



Institutionalization of a Power BI-Based National Dashboard for Pharmacy Workforce Monitoring in the Philippines

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Introduction

The shortage of pharmacists has become a critical issue in the Philippines. Not only does the supply of registered pharmacists fall short of the rising demand, but also the maldistribution of the pharmacy workforce persists in many rural communities (GMA Integrated News 2025).

To address this scarcity of pharmacists, the Commission on Higher Education's (CHED) Pharmacy Education Roadmap 2030 was developed. It aims to push for policy recommendations and educational reforms specifically designed to the challenges and needs of the country. With this framework came two important policy recommendations, which are: (1) to amend Republic Act No. 10918, implementing rules and regulations, and (2) to revise CHED Circular Memorandum Order (CMO) No. 25. s.2021.

The first policy recommendation aims to incorporate ladderized education, telepharmacy, and rural practice incentives into the pharmacy sector. The proposed ladderized pharmacy education framework provides Bachelor of Science (BS) in Pharmacy students with exit points at various stages of their education in case of incompleteness. These exit points lead to certifications for subprofessional careers credited by either the Professional Regulation Commission

(PRC) Board of Pharmacy or Technical Education and Skills Development Authority (TESDA). Additionally, the amendment on RA No. 10918 aims to advance the digitalization of the pharmacy profession, allowing and enabling pharmacists and certified subprofessionals to provide service in geographically disadvantaged areas. The amendment also recommends offering incentives, such as scholarship-for-service, to encourage prospective pharmacists to practice in rural communities.

Meanwhile, the second policy recommendation, i.e., the proposed revision to CHED CMO No. 25, s.2021, supports the integration of the aforementioned ladderized pharmacy education framework and recommends a reevaluation of the curriculum so that it aligns with emerging trends in the field (e.g., telepharmacy and data analytics). This also emphasizes the need to tailor the curriculum to the needs of communities.

These policy recommendations intend to increase the workforce in the pharmacy field, especially in the rural area. Thus, to assess the effectiveness and measure the outcomes of these policies, it is essential to monitor the job trends, licensure outcomes, and geographic distribution of the pharmacy workforce.

Such monitoring allows policymakers to create timely and evidence-based policies that respond to the ever-evolving landscape of the pharmacy profession. This monitoring can be achieved through a dashboard, which was the original instrument used to formulate and contextualize the Pharmacy Education Roadmap.

This paper thus proposes the institutionalization of a Power BI-driven national dashboard to monitor the country’s pharmacy workforce. This will act in complement to the Pharmacy Education Roadmap. The paper also further discusses the major considerations when implementing this as a national tool.

Discussion: Usage of Microsoft Power BI Dashboard in Contextualizing the Pharmacy Education Roadmap 2030

The Pharmacy Education Roadmap is a strategic framework that tackles the challenges and opportunities for transformation in the Philippine pharmacy profession. It was tailored to the Philippine pharmacy workforce’s context, which was characterized through an explanatory sequential mixed-methodology approach.

This study’s methodology had two main phases. The first phase was a thorough and comprehensive review of Licensure, Policies, Standards, and Guidelines (LPSGs) to highlight policy gaps and align existing frameworks. This was further enriched by analyzing quantitative data about the pharmacy education and workforce.

The data used for the quantitative analysis were secondary in nature and derived from multiple government agencies, which include, but are not limited to: Food and Drug Administration (FDA), Department of Health (DOH), Department of Labor and Employment (DOLE), Professional Regulation Commission (PRC), Commission on Higher Education (CHED), Department of the Interior and Local Government (DILG), Philippine Statistics Authority (PSA), Department of Migrant Workers (DMW), Overseas Workers Welfare Administration (OWWA), and Philippine Pharmacists Association (PPhA).

Supply and demand data were collated from the aforementioned organizations. The supply variables consist of: pharmacy education data (number of pharmacy schools and graduates); Philippine Pharmacist Licensure Examination (PPhLE)

data (number of PPhLE takers, passers, and the corresponding passing rate); and practicing pharmacist data (number of registered pharmacists, pharmacists with valid professional identification cards [PICs], and the PIC renewal ratio).

On the other hand, the demand variables include: pharmaceutical industry establishments from the FDA database (such as drug distributors, sponsors, traders, manufacturers, and contract research organizations); community pharmacy establishments (including drugstores and retail outlets for non-prescription drugs); hospitals; pharmacy schools; and primary health care facilities, which collectively constitute the national minimum demand.

The data were used to generate visualizations in Microsoft Power BI. Microsoft Power BI offers a comprehensible presentation of key analytical outcomes. This is particularly helpful in enabling decision-makers to derive insights and make evidence-based decisions. Various visualization tools were used to present the data and derive insights from it. Some of which include: line and stacked column charts, pie charts, and clustered column charts. To analyze these data, the researcher developed three dashboards, which were: pharmacy education (Figure 1), pharmacy workforce supply (Figure 2), and pharmacy workforce demand (Figure 3).

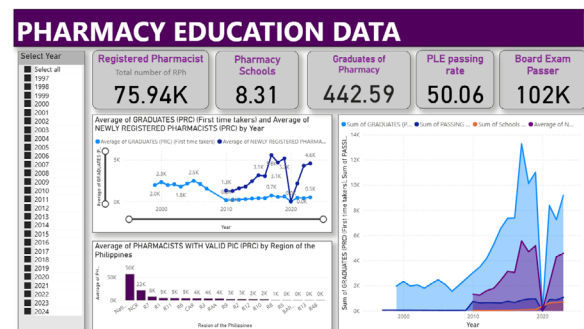


Figure 1. Pharmacy education dashboard

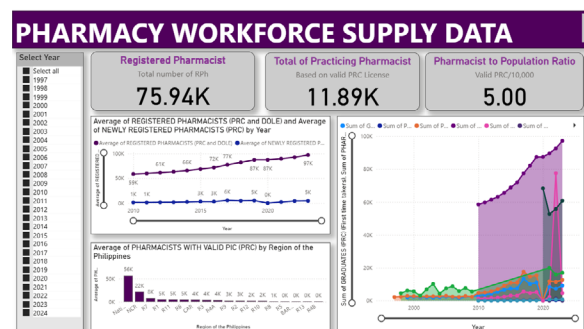


Figure 2. Pharmacy workforce supply dashboard

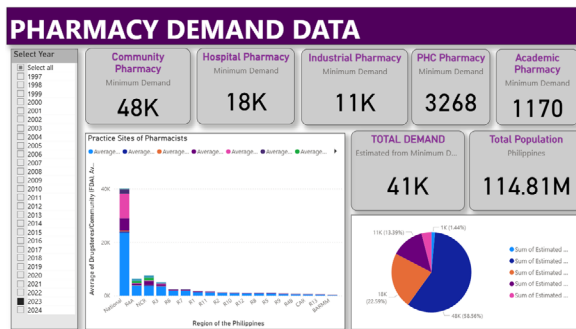


Figure 3. Pharmacy workforce demand dashboard

The analysis and visualization focused on exploring relationships among variables, particularly the influence of educational institutions, licensure examination performance, and workforce distribution.

These Power BI dashboards showed that a supply-demand gap remains, particularly in rural areas, despite the improved pharmacist-to-population ratio. Workforce demand is also concentrated in urban centers, which highlights the need for targeted policy interventions.

Apart from these insights, the researcher conducted a descriptive study highlighting the key features of Microsoft Power BI. This involved a comprehensive analysis of how the platform's diverse functionalities enable efficient data processing, visualization, and informed decision-making. The study further illustrated the reports and forecasts generated through Power BI, demonstrating its practical applications in real-world contexts. Additionally, the research explored insights and trends powered by artificial intelligence.

Overall, dashboarding through Power BI has proven useful and convenient in contextualizing the problems of the Philippines in relation to the pharmacy workforce.

Policy Recommendation: Power BI-Based National Dashboard for Pharmacy Workforce Monitoring

The national government should institutionalize a Power BI-driven centralized dashboard as a standard mechanism for evidence-based decision-making, monitoring, and strategic planning of the pharmacy workforce in the Philippines. This is to be utilized by the Professional Regulatory Board of Pharmacy (BOP), together with the Philippine Pharmacists Association, which are the government agencies

responsible for regulating and monitoring the practice of pharmacy in the country. It is in their mandate to enhance the profession through the adoption of measures for the advancement and maintenance of high professional, academic, ethical, and technical standards (Republic Act No. 10918). To do so, a centralized dashboard is instrumental.

Modeled after the methodology of this study, this centralized dashboard consists of three components: (1) pharmacy education, (2) pharmacy workforce supply, and (3) pharmacy workforce demand.

Implementing this dashboard requires establishing comprehensive guidelines for an efficient data pipeline. The data pipeline is comprised of a series of processes that transport and transform data from multiple sources into a target system where it becomes suitable for analysis. They serve as the foundation of analytics, reporting, and machine learning applications (Densmore 2021).

In this context, the data pipeline starts with an automated collection of supply and demand data from relevant agencies, such as the FDA, PRC, and PPhA.

The data collected include the following, but are not limited to: Philippine Pharmacist Licensure Examination (PPhLE) data (including the number of PPhLE takers, passers, and the passing rate) and practicing pharmacists (number of registered pharmacists, pharmacists with valid professional identification cards (PICs), and the PIC renewal ratio). Other than these, demand data must be collected through various pharmaceutical industry establishments, community pharmacy establishments, hospitals, pharmacy schools, among others. In this data collection, the interoperability of data must also be taken into account. Data interoperability refers to the ability of different organizations to exchange, understand, and use data seamlessly. In this context, syntactic interoperability is important, considering the large volumes of data that have to be readily accessed and preprocessed from other organizations' systems (Rinderle-Ma et al. 2024).

Afterwards, the data may undergo processing, which may involve integration, transformation, imputation, and other operations to prepare it

for analysis or storage. All of the preprocessing required may be done through Power BI.

Power BI is then used to create the dashboard. It is a cost-effective and user-friendly business intelligence (BI) platform from Microsoft that offers various data visualizations, such as pie charts, line charts, scrollers, clustered column charts, card visuals, and slicers (Ferrari and Russo 2016).

Power BI also has artificial intelligence features, such as natural language queries and automated insights (Manchanayake 2025), which help in uncovering trends without the need of advanced programming. These features can be incorporated into the said dashboard to aid in creating timely policies based on the dynamic supply and demand of the pharmacy workforce in the country.

In essence, this Power BI-driven dashboard is essential in monitoring the following: (1) pharmacy workforce trends, (2) licensure outcomes, and (3) geographic distribution.

For example, by utilizing its regional data, the dashboard can effectively support the proposed “Pharmacist to the *Barrios*” program, a recommended novel policy designed to address the maldistribution of the pharmacy workforce in underserved rural areas. This is inspired by the existing “Doctor to the *Barrios*” program, which aims to address healthcare inaccessibility in rural areas (Barredo et al. 2023). Specifically, the dashboard can identify regions with workforce shortages and forecast potential future shortages to inform targeted interventions.

In addition to the dashboard, a comprehensive data governance framework is also essential. This must be considered when implementing a Power BI-driven dashboard as a national tool.

Implementation

Considerations: Data Governance Framework

Data governance is a collection of practices that aim to ascertain data quality, data integrity, and data ethics, among others (Eryurek et al. 2021).

The creation of a Power BI-driven national dashboard implies the involvement of many

sources, where data may have diverse issues in terms of ownership and data quality issues (e.g., formatting, redundancy, and credibility).

The data governance framework herein must be clear in defining the roles and responsibilities of entities in relation to data. It must detail how these data assets are managed, protected, and used.

Other than that, a data governance framework must also involve setting up clear processes and controls to maintain the quality and integrity. In essence, data governance focuses on keeping data reliable and trustworthy. This ensures that it can be used confidently for analysis, planning, and decision-making.

Conclusion

Tackling the shortage and maldistribution of pharmacists in the Philippines does not only require comprehensive policy action, but also the development of a centralized dashboard to support timely and evidence-based decision-making.

The institutionalization of a Power BI-driven national dashboard offers a cost-effective and user-friendly solution for monitoring, evaluating, and forecasting pharmacy workforce trends. Implementing this as a national tool necessitates the creation of a robust data pipeline and an effective data governance framework. The insights generated from this system will be instrumental in shaping the Pharmacy Education Roadmap 2030 and beyond.

To ensure sustainability and strategic direction, the PRC Board of Pharmacy, in collaboration with the PPhA, can take the lead in managing this initiative. Supported by the principles of freedom of information and transparency, relevant government data from the DOH, FDA, CHED, and other key agencies must be shared and jointly analyzed. This collaborative approach will enable the formulation of more responsive, data-driven, and forward-looking workforce policies for the pharmacy profession in the country.

References

- Barredo, isaiah Anthony Thomas, Guia Marin Alberto, Bianca Damiles, Alaiza Jonna Digal, John Mickael Diokno, Marco Antonio Palanca, and AL Prince Sangual. 2023. "The Role of the Doctors to the Barrios Program in Addressing Rural Health Care Inaccessibility in Eastern Visayas." Research Paper, University of Perpetual Help System DALTA. DOI: 10.13140/RG.2.2.29438.77123.
- Densmore, James. 2021. *Data Pipelines Pocket Reference*. O'Reilly Media, Inc.
- Eryurek, Evren, Uri Gilad, Valliappa Lakshmanan, Anita Kibunguchy-Grant, and Jessi Ashdown. 2021. *Data Governance: The Definitive Guide*. O'reilly Media.
- Ferrari, Alberto, and Marco Russo. 2016. *Introducing Microsoft Power BI*. Redmond, Washington: Microsoft Press.
- GMA Integrated News. 2025. "PH hobbled by shortage of 27,500 registered pharmacists — PSAC." GMA News Online, 8 March 2025. https://www.gmanetwork.com/news/topstories/nation/938624/ph-hobbled-by-shortage-of-27-500-registered-pharmacists-psac/story/?utm_source=chatgpt.com.
- Manchanayake, Sachini. 2025. "Power BI AI Capabilities: Transform Data Insights." Business Experts MEA LLC, 3 January 2025. https://www.bemea.com/power-bi-ai-capabilities-transform-data-insights-2/?utm_source=chatgpt.com.
- Republic Act No. 10918. "Philippine Pharmacy Act.", 21 July 2016. elibrary.judiciary.gov.ph/thebookshelf/showdocs/2/70354
- Rinderle-Ma, Stephanie, Jürgen Mangler, and Daniel Ritter. 2024. *Fundamentals of Information Systems Interoperability*. Springer Nature.

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