

EXPERIENCE REPORT

Business Intelligence in supporting strategic health management: an experience report

Business Intelligence no apoio à gestão estratégica em saúde: um relato de experiência

Business Intelligence en apoyo a la gestión estratégica en salud: relato de experiencia

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ABSTRACT

Background and objectives: In 2015, Microsoft launched a Business Intelligence service, called Power BI, which can be used in several areas of knowledge if operated by a qualified professional. Power BI has several utilities, including the integration of data from various sources and formats, case mapping, real-time data visualizations, and remote work. This study aimed to report the use experience of Power BI by utilizing data from a State Department of Health Western Amazon, Brazil. **Methods:** As an example, cases of tuberculosis in the state of Acre, from 2010 to 2020, were used. These data were extracted from the Notifiable Diseases Information System, provided by the State Health Department of Acre – SESACRE. **Results:** Power BI offers a simple and intuitive interface. To share the experience, we provided a link (<http://tiny.cc/tbacre>) to explore the tool and understand the speed and practicality in data visualization. **Conclusion:** We recommend the use of Power BI mainly in agencies that need agile decision-making based on evidence.

Keywords: Health Information Management. Epidemiological Monitoring. Information Technology. Communicable Disease Control.

RESUMO

Justificativa e objetivos: Em 2015, a Microsoft lançou um serviço de *Business Intelligence* (Inteligência de Negócios), chamado *Power BI*, que pode ser empregado em diversas áreas do conhecimento, desde que operado por um profissional capacitado.

Possui diversas utilidades, entre elas: a integração de dados provenientes de diversas fontes e formatos, mapeamento de casos, visualizações de dados em tempo real e trabalho remoto. Este trabalho propôs relatar a experiência de uso do *Microsoft Power BI* utilizando dados de uma Secretaria Estadual de Saúde da Amazônia Ocidental, Brasil. **Métodos:** Como exemplo, utilizam-se casos de tuberculose no estado do Acre, de 2010 a 2020, extraídos do Sistema de Informação de Agravos de Notificação (Sinan), fornecidos pela Secretaria de Estado da Saúde do Acre (Sesacre). **Resultados:** O *Power BI* oferece uma interface simples e intuitiva. Para compartilhar a experiência, foi fornecido um link (<http://tiny.cc/tbacre>) por meio do qual foi possível explorar a ferramenta e perceber a rapidez e praticidade na visualização de dados. **Conclusão:** Recomenda-se sua utilização sobretudo em órgãos que necessitam de tomadas ágeis de decisões baseadas em evidências.

Descritores: Gestão da Informação em Saúde. Monitoramento Epidemiológico. Tecnologia da Informação. Controle de Doenças Transmissíveis.

RESUMEN

Justificación y objetivos: En 2015, Microsoft lanzó un servicio de *Business Intelligence*, denominado *Power BI*, que puede ser utilizado en diversas áreas del conocimiento siempre que sea realizado por un profesional capacitado. Tiene varias utilidades, incluyendo la integración de datos de diferentes fuentes y formatos, mapeo de casos, visualización de datos en tiempo real y trabajo remoto. Este trabajo propuso relatar la experiencia de uso de *Microsoft Power BI* utilizando datos de un departamento de salud estatal en la Amazonía Occidental, Brasil. **Methods:** Como ejemplo, se utilizaron casos de tuberculosis en el estado de Acre, de 2010 a 2020, extraídos del Sistema de Información de Enfermedades de Declaración Obligatoria – SINAN, proporcionado por la Secretaría de Salud del Estado de Acre – SESACRE. **Results:** *Power BI* ofrece una interfaz sencilla e intuitiva. Para compartir la experiencia, se facilitó el enlace (<http://tiny.cc/tbacre>). A través de esto, fue posible explorar la herramienta y darse cuenta de la rapidez y practicidad en la visualización de datos. **Conclusión:** Recomendamos su uso, sobre todo, en órganos que necesiten una toma de decisiones ágil y basada en evidencias.

Palabras clave: Gestión de la Información en Salud. Vigilancia Epidemiológica. Tecnología de la Información. Control de Enfermedades Transmisibles.

INTRODUCTION

In recent decades, due to technological advances, data accumulation in all fields of knowledge increased. Such information, converted into practical knowledge, promote major disruptions in public or private companies and, thus, are considered a valuable resource.¹

However, considering the costs of collection and storage, the data obtained must have relevant information to be extracted. Thus, after obtaining the data, it is necessary to classify them so hypotheses can be propose and tested.¹ Moreover, a given information

may have an expiration date and loses its value if certain actions are not implemented at that specific time, which may result in losses of many kinds.²

Since 1991, the Brazilian Ministry of Health has an Informatics Department of the Brazilian Unified Health System (DATASUS) and has developed more than 200 systems.³ Currently, the amount of data stored is greater than the ability to turn them into information useful for decision making. Moreover, the data are obtained in the most diverse sources and formats, making it difficult their dynamic management and analysis.⁴

Nevertheless, government health agencies in Brazil suffer from difficulties in the systematic analysis of data due to several obstacles, such as a shortage of human resources and budgets. Thus, the agencies often fail to deliver timely responses to public health demands.⁵

To transform data into information, the U.S. company Microsoft launched in 2015 a business intelligence service called Power BI (Business Intelligence), which can be used in several areas of knowledge to extract, integrate, and centralize data from many sources and formats.^{6,7}

This study aimed to report the use experience of Power BI by utilizing data from a State Department of Health of Western Amazon, Brazil.

METHODS

This is an experience report of the use of the Microsoft Power BI program, based on an experimental approach of the database of tuberculosis cases in the state of Acre, from 2010 to 2020. The databases were provided by the State Health Department of Acre (SESACRE) in spreadsheets. For the incidence calculation, we used population estimates provided by DATASUS.³

To enable the control panel of Power BI, also known as dashboard, all data were universalized to the same standard to enable communication between them. For variables to respond together, connections were made sequentially between them. This stage in the process is complex because any mistaken connection can generate incongruous data. At the end of this procedure, the program provides a link to access the data.

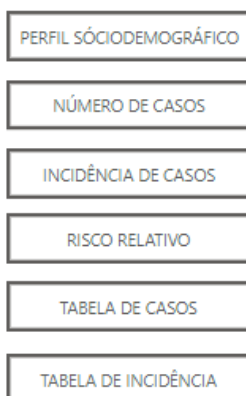
This type of study that involves data from the public domain without the identification of individuals does not require approval from the Research Ethics Committee.

RESULTS

Power BI offers a simple and intuitive interface. To illustrate the interface, we created a link (<http://tiny.cc/tbacre>), in which is possible to try the tool by using a computer or mobile phone.

On the home screen, there is an access list to several pre-programmed databases. The initial step is choosing an available database. As an example, we chose the first option – “Sociodemographic Profile” (Figure 1).

DADOS TUBERCULOSE ESTADO DO ACRE



Verte do Português para o Inglês (Figura 1):

DATA OF TUBERCULOSIS IN THE STATE OF ACRE

SOCIODEMOGRAPHIC PROFILE

NUMBER OF CASES

INCIDENCE OF CASES

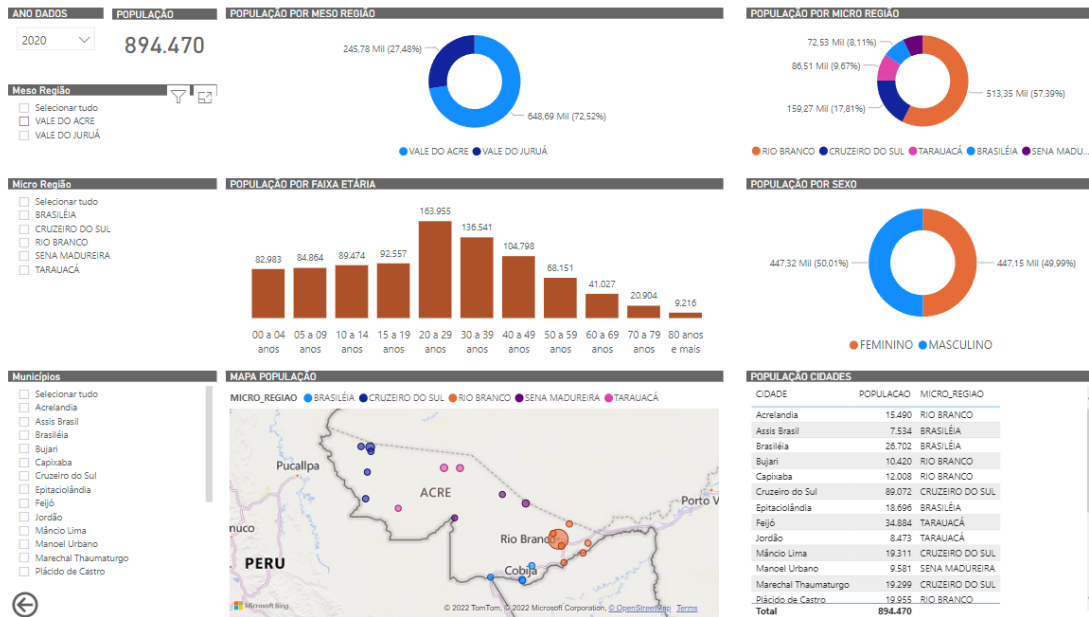
RELATIVE RISK

TABLE OF CASES

TABLE OF INCIDENCE

Figure 1. Home screen with access to different databases.

On the “Sociodemographic Profile” display screen there is a menu on the left with pre-inserted filters: year, mesoregion, microregion, and cities (Figure 2). The second step is selecting the desired filters to view the data. By the graphs in the example, we observed different sociodemographic profiles, according to age group, gender, year, and location. In the lower left corner of this screen, there is an option to return to the home screen that allows access to the other previously programmed bases, with new options of filters and graphics.



Verter do Português para o Inglês (Figura 2):

YEAR OF DATA; POPULATION; POPULATION BY MESOREGION; POPULATION BY MICROREGION
 Mesoregion; Microregion; Seleccionar tudo = Select all;
 POPULATION BY AGE; POPULATION BY SEX
 Mil = substituir por 000; a = to; anos = years old;
 FEMININO = FEMALE; MASCULINO = MALE
 Municípios = Cities; POPULACION MAP; CITIES' POPULATIONS;
 CIDADE = CITY; POPULACAO = POPULATION; MICRO_REGIAO = MICROREGION

Figure 2. Display screen of the “Sociodemographic Profile” database.

The programming of Power BI may require intermediate knowledge in computer science and/or specialized technician. However, by overcoming the difficulty of programming, we observed a customizable program that greatly assists database understanding and automatically updates as new data is entered.

DISCUSSION

The concept of Business Intelligence (BI) emerged in 1958 and it was applied to any type of organization, such as industrial, scientific, or governmental.⁷ In the 1990s, BI was defined as a generic term that addresses concepts and methods to improve evidence-based decision-making.⁸

Power BI synchronizes services such as spreadsheets, websites, social networks, and other sources. According to Microsoft, the service is an “unified and scalable platform for enterprise and self-service BI, which is easy to use and helps gaining deeper insights into the data.”⁶

In short, using BI makes analysis faster and more practical, since it is unnecessary to search for data spread across several programs and platforms. Thus, it is easier to understand the data and to draw more assertive strategies.^{2,4}

Among other advantages, the program features case mapping, real-time information sharing, and remote working options⁹. Power BI can be useful in scientific communication by facilitating the visualization of data in scientific journals. The “COVID-19 Panel”, widely viewed since 2020, is based on this tool and allowed managers agility in combating the disease and optimizing resources.^{9,10}

A disadvantage of Power BI is the difficulty of programming the databases. However, training, even virtual training, can solve this issue. Once this programming is performed, an unqualified person is able to operate the tool, giving autonomy and agility to the work teams.

We recommend using Power BI especially in agencies that require agile evidence-based decision making.

REFERENCES

1. Kemp T, Butler-Henderson K, Allen P, et al. The impact of health information management professionals on patient safety: A systematic review. *Health Info Libr J.* 2021;38(4):248-58.
2. Bello IM, Sylvester M, Ferede M, et al. Real-time monitoring of a circulating vaccine-derived poliovirus outbreak immunization campaign using digital health technologies in South Sudan. *Pan Afr Med J.* 2021;40:200.
3. Brasil. Datasus. <https://datasus.saude.gov.br/>: Ministério da Saúde; 2022.

4. Husnayain A, Fuad A, Laksono IS, et al. Improving Dengue Surveillance System with Administrative Claim Data in Indonesia: Opportunities and Challenges. *Stud Health Technol Inform.* 2020;270:853-7.
5. Paula AdC, Maldonado JMSdV, Gadelha CAG. Healthcare telemonitoring and business dynamics: challenges and opportunities for SUS. *Revista de Saúde Pública.* 2020;54.
6. Microsoft. Power BI powerbi.microsoft.com: Microsoft; 2022.
7. Luhn HP. A Business Intelligence System 1958; 2(4):[314-9 pp.].
8. Microsoft. O que é Business Intelligence? <https://powerbi.microsoft.com/pt-br/what-is-business-intelligence/2022>
9. Akpan GU, Bello IM, Touray K, et al. Leveraging Polio Geographic Information System Platforms in the African Region for Mitigating COVID-19 Contact Tracing and Surveillance Challenges: Viewpoint. *JMIR Mhealth Uhealth.* 2022;10(3):e22544.
10. Fazaeli S, Khodaveisi T, Vakilzadeh AK, et al. Development, Implementation, and User Evaluation of COVID-19 Dashboard in a Third-Level Hospital in Iran. *Appl Clin Inform.* 2021;12(5):1091-100.

Authors' contributions:

Andreia Fernandes Brilhante, Leonardo Augusto Kohara Melchior and Leonardo José Tomaz da Silva contributed to the conception and design of the study, data analysis, and the writing, review, and final approval of the study.

All authors approved the final version of the study and declare responsibility for all its aspects, guaranteeing the accuracy and integrity of the study.