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The Minimal Cost Implication of Establishing a Pharmacy School in Nigeria

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ABSTRACT

Background: Nigeria is arguably known for its robust higher educational system. Despite the extensive educational system, the availability of recognized pharmacy schools remains limited. The slow expansion of pharmacy programs is attributed, in part, to funding challenges confronting tertiary institutions. This highlights stepwise approach of the study, which focuses on equipment and human resources as the initial critical cost factors necessary for establishing an accredited pharmacy school to meet the growing demand for qualified pharmacists in Nigeria. This study investigates the comprehensive cost analysis associated with establishing a new pharmacy school in Nigeria, focusing on procuring essential equipment and recruiting necessary human resources.

Methods Utilizing regulatory requirements as a benchmark, the study employed online market stores to estimate equipment costs. Primary data was collected through an inquiry form to ascertain equipment prices, while secondary data from regulatory agencies and the salary and Wages Commission in Nigeria informed the cost requirements for both physical equipment and human resources (teaching and non-teaching).

Results: Findings reveal that the initial equipment investment required is approximately US$303,834. According to regulatory bodies, staffing must be according to student enrollment. Therefore, to launch the school with 25 students, a minimum of 4 lecturers, a technical and administrative personnel across five departments is required. The cost calculation is based on the basic salary structure for teaching and non-teaching staff essential for the school's inception. The projected start-up costs human resources are estimated at $91,485 per year.

Conclusion: The total expenditure (equipment and human resources) for establishing a pharmacy school is approximated at $395,319 emphasizing the financial considerations crucial for instituting and sustaining a pharmacy education program in Nigeria.

INTRODUCTION

Nigeria, the most populous country in Africa and the seventh largest globally, with an estimated population of 202 million as of 2023, underscores the critical need for a robust healthcare infrastructure to serve its burgeoning populace[1]. Amidst this dynamic landscape, the role of pharmacists has evolved from its origins as a supportive function to medical officers to a pivotal position as healthcare providers[2-4]. The significance of pharmacists is further magnified in the global context, where they rank as the third largest and most accessible healthcare professionals, collectively contributing to the pursuit of universal healthcare[5].

Despite Nigeria's extensive higher education system, comprising 52 federal, 63 state, and 147 private universities[6], the availability of recognized pharmacy schools remains limited, standing at only 22 institutions[7]. The slow expansion of pharmacy programmes is attributed, in part, to funding challenges confronting tertiary institutions, as noted by Knight (2019).[8] As of 2023, the registered pharmacist count in Nigeria stands at over 23,000, with a little more than 14,000 actively engaged in professional practice[7]. However, this translates to a pharmacist-to-population ratio of approximately 1:14,500,

indicating a substantial deficit compared to more developed nations[5].

As a result of the growing demand for qualified pharmacists, there is a pressing need to expand the number of accredited pharmacy faculties. This expansion, however, is not without financial implications. Olweny (2011) emphasizes the need to put together critical cost factors before embarking on a program. Also, Babalola (1995) acknowledged the necessity of conducting a comprehensive cost-feasibility study to gauge the viability of new programs. The global economic challenges highlighted by Hosein *et al.* (2011) reinforce the importance of securing financial support, either from government bodies or the private sector, for the development of tertiary institutions[9-11].

The private sector, as a key player in the growth of educational institutions, plays a crucial role in providing financial backing. However, Fahmi underscores the need for precise information on the cost of establishing specific programs, such as pharmacy schools, to facilitate informed resource allocation[12].

Despite the acknowledged importance of understanding the financial landscape, there exists a significant gap in the literature regarding the detailed monetary costs associated with establishing a pharmacy school. This knowledge void poses a substantial hurdle for potential investors, universities, and stakeholders considering the initiation of pharmacy programs in Nigeria. Against this backdrop, the present study aims to address critical questions:

a. What is the comprehensive cost breakdown associated with procuring the necessary equipment to establish and maintain a pharmacy school in Nigeria?

b. What is the financial commitment required for securing and sustaining the human resources essential for the establishment and continual operation of a pharmacy school in Nigeria?

Attempting to answer these questions and incorporating the most recent data available, the study seeks to provide an up-to-date understanding of the financial intricacies associated with establishing a pharmacy school in Nigeria, thereby offering essential insights for academic institutions, potential investors, and policymakers navigating the dynamic landscape of pharmaceutical education.

METHODS

This study adopted a descriptive approach, focusing on a survey of costs associated with acquiring both equipment and human resources essential for setting up a pharmacy school in Nigeria. The study excluded obtaining information such as the cost of buildings and furniture for starting a pharmacy school. The data collection period spanned from August to November 2021, utilizing both primary and secondary data sources.

Data Collection

Primary data was collected through a meticulously designed inquiry form, which comprised ten sections corresponding to key aspects of a pharmacy school, including pharmacology, pharmaceutical chemistry, pharmaceutics, pharmacognosy, pharmaceutical technology laboratory, clinical pharmacy, workshop, animal house, darkroom, and audiovisual equipment. The form featured open-ended questions aimed at obtaining detailed information on the cost of each individual piece of equipment.

To ensure a comprehensive analysis, prices for the identified equipment were sourced from diverse online market platforms, including well-established sources such as Amazon, eBay, Jumia, Indiamart, Konga, among others. This triangulation of data from multiple sources enhances the robustness and reliability of the study's findings, providing a better understanding of the financial considerations involved in establishing a pharmacy school in Nigeria.

In addition to primary data, secondary data was drawn from the Pharmacy Council of Nigeria (PCN) Benchmark Minimum Academic Standard, specifically under the laboratory equipment section, to delineate the minimum equipment and resources required for setting up a pharmacy school. Furthermore, secondary data was utilized to gather insights into the salary structure for pharmacy lecturers, a crucial component of the human resources required for the school's establishment.

Cost Estimation

The estimation of the cost of equipment associated with each department was done using the minimum benchmark. These pharmacy school's departments include; Pharmacology, Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmaceutical Technology, Clinical Pharmacy, Animal House, and the Workshop. In estimating the cost of human resource, the study followed the PCN guidelines for staffing, which specify a staff-to-student ratio of 1:6 for pharmacy programs. calculations were done for the minimum number of staff required for a department to start operation. For example, for a starting number of 25 students, the five departments in the faculty of pharmacy each require a minimum of four academic staff, one

technician, and one administrative staff. In addition, one of the academic staff members must be at the minimum level of a professor. Therefore, a minimum of 20 lecturers, five technical and five administrative staff would be required for the faculty to start up with 25 students present. Salaries for academic staff were sourced from the Salaries and Wages Commission's published scales.

Data analysis

This study was descriptive cost analysis research to investigate the cost of establishing a pharmacy school by obtaining the cost associated with acquiring both equipment and human resources, hence no inferential statistical analysis was undertaken. To standardize the costs and use a stable and widely accepted currency for estimation, they were grouped according to the respective departments and translated to US dollars at an exchange rate of ₦793.80 per dollar.

It is imperative to note that this study intentionally excludes the cost of building facilities, maintenance, and day-to-day operational expenses. The decision to exclude buildings from the scope of the current study is strategic and aligns with a stage-by-stage approach[24].

The exclusion of building costs is deliberate, rooted in a methodological decision to manage the scope of the research effectively. A focused scope allows for an in-depth analysis of specific aspects—equipment and human resources—without overwhelming the investigation. This stage-by-stage approach ensures a systematic exploration of each facet involved in establishing a pharmacy school, preventing information overload, and facilitating a more digestible presentation of findings. Several factors contribute to this exclusion, emphasizing the feasibility considerations, resource and time constraints, and the need for a detailed examination of each aspect in subsequent stages. Building costs entail a distinct set of considerations, including architectural planning, construction materials, and adherence to local regulations. Given the resource limitations and time constraints inherent in the current study, prioritizing equipment and human resources allows for a more focused and detailed exploration of these critical aspects.

Ethical approval

This study did not require ethical approval because it did not involve human subjects or sensitive data. The analysis was entirely based on publicly available data and market research. However, the study strictly adhered to accepted academic and research guidelines.

RESULTS

Comprehensive breakdown of equipment costs

department in the pharmacy school, as outlined by the Pharmacists Council of Nigeria (PCN). The total equipment cost for establishing a pharmacy school, as outlined by the Pharmacists Council of Nigeria, is estimated at $303,834. This includes essential equipment across various departments such as Pharmacology, Pharmaceutics, Pharmacognosy, Pharmaceutical Chemistry, Pharmaceutical Technology Laboratories, Clinical Pharmacy, and administrative units, as well as facilities like a workshop, animal house, and darkroom. The most significant expenditure is allocated to the Pharmaceutical Technology Laboratories, with a total cost of $126,464.

Table 1: Equipment Costs of each Department as Outlined by the Pharmacy Council of Nigeria.

S/N	DEPARTMENT	AMOUNT
1	Pharmacology	$26,139
2	Pharmaceutics	$37,605
3	Pharmacognosy	$42,135
4	Pharmaceutical Chemistry	$35,430
5	Pharmaceutical Technology Laboratories	$126,464
6	Clinical Pharmacy	$26,904
7	Workshop	$4,743
8	Animal House	$1,475
9	Darkroom	$2,027
10	Administrative Pharmacy (Audio Visual Equipment)	$912
	Total	**$303,834 (₦241 ,183,429.20)**

Cost of Human Resources

In calculating the cost of human resources, the minimum number of staff required for each department was considered. For a starting number of 25 students, the five departments in the faculty would require a total of 20 lecturers, five technical staff, and five administrative staff. Notably, the highest cost is associated with the professors, totaling $31,955 annually, while the cost for technical staff is $10,681. Table 2 presents the detailed breakdown of the cost of human resources per year. The total cost for human resources was calculated to be $91,485.

Table 2: Cost of Human Resources per Year.

S/N	Staff Category	Number	Number for Five Departments	Number x Salary/ year (₦)	Total (₦)	Total (USD)
1	Lecturer II	1	5	5 x 2,425,322	12,126,610	15,277
2	Lecturer I	2	10	10 x 1,925,958	19,259,580	24,262
3	Professor	1	5	5 x 5,073,220	25,366,100	31,955
4	Technical Staff	1	5	5 x 1,695,770	8,478,850	10,681
5	Administrative	1	5	5 x 1,478,046	7,390,230	9,310
	Total				72,621,370	91,485

DISCUSSION

Opportunity Cost and Educational Prioritization

Establishing a pharmacy school involves not just financial considerations but also understanding the opportunity cost in a developing country like Nigeria. In sub-Saharan Africa, prioritizing resources for education, particularly in the establishment of medical schools is one that requires strategic planning and governmental commitment[13-15].

Opportunity cost, as defined by Voiculescu (2009)[16], refers to the sacrifice made to obtain something. It is what would have been won if another option was chosen. In the context of establishing a pharmacy school, this opportunity cost extends beyond financial investments. It encompasses the real sacrifices required during the process of education[14]. Most government officers and politicians in developing countries are often inclined towards projects that offer immediate visibility and political mileage[17]. Urgent matters like road construction, unfinished government projects, and tackling unemployment take precedence over long-term investments in education. Consequently, education, and by extension, the establishment of a pharmacy school, faces budgetary constraints, reducing the financial allocations needed for successful initiation and operation. For effective advocacy and allocation of resources, a fundamental shift in perception is necessary, highlighting education as a strategic and urgent need deserving of sustained financial commitment.

Equipment Cost Estimation and Currency Considerations

The cost estimation for equipment encompasses a global perspective, reflecting the international nature of pharmaceutical procurement[18]. The pharmaceutical industry relies heavily on global suppliers like from the U.S.A, China, India and Japan for cutting-edge equipment and technology. This international dependency contributes to the invariable increase in the cost of procurement, especially when considering additional expenses such as shipping. Consequently, the study employed a meticulous approach, converting costs from various currencies to dollars acknowledging it as a stable and widely accepted currency for estimation and recognizing its role in international transactions[19]. Thus, converting costs from currencies like Indian Rupees, Naira, Euros, and China's

Yuan to dollars provided a standardized metric for assessing the financial implications of establishing a pharmacy school.

Human Resources: Balancing Quantity and Quality

Human resources play a pivotal role in the optimal functioning of a pharmacy school[18]. Adhering to PCN benchmarks, the study calculated the minimum staff required for each department, emphasizing the importance of maintaining an ideal student-to-teacher ratio[20]. However, discrepancies between the ideal ratio and actual recruitment practices raise concerns, necessitating a closer examination of quality versus quantity in staffing.

According to the PCN (2008) and the National Universities Commission (NUC) (2014) benchmarks for Pharmacy education, academic staffing should be according to student enrollment. While the NUC has a more accommodating ratio of 1:10, the PCN insists on a stricter 1:6 staff/student ratio for Pharmacy Colleges to ensure effective learning experiences and individual attention for students thereby promoting quality education[6-7,25].

The PCN and NUC standards also mandates a staff mix of professors, senior lecturers, and others from lecturer I and below in a ratio of 25%:30%:40%, respectively. This is to ensure that there is adequate academic experience for a start-up institution. A minimum ratio of 1:4 technical staff/academic staff is also required. while administrative staffing is compulsory to a startup institution, no benchmark is stated. Administrative staffing, however, must also be in proportion to academic staffing[6-7,26].

The aforementioned benchmarks serve as a basis for justifying the allocation of institutional resources and mediating among competing demands for additional program staff or space . However, the implementation of these benchmarks is often compromised due to challenges in recruitment processes, inadequate funding, over-enrolment and high degree of "brain-drain" as noted in a previous study[20-21].

Cost Variations and Global Dependencies

The study revealed that variations in the cost of equipment were influenced by factors such as importation, international suppliers, functionality and technological complexities. Equipment costs, ranging from a few dollars to significant amounts, mirror the complexity of pharmaceutical technology laboratories[19].

Just as balancing quality and quantity is essential for human resources, the same principle applies to equipment. While the PCN and NUC BMAS outline minimum equipment requirements for pharmacy schools, financial constraints often prevent institutions from acquiring every item at the outset. Many schools prioritize essential equipment and adopt a phased procurement approach, gradually acquiring more advanced or specialized tools as resources permit. Though practical, this strategy raises concerns about its impact on education quality, especially in technical fields like pharmaceutical technology, where access to sophisticated equipment is vital for effective learning. Additionally, it may affect the school's ability to meet accreditation standards set by the PCN and NUC.

This study also revealed disparity in the renumeration of staffs compared to global standards, particularly between developing and developed countries. The cost of human resources including the remuneration of academic and administrative staff, emerged as a significant concern when benchmarked against global standards. In 2001, Erhun and Babalola disclosed that the monthly salary of an academic pharmacist in Nigeria ranged from $500 to $1000. However, this study revealed the annual salary of a professor is approximately $6,391. By contrast, in the United States of America, the average entry-level basic annual salary is about $50,377 and $86,168 for senior lecturers. While recognizing the need for comprehensive considerations in cross-country salary comparisons, the substantial disparity between the reported figures remains striking and concerning[22-23]. Such differences highlight a major challenge faced by academic institutions in developing countries in attracting and retaining qualified staff. Therefore, it is important that while acknowledging the economic realities and resource constraints in Nigeria, it is imperative for policymakers and educational institutions to explore avenues for enhancing staff remuneration to attract and retain qualified professionals. This may involve seeking innovative funding mechanisms, engaging with the private sector, or implementing performance-based incentives to bridge the gap and elevate the standards of remuneration in line with global benchmarks. Addressing this issue is crucial not only for the well-being of academic and administrative staff but also for fostering a conducive and competitive environment in Nigerian higher education.

Cumulative Estimated Cost and Exclusion of Buildings

The culmination of the estimated costs for equipment and human resources for the start-up of a pharmacy school amounts to $395,319.

Limitations of the Study

This study has several limitations that should be

acknowledged. Firstly, the exclusion of building costs, maintenance, and daily operational expenses limits the comprehensive assessment of all facets involved in establishing a pharmacy school. The study's reliance on a fixed exchange rate (793.80 Naira to 1 Dollar) presents potential inaccuracies as currency exchange rates are subject to fluctuations. The omission of used equipment costs oversimplifies the assessment, neglecting potential cost-saving avenues. The study's geographic focus on Nigeria may restrict the generalizability of findings to other regions with distinct economic, regulatory, and educational contexts. Assumptions of standardization in equipment costs, fixed human resource ratios, and static salary structures might not fully capture the dynamic and diverse real-world scenarios. Additionally, the projection of human resource costs for a single year oversimplifies the complex staffing dynamics that institutions may experience over time. These limitations underscore the need for careful interpretation and highlight avenues for future research refinement**.**

Recommendations

Strategic Resource Prioritization: It is crucial for governments and stakeholders to strategically prioritize education in national development plans. Allocating sufficient funds and resources to the establishment of pharmacy schools will contribute to the overall improvement of healthcare infrastructure and workforce.

Diversified Funding Strategies: To overcome financial constraints in establishing pharmacy schools, institutions and policymakers should explore diverse funding sources. Public-private partnerships, international collaborations, and innovative financing mechanisms can play a pivotal role in ensuring sustainable funding for educational initiatives.

Localized Equipment Production: Encouraging the local production of essential pharmaceutical laboratory equipment is imperative. This strategy not only reduces costs associated with importing equipment but also stimulates economic growth by fostering a self-sufficient and sustainable environment within the pharmaceutical sector.

Optimal Human Resource Management: Adherence to recommended staffing ratios is essential for the effective functioning of pharmacy schools. Institutions should prioritize robust recruitment processes to ensure qualified and competent faculty members. Additionally, a focus on providing students with practical learning experiences will contribute to the overall enhancement of pharmacy education quality.

CONCLUSION

In conclusion, this study aimed to reveal the cost implications of establishing a pharmacy school in Nigeria. The estimated total cost for equipment and human resources for the start-up amounts to $395,319, excluding building costs. The decision to exclude cost of buildings allowed for a focused exploration of equipment and human resources. The findings present the minimum costs which underscores the financial intricacies and challenges involved in establishing a pharmacy school, providing valuable insights for future considerations by stakeholders or policy makers.

This study also laid a foundational understanding of the financial landscape, emphasizing the need for strategic planning and comprehensive resource allocation in the establishment of Pharmacy schools. The study also highlighted the disparity in staff renumeration when benchmarked against global standards which raises significant concern. Ensuring adequate funding for equipment and human resources is essential for maintaining quality education and meeting global standards. Therefore. it is important that as Nigeria seeks to expand and improve its higher education sector, there must be careful consideration of these factors which would be pivotal in providing an equipped and well-structured facility that not only offers quality education but also rewards staff appropriately.

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