)			30 (83.3%)	6 (16.7%)		
Physical Count	No	125 (65.4%)	66 (34.6%)	1.686	0.194	88 (46.1%)	103 (53.9%)	0.112	0.738
	Yes	507 (70.3%)	214 (29.7%)			342 (47.4%)	379 (52.6%)		
Bin card/Stock Card	No	539 (66.8%)	268 (33.2%)	20.717	< 0.001*	397 (49.2%)	410 (50.8%)	11.768	0.001*
	Yes	93 (88.6%)	12 (11.4%)			33 (31.4%)	72 (68.6%)		
Notebook	No	441 (70.8%)	182 (29.2%)	2.047	0.153	300 (48.2%)	323 (51.8%)	0.797	0.372
	Yes	191 (66.1%)	98 (33.9%)			130 (45.0%)	159 (55.0%)		
Payment methods by PPMVs									
Cash	No	0 (0.0%)	1 (100.0%)	2.267	0.132	0 (0.0%)	1 (100.0%)	0.889	0.346
	Yes	634 (69.4%)	279 (30.6%)			430 (47.1%)	483 (52.9%)		
POS	No	476 (73.6%)	171 (26.4%)	18.429	< 0.001*	268 (41.4%)	379 (58.6%)	28.12	< 0.001*
	Yes	158 (59.2%)	109 (40.8%)			162 (60.7%)	105 (39.3%)		
Bank Transfer	No	154 (89.0%)	19 (11.0%)	38.782	< 0.001*	48 (27.7%)	125 (72.3%)	31.907	< 0.001*

Financial Management Practice	Category	State		Tier					
		Kaduna	Lagos	χ^2	p-value	Tier 1	Tier 2	χ^2	p-value
		n(%)	n(%)			n(%)	n(%)		
	Yes	480 (64.8%)	261 (35.2%)			382 (51.6%)	359 (48.4%)		
Ownership of corporate account by PPMVs	Yes	86 (44.8%)	106 (55.2%)	69.071	< 0.001*	109 (56.8%)	83 (43.2%)	9.227	0.002*
	No	548 (75.9%)	174 (24.1%)			321 (44.5%)	401 (55.5%)		
Payment of tax by PPMVs	Yes	495 (68.5%)	228 (31.5%)	1.321	0.250	372 (51.5%)	351 (48.5%)	26.964	< 0.001*
	No	139 (72.8%)	52 (27.2%)			58 (30.4%)	133 (69.6%)		

Bold with * indicate statistical significance at $p < 0.05$

Comparison of Socio-demographic Factors and Their Association with Financial management/Operational Practices in both states

Regional (state) comparisons between Lagos and Kaduna show varying levels of association between socio demographic factors and their financial management/operational practices. In consideration of gender, there is a significant relationship between bank payment use of PoS machines and in Kaduna unlike in Lagos; while in consideration of age, there is a significant relationship between the use of notebook in both States. Educational background is only significantly related to use of a notebook for operational records in Lagos. The tier levels have varying degrees of relationship in the assessed parameters across both states (**see supplementary Figs. 2 to 5**).

Access to loans among PPMVs

Supplementary Table 5 presents the distribution of access to loans among PPMVs. Awareness of loan products targeted at PPMVs was low, with only 13.89% of respondents reporting awareness, while 86.11% were unaware. Among those who applied for loans, working capital loans were the most commonly applied for (10.07%), followed by equipment financing (2.95%), and other types of loans (9.63%). Applications for equity financing and start-up loans were minimal, with only 0.88% applying for each. A significant portion of respondents (80.38%) reported not applying for any loan products. Among those who applied, 67.97% successfully obtained the loan, while 32.03% were unsuccessful.

Association and predictors of successful loan acquisition among PPMVs based on financial management practices

Supplementary Table 6 presents the association between financial management practices and access to loans among PPMVs. There was a significant association between business tax payment and successful loan acquisition ($p = 0.036$), with 72.1% of respondents who paid business tax successfully obtaining loans compared to 50% of those who did not pay taxes. There was no significant association between successful loan acquisition and other financial management practices, such as keeping financial records ($p = 0.693$), the method of keeping records ($p = 0.778$), or having a corporate bank account ($p = 0.535$). **Supplementary Table 7** shows the logistic regression analysis results to identify predictors of successful loan acquisition. Paying business tax was a significant predictor, with respondents

who paid taxes being 2.53 times more likely to successfully obtain a loan than those who did not (AOR = 2.533; 95% CI: [1.019, 6.3]; p = 0.045). Keeping financial records (AOR = 1.217; 95% CI: [0.546, 2.711]; p = 0.631) and having a corporate bank account (AOR = 0.786; 95% CI: [0.342, 1.805]; p = 0.570) were not significant predictors.

Qualitative result

Preference for one digital system for inventory and financial records

PPMVs generally preferred using a single digital system to manage both inventory and financial records. This preference was driven by the convenience of having all business data centralized in one place, making it easier to track sales, manage stock, and calculate profits without switching between systems. However, some respondents highlighted concerns about the cost of acquiring and maintaining such systems.

"We want one system that can manage both inventory and financial records because it allows us to track our stock, calculate profits, and manage expenses efficiently in one place." (P1, Lagos Urban 1 PPMV)

"Having separate systems can be stressful; it's better when everything is combined so we don't make mistakes." (P3, Kaduna Rural 1 PPMV)

"The main issue with digital systems is the cost. If the government or partners can help us with these tools, it would be easier to adopt." (P5, Lagos, Urban 2 PPMV)

Methods of keeping financial records and use of technological tools

The majority of PPMVs reported using manual methods for keeping financial records, such as exercise books or notebooks. While some expressed satisfaction with these methods, others acknowledged the limitations, including errors and inefficiencies. A smaller number of respondents used simple digital tools like mobile apps but cited challenges with consistent use and lack of training.

"I use an exercise book to record daily sales, and at the end of the week, I calculate profits and expenses manually." (P4, Lagos Rural 1, Ikorodu PPMV)

"I have tried using an app, but sometimes I forget to update it because of how busy the shop can get." (P5, Kaduna Rural 1 PPMV)

"Keeping records manually works for me, but I know it's not the best. I just don't have access to digital tools or the knowledge to use them." (P1, Kaduna Rural 2 PPMV)

While a few PPMVs had adopted technological tools such as tablets or software provided by external organizations, most participants reported limited access to such tools. Many expressed a desire to learn about and adopt affordable and user-friendly digital systems to improve efficiency.

"I use a tablet provided by M-Pharma for managing stock and printing receipts, but I pay for it in installments." (P5, Lagos Urban 1 PPMV)

"I think tools that track sales and inventory automatically would be very helpful, but they are expensive for small businesses like mine." (P4, Kaduna 2 Rural PPMV)

"If there were free or subsidized tools for PPMVs, I believe more of us would adopt them." (P5, Lagos Urban 2 PPMV)

Types of financial records maintained

PPMVs reported maintaining records such as daily sales logs, expense records, and, in some cases, separate savings and business transaction accounts. Most participants emphasized the importance of keeping these records updated to monitor profits and manage expenses effectively.

"I keep daily sales records and maintain two accounts: one for savings and one for business transactions." (P3, Lagos Rural 1 Ikorodu PPMV)

"I have one account that I use for both personal and business transactions, but most of my sales are cash-based." (P6, Lagos Urban 1 PPMV)

"Recording my expenses daily helps me ensure that I am not overspending, even though I still do it manually." (P3, Kaduna 2 PPMV)

Experiences with business loans and financial services

PPMVs expressed mixed experiences with business loans and financial services. While many appreciated loans for enabling them to grow their businesses, high interest rates and collateral requirements posed significant barriers. Participants emphasized the need for affordable loan schemes tailored to small business owners.

"Loans allow us to purchase what we need for our shops and choose the products that are in demand." (P2, Lagos Rural 2 Epe PPMV)

"A loan with a low interest rate is acceptable, but 5% is too high for most of us to manage." (P4, Lagos Urban 1 PPMV)

"Our licenses and shops should serve as collateral because they reflect our credibility and commitment." (P5, Lagos Rural 1 Ikorodu PPMV)

"We need loans that do not require heavy collateral because many of us are already financially stretched." (P5, Kaduna Rural 1 PPMV)

DISCUSSION

The study evaluated financial and operational practices among Proprietary Patent Medicine Vendors (PPMVs) by gender, region, and tier classifications. The study sample was characterized by a preponderance of females and more respondents from Kaduna. There was equally a predominance of respondents with more than 10 years of operation, and none were in tier three (by PCN categorization). In particular, findings present opportunities for closing gaps to improve business and operational efficiencies of PPMVs in both Lagos and Kaduna states.

A majority of PPMVs do not keep records of their financial transactions, which implies a serious gap in business management practice. Among them, three-quarters principally document their financial transactions with paper, while only about 1 in every 74 PPMVs admit to adopting digital tools, with some citing challenges with consistent use related to poor training. The results indeed corroborate previous studies indicating very low uptake of digital financial tools in similar settings, mainly due to low digital filling and infrastructure hurdles [1, 12]. This can inhibit their ability to secure access to financing that can advance their service delivery capacity [5]. Better training and provision of user-friendly digital tools would address these barriers, improving record keeping and accountability [17].

Most of the respondents carry out their stock checks physically or use notebooks, while only a few have computerized stock tracking systems. This calls for innovative and tailored strategies to encourage affordable and scalable inventory management solutions that are context-specific. The poor utilisation of bin cards indicates a probable area of interest for strengthening effective stock monitoring [18]. Though participants also acknowledged the importance of keeping financial records, the implementation seemed poor with some respondents admitting to *“one account that I use for both personal and business transactions”*, a clear limitation to accessing financial support to improve service delivery. However, a lower loan interest rate and utilisation of the PPMV licence for collateral were recommended by respondents as strategies to improve loan accessibility. Similar models to improve accessibility were described in the United States [19].

The payment practice of PPMVs is more inclined towards cash than to bank transfer and point of sales (POS) in their financial practices. This may not enhance transaction experiences. Despite being occasionally plagued by technical difficulties, fraud, and cybercrimes, it has been reported that cashless services are a preferred method of payment for both consumers and organizations due to their convenience (lesser administrative effort), accountability, and accessibility [20]. However, gender analysis of findings in this study indicated that females are more likely to adopt POS and bank transfer payments than males. This may be related to security issues. Marselina PSP found that the security of the payment system and perceived ease of use are important factors that influence the customer in deciding which payment system to use [21, 21]. Gender-based considerations become necessary when migration to digital platforms is desired.

PPMVs in Lagos have opted to use digital tools more than those in Kaduna, which prefer the traditional methods. The World Bank reports that digitalized financial tools have the potential to lower costs, increase speed, and security, and allow for more tailored services [23]. Differences observed in both states may arise due to differences in levels of economic development, access to digital infrastructure, and differences in market forces. In both states, except for the use of notebooks in record keeping, there were varying differences in relationships between sociodemographic variables and the operational/financial practices. Therefore, tailored approaches addressing differences in contexts would have to be unique and consider the socio-economic and infrastructural realities of each region. There are some major tier distinctions, with the upper-tier PPMVs being more likely than lower-tier PPMVs to adopt formalized practices and digital tools. Musantu in Zambia also showed that higher formal education is positively associated with a preference for digital financial tools [24]. This means that the lower-tier PPMVs may be faced with more operational challenges in upgrading services or seeking better financing. Closing this gap will require specific interventions in training and support programs for low-tier PPMVs to improve their business management skills and catalyse access to credit.

High levels of tax compliance were recorded among PPMVs, although ownership of corporate bank accounts was relatively low. Gender differences were also found in tax compliance that might reflect the differences in access to business formalization resources and tax education. Awareness and access to loans for PPMVs were limited, which further highlights the gap in financial literacy initiatives and credit facilities needed for specific engagements. However, findings by Abiola et al, show that financial literacy and good financial practices have a significant effect on the sustainability of the business [25].

Though the sample selection process purposively, was aligned with the goals of the Promoting Accreditation for Community Health Services (PACS) project to maximize security and efficiency, it can reduce the influence of chance and create selection bias, which in turn limits accurate representativeness in the broader population of PPMVs in Nigeria. Consequently, the findings might reflect the characteristics of the selected sample rather than the entire

population, limiting the external validity of the study. However, remarkable efforts were deployed to maximise representation in consideration of density, gender, and geographical spread.

Conclusion

This study revealed the gap in financial practices and operations in PPMVs; these were shaped by gender, tier, and region. The use of digital financial tools was more in Lagos, females and the upper tier of categorization. To close these gaps, strategies should target capacity building and digital tool adoption in order to catalyse improved access to financial services. The interventions should take into consideration the nuances in place of operation and tier of categorization, as well as context-specific models to enhance access to financing in order to enhance service delivery to consumers and ensure sustainability for PPMVs.

Abbreviations

AORs
adjusted odds ratios
CHEWs
Community Health Extension Workers
FGD
focus group discussions
HEFAMAA
Health Facilities Monitoring and Accreditation Agency
LASHMA
Lagos State Health Management Agency
LGAs
Local Government Areas
LSHS
Lagos State Health Scheme
NGOs
non-governmental organisations
OTC
over-the-counter
PACS
Promoting Accreditation for Community Health Services project
PCN
Pharmacy Council of Nigeria
PHCUOR
Primary Health Care Under One Roof
PPMVs
Patent and Proprietary Medicine Vendors
SPHCDA
Kaduna State Primary Health Care Development Agency
TSTS
Task-Shifting and Task-Sharing.

Declarations

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Availability of data and materials

The data used in this study can be made available to eligible researchers upon request, with the intention of enabling the replication of methods and findings. To request access, interested individuals should reach out to the corresponding author. Access will be granted upon the completion of a data use agreement outlining terms such as crediting data sources, adhering to ethical standards, safeguarding confidentiality, and restricting data dissemination.

Authors' contributions

Conceptualization: UI, OJ, EO, EAJr. Methodology and study design: GO, EAJr, PU, OS, OE, AB-A, AN. Data collection and supervision: GO, EAJr, PU, OS, OE, AB-A, AN. Formal analysis and data visualization: OS, PU, AN, EAJr. Writing—original draft: GO, PU. Writing—review and editing: UI, OJ, IB, EAJr, EO, OE. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Ethical approval was obtained from the Lagos State Ministry of Health (LSHREC/2024/0007) and the Kaduna State Ministry of Health (MOH/ADM/744/VOL.1/1110015). Written informed consent was obtained from all participants prior to enrolment. This study was performed in line with the principles of the Declaration of Helsinki. Participant anonymity and confidentiality were strictly maintained through the use of anonymized questionnaires and secure data handling procedures. Participants were informed of their right to withdraw from the study at any time without penalty. The study was conducted in accordance with national and international ethical standards.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

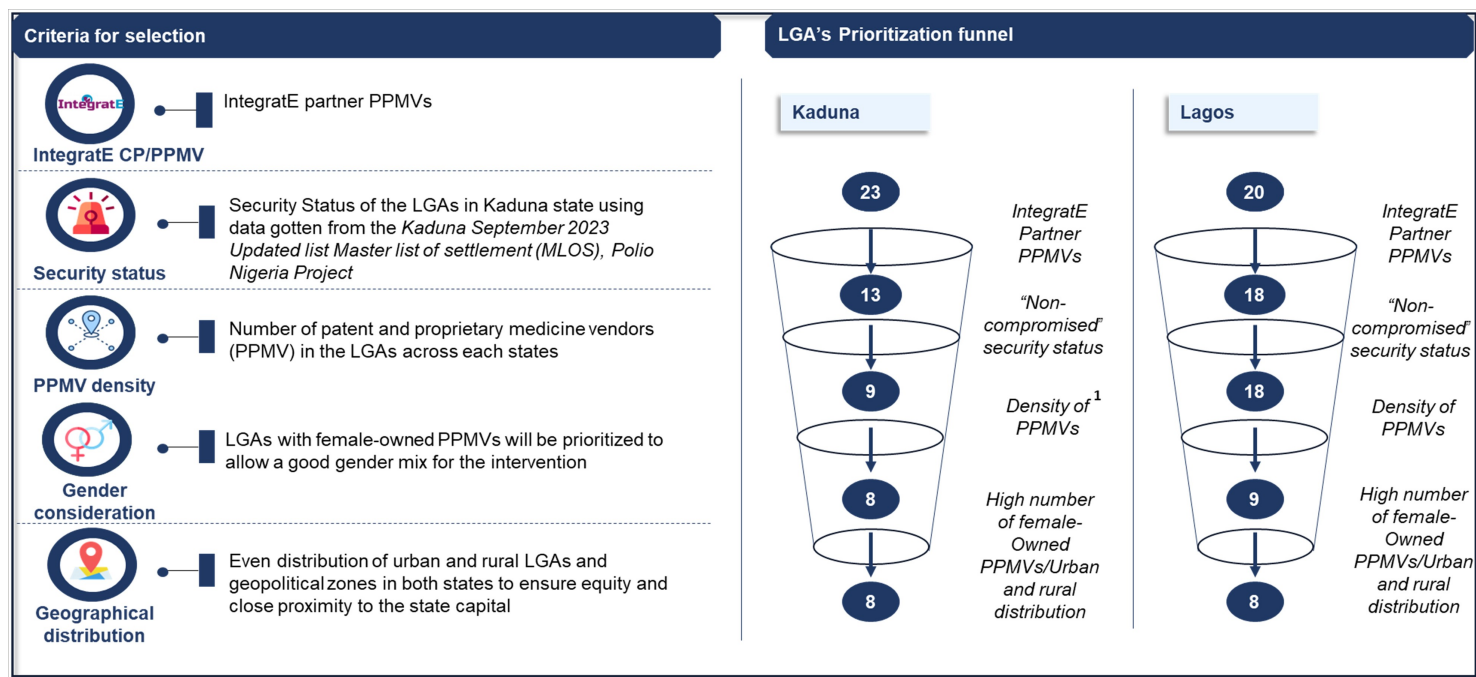


Figure 1

Criteria for LGA Selection in the Study (Source: SCIDaR Analysis)

Supplementary Files

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