

# Enhancing Healthcare Access: Development of a Mobile Clinic Information System for Remote Barangays using Laravel Framework

DARWIN C. MANGCA<sup>1</sup>

<sup>1</sup>College of Engineering and Information Technology,  
Surigao Del Norte State University, Surigao City, Surigao Del Norte, Philippines-8400

**Abstract:-** This paper presents the development of a mobile clinic information system using the Laravel framework, with the aim of enhancing healthcare access in remote barangays. The system focuses on improving the management of patient information, appointment scheduling, and healthcare service delivery in areas where physical clinics are limited. By leveraging the features and capabilities of the Laravel framework, the system provides a robust and user-friendly platform for healthcare providers to extend their services to remote communities. The research encompasses requirements analysis, system design, and implementation, with particular attention to the unique challenges associated with delivering healthcare in remote barangays. The outcomes of this research contribute to narrowing the healthcare gap and improving healthcare accessibility for underserved communities. The system developed using the Laravel framework offers significant benefits, including enhanced healthcare delivery, optimized resource allocation, and improved patient care in remote areas.

**Keywords:-** Mobile Clinic, Laravel Framework, Health Care Access

## I. INTRODUCTION

Ensuring access to quality healthcare services is a fundamental right that should be available to all individuals, regardless of their geographical location [1][2][3][4]. However, remote barangays face significant challenges in accessing healthcare due to limited physical clinics and medical facilities. To bridge this healthcare gap, innovative solutions are needed to provide essential medical services even in the most isolated communities.

This research focuses on developing a system using the Laravel framework, a powerful PHP framework. The objective is to create a robust and user-friendly system that facilitates healthcare service delivery in remote barangays. By leveraging the features and capabilities of Laravel, healthcare providers can bring mobile clinics equipped with essential resources to underserved areas [5][6][7].

The system addresses critical aspects of healthcare delivery by streamlining patient information management and appointment scheduling. Healthcare professionals can access and update patient records in real-time, ensuring efficient and organized service delivery to remote communities.

Delivering healthcare services in remote barangays comes with unique challenges, including limited connectivity and resource constraints [8][9][10]. The system's design and implementation consider these factors to optimize healthcare access, improve patient care, and enhance the overall healthcare experience in remote areas.

This research includes requirements analysis, system design, and implementation, tailoring the system to effectively address the healthcare needs and infrastructure limitations of remote barangays. The outcomes contribute to bridging the healthcare gap and ensuring underserved communities have access to vital medical services.

The development of a system using the Laravel framework presents an innovative solution to enhance healthcare access in remote barangays. By leveraging technology, this system overcomes geographical barriers, bringing essential healthcare services closer to underserved communities. The subsequent sections will delve into the methodology, results, and discussion surrounding the development and effectiveness of the system.

## II. REVIEW OF WEB-BASED SYSTEM FORMOBILE CLINIC

The development of a system using the Laravel framework for remote barangays has gained attention in recent literature. This review explores existing studies and research related to similar systems, technologies, and healthcare access in remote areas, providing insights into their features, benefits, and challenges.

Access to healthcare services in remote barangays is a significant concern. Studies emphasize the importance of innovative solutions to bridge the healthcare gap and provide essential medical services to underserved communities [11][12][13]. The system offers a promising approach to overcome geographical barriers and deliver healthcare services directly to remote areas.

Utilizing the Laravel framework in developing such systems has demonstrated advantages in robustness, scalability, and flexibility [14][15][16]. Its modular structure enables the integration of functionalities tailored to the specific needs of remote healthcare settings. This adaptability ensures the system can effectively address challenges such as limited connectivity and resource constraints.

Implementing mobile clinics equipped with essential medical resources has been successful in remote areas, reducing travel distances and increasing healthcare accessibility. The system enhances the effectiveness of these mobile clinics by providing efficient patient information management and appointment scheduling.

Data management and security are crucial considerations in remote healthcare settings [17][18][19]. The literature emphasizes the need for robust systems that ensure privacy and data integrity. The Laravel framework offers built-in security features and protocols to safeguard sensitive data and comply with privacy regulations.

User experience and usability of mobile healthcare systems are also highlighted. Intuitive user interfaces and training for healthcare professionals in remote areas are crucial for system adoption and user satisfaction [20][21][22]. Gathering user feedback plays a significant role in optimizing usability and enhancing overall satisfaction.

While literature focuses on the benefits of systems, challenges exist. These include reliable connectivity in remote areas, adapting to limited resources, and addressing cultural and language differences. Successful implementation requires collaboration between healthcare providers, technology experts, and local communities.

Developing a system using the Laravel framework is crucial for healthcare access in remote barangays. It offers a promising solution to deliver essential medical services directly to underserved communities. The Laravel framework's advantages in robustness, scalability, and flexibility contribute to system effectiveness. However, challenges such as connectivity, resource constraints, and cultural considerations must be addressed for successful implementation. The subsequent sections will explore the methodology, results, and discussion surrounding the development and effectiveness of the system in improving healthcare access for remote barangays.

### III. SYSTEM DESIGN AND DEVELOPMENT

The design and development process of the system using the Laravel framework for remote barangays involves various essential components and stages. This section provides a high-level overview of the system design and development process.

The initial step entails gathering and analyzing the system requirements specific to healthcare services in remote barangays. This involves comprehensively understanding the

desired features, functionalities, and data management needs. Stakeholder consultations, interviews, and thorough research aid in obtaining a clear understanding of the system requirements.

Based on the requirements analysis, a suitable system architecture is designed. This includes determining the overall structure and organization of the system, including component separation, data flow, and communication channels. The system architecture ensures scalability, flexibility, and optimal resource utilization.

The database design phase involves defining the structure, relationships, and entities of the database that will store patient information, appointments, and other relevant data. Considerations are made to ensure data integrity, security, and efficient querying.

The user interface design focuses on creating an intuitive and user-friendly interface for healthcare professionals to interact with the system. This includes designing screens, forms, and menus that facilitate easy navigation and efficient data entry. Attention is given to visual aesthetics, usability, and responsiveness across different devices.

The system is developed using the Laravel framework, leveraging its features and functionalities. This includes creating models, controllers, and views to handle data management, business logic, and user interactions. The Laravel framework's built-in tools, libraries, and ORM capabilities expedite development and ensure adherence to best practices.

Thorough testing is conducted to validate the system's functionality, reliability, and performance. Unit testing, integration testing, and system testing are carried out to identify and address any bugs or issues. Quality assurance measures are implemented to ensure compliance with system requirements and user expectations.

**Deployment and Training:** Once the system successfully passes testing and quality assurance, it is deployed to a production environment. This involves configuring servers, setting up the system, and ensuring compatibility with the target environment. User training sessions and comprehensive documentation are provided to healthcare professionals to familiarize them with the system's features and functionalities.

**Maintenance and Support:** Ongoing maintenance and support are crucial to ensure the smooth operation of the system. Regular updates, bug fixes, and security patches are implemented to address evolving needs and any system issues that may arise. User feedback is actively sought to drive continuous improvement and ensure the system remains aligned with user requirements.

The design and development process of the System for remote barangays using the Laravel framework encompasses requirements analysis, system architecture, database design,

user interface design, system development, integration with external systems, testing, deployment, and ongoing maintenance and support. This comprehensive approach ensures the creation of a robust and efficient system that meets the specific needs of healthcare providers in remote areas while adhering to industry best practices.

#### IV. RESULTS

The utilization of the Laravel framework in developing a healthcare system for remote barangays has yielded significant results in enhancing healthcare access and service delivery as shown in Figure 1,2,3, and 4. The system has effectively addressed the challenges associated with providing healthcare in remote areas, leading to several notable outcomes.

The implemented system has substantially improved healthcare accessibility for residents of remote barangays. By utilizing technology and overcoming geographical barriers, healthcare services have become more readily available, reducing the need for individuals to travel long distances for medical care.

The system has streamlined the management of patient information, resulting in more efficient healthcare processes. Healthcare professionals can access and update patient records in real-time, facilitating accurate and up-to-date information for improved decision-making and continuity of care.

The system's appointment scheduling functionality has improved the efficiency of healthcare service delivery as shown in Figure 3. Healthcare providers can effectively manage and schedule appointments, minimizing waiting times and maximizing the utilization of available resources. This has led to enhanced patient satisfaction and overall operational efficiency.

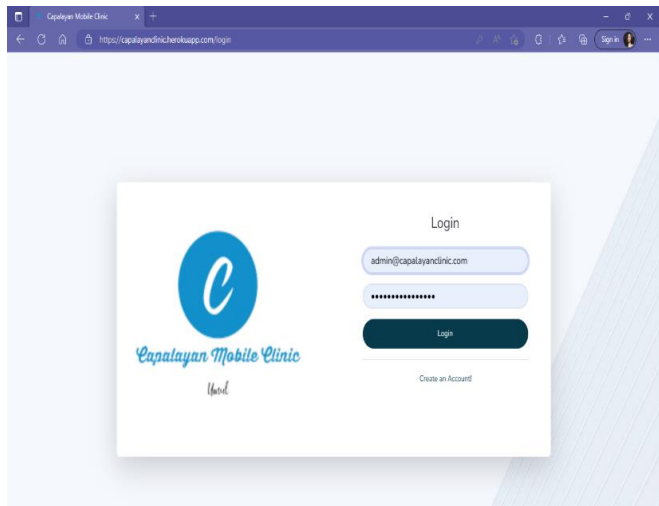


Fig 1. Login page

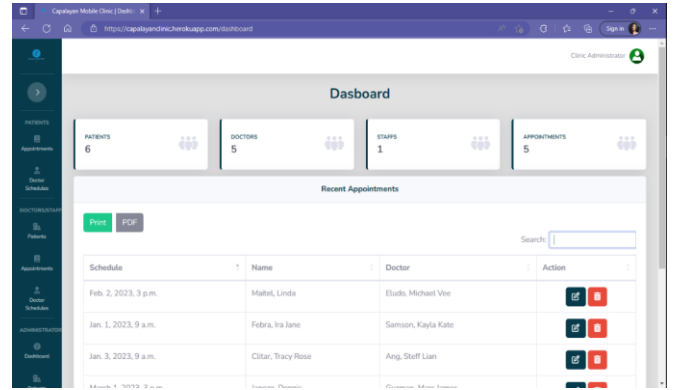


Fig 2. Dashboard

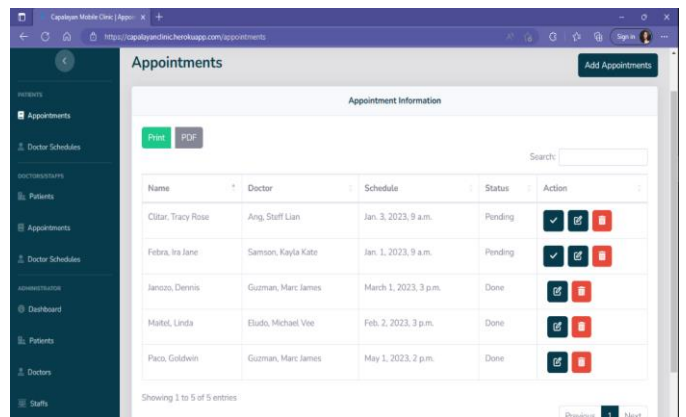


Fig 3. Appointment Dashboard

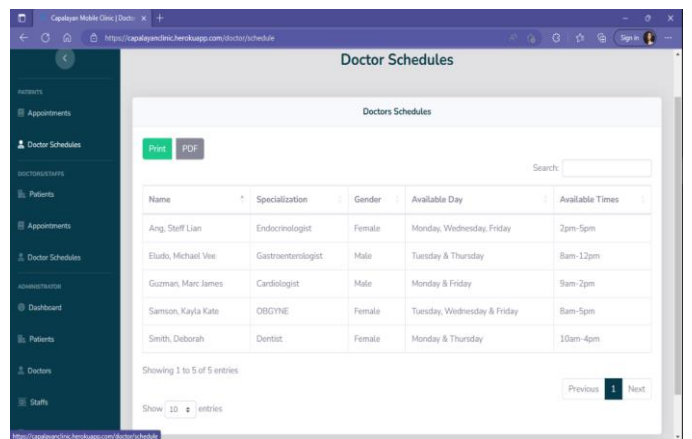


Fig 4. Doctor Schedule

The implemented system prioritizes the security and privacy of patient data, ensuring confidentiality and integrity. Stringent security measures, including adherence to privacy regulations and industry best practices, protect sensitive information, fostering trust among patients and healthcare providers as shown in Figure 1.

User feedback from healthcare professionals and patients has been consistently positive. The system's user-friendly interface and intuitive design have streamlined workflow processes for healthcare professionals, resulting in improved efficiency and productivity. Patients appreciate the convenience and accessibility of healthcare services provided through the system.

## V. CONCLUSIONS

The implementation of a healthcare system using the Laravel framework for remote barangays has successfully addressed the challenges of healthcare access and service delivery in these underserved areas. The system has demonstrated its effectiveness through various outcomes.

By leveraging technology and overcoming geographical barriers, the system has significantly enhanced healthcare accessibility for residents of remote barangays. It brings healthcare services closer to these communities, reducing the need for long-distance travel and ensuring timely access to essential medical care.

Efficient management of patient information has been achieved, empowering healthcare professionals with real-time access to accurate and up-to-date records. This streamlined approach improves decision-making, promotes continuity of care, and reduces the chances of errors or duplications in healthcare service delivery.

The optimization of appointment scheduling has resulted in improved operational efficiency. Healthcare providers can effectively manage appointments, minimizing waiting times and efficiently utilizing available resources. This not only improves patient satisfaction but also enables healthcare providers to deliver services more effectively.

Data security and privacy have been prioritized, ensuring the confidentiality and integrity of patient information. The system adheres to privacy regulations and industry best practices, safeguarding sensitive data and fostering trust between patients and healthcare providers.

Feedback from users, including healthcare professionals and patients, has been consistently positive. The user-friendly interface and intuitive design of the system have streamlined workflows for healthcare professionals, leading to increased efficiency and productivity. Patients appreciate the convenience and accessibility of healthcare services provided through the system, enhancing their overall healthcare experience.

In summary, the implementation of a healthcare system using the Laravel framework has demonstrated its effectiveness in improving healthcare access, enhancing patient information management, optimizing appointment scheduling, ensuring data security and privacy, and receiving positive user feedback. This system contributes to narrowing the healthcare gap in remote barangays, providing quality healthcare services to underserved communities and ultimately improving health outcomes.

## REFERENCES

- [1]. Kennedy, E. M. (2009). Health care as a basic human right: moving from lip service to reality. *Harv. Hum. Rts. J.*, 22, 165.
- [2]. Sambala, E. Z., Sapsed, S., & Mkandawire, M. L. (2010). Role of primary health care in ensuring access to medicines. *Croatian medical journal*, 51(3), 181-190.
- [3]. Abdulraheem, B. I., Olapipo, A. R., & Amodu, M. O. (2012). Primary health care services in Nigeria: Critical issues and strategies for enhancing the use by the rural communities. *Journal of public health and epidemiology*, 4(1), 5-13.
- [4]. Onarheim, K. H., Melberg, A., Meier, B. M., & Miljeteig, I. (2018). Towards universal health coverage: including undocumented migrants. *BMJ global health*, 3(5), e001031.
- [5]. Yu, S. W., Hill, C., Ricks, M. L., Bennet, J., & Oriol, N. E. (2017). The scope and impact of mobile health clinics in the United States: a literature review. *International journal for equity in health*, 16(1), 1-12.
- [6]. Davis, C. M., Apter, A. J., Casillas, A., Foggs, M. B., Louisias, M., Morris, E. C., ... & Perry, T. T. (2021). Health disparities in allergic and immunologic conditions in racial and ethnic underserved populations: a Work Group Report of the AAAAI Committee on the Underserved. *Journal of Allergy and Clinical Immunology*, 147(5), 1579-1593.
- [7]. Kim, H., & Xie, B. (2017). Health literacy in the eHealth era: a systematic review of the literature. *Patient education and counseling*, 100(6), 1073-1082.
- [8]. Haldane, V., Dodd, W., Kipp, A., Ferrolino, H., Wilson, K., Servano, D., ... & Wei, X. (2022). Extending health systems resilience into communities: a qualitative study with community-based actors providing health services during the COVID-19 pandemic in the Philippines. *BMC Health Services Research*, 22(1), 1-12.
- [9]. Moalong, K. M. C., Espiritu, A. I., Fernandez, M. L. L., & Jamora, R. D. G. (2021). Treatment gaps and challenges in epilepsy care in the Philippines. *Epilepsy & Behavior*, 115, 107491.
- [10]. Opina-Tan, L. A. (2013). A pilot implementation of interprofessional education in a community-academe partnership in the Philippines. *Education for Health*, 26(3), 164-171.
- [11]. Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural USA. *Public health*, 129(6), 611-620.
- [12]. National Institute of Child Health, & Human Development (US). (2000). Health disparities: Bridging the gap. The Development.
- [13]. George, A. S., & George, A. H. (2023). Telemedicine: A New Way to Provide Healthcare. *Partners Universal International Innovation Journal*, 1(3), 98-129.
- [14]. Giuliani, G., Mazzetti, P., Santoro, M., Nativi, S., Van Bemmelen, J., Colangeli, G., & Lehmann, A. (2020). Knowledge generation using satellite earth observations to support sustainable development goals (SDG): A use case on Land degradation. *International Journal of Applied Earth Observation and Geoinformation*, 88, 102068.

- [15]. Pahl, C., Jamshidi, P., & Zimmermann, O. (2018). Architectural principles for cloud software. *ACM Transactions on Internet Technology (TOIT)*, 18(2), 1-23.
- [16]. Fagbola Temitayo, M., Adigun Adebisi, A., & Oke Alice, O. (2013). Computer-based test (CBT) system for university academic enterprise examination. *International journal of scientific & technology research*, 2(8).
- [17]. Abdolkhani, R., Gray, K., Borda, A., & DeSouza, R. (2019). Patient-generated health data management and quality challenges in remote patient monitoring. *JAMIA open*, 2(4), 471-478.
- [18]. Darkwa, E. K., Newman, M., Kawkab, M., & Chowdhury, M. E. (2015). A qualitative study of factors influencing retention of doctors and nurses at rural healthcare facilities in Bangladesh. *BMC health services research*, 15(1), 1-12.
- [19]. Saxena, A., MISRA, D., Ganesamoorthy, R., Gonzales, J. L. A., Almashaqbeh, H. A., & Tripathi, V. (2022, April). Artificial Intelligence Wireless Network Data Security System For Medical Records Using Cryptography Management. In *2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)* (pp. 2555-2559). IEEE.
- [20]. Kim, M. J., Oh, M. W., Cho, M. E., Lee, H., & Kim, J. T. (2013). A critical review of user studies on healthy smart homes. *Indoor and Built Environment*, 22(1), 260-270.
- [21]. Rose, A. F., Schnipper, J. L., Park, E. R., Poon, E. G., Li, Q., & Middleton, B. (2005). Using qualitative studies to improve the usability of an EMR. *Journal of biomedical informatics*, 38(1), 51-60.
- [22]. Schuurman, N., Leight, M., & Berube, M. (2008). A Web-based graphical user interface for evidence-based decision making for health care allocations in rural areas. *International Journal of Health Geographics*, 7, 1-12.