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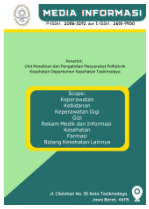

Development of a Prototype Web-Based Information System for Home Visit Services at Puskesmas Kemang, Bogor Regency

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Abstract

Background: Home Visit is one of the healthcare programs at Puskesmas Kemang, serving as a supporting activity for counseling and guidance to obtain data, information, and commitment in resolving patients' health problems through home visits. Interviews with cadres and nurses revealed that the implementation of Home Visit is still carried out manually, resulting in services that are less efficient and slower. Considering the increasing demand for patient-centered care and the limited use of health information technology at the Puskesmas, an information system is needed to accelerate and streamline the service process with accurate data output. This study aims to design a prototype of a web-based Home Visit information system at Puskesmas Kemang, Bogor Regency. **Methods:** The study applied the *System Development Life Cycle (SDLC)* with a *Waterfall* model. Data were collected through interviews and direct observation. **Results:** The current Home Visit service is still performed manually without a standardized Standard Operating Procedure (SOP), causing delays and unstructured workflows in registration, examination, and documentation. The designed prototype aligns with service needs and provides a more systematic workflow. **Conclusion:** The absence of SOPs in the Home Visit program has reduced service efficiency. The proposed web-based information system proves effective in accelerating registration, simplifying visit documentation, and improving the organization of patient records. Thus, this system is expected to enhance the quality of health services at Puskesmas Kemang by supporting the transition from manual processes to standardized electronic systems.

INTRODUCTION

Health is a fundamental need of every human being. According to Law of the Republic of Indonesia No. 17 of 2023, health is defined as a state of well-being in which an individual is physically, mentally, and socially healthy, and not merely free from disease, thus enabling a productive life. The general health conditions in Indonesia are influenced by environmental factors, behavior, and the quality of health services (Apriyanti et al., 2014). Community health can be improved through the availability of adequate health facilities. Based on the Regulation of the Minister of Health ((Permenkes)) No. 3 of 2023, a health facility is a place used to provide healthcare efforts such as education, prevention, treatment, and rehabilitation, carried out by the central government, local governments, and the community. Furthermore, Government Regulation of the Republic of Indonesia

No. 3 of 2023 stipulates that health facilities deliver healthcare services in the form of individual health services and/or public health services. In this context, Puskesmas, as a primary health facility, plays a crucial role in delivering comprehensive healthcare, including Home Visit services. Strengthening service quality through information system innovation is therefore essential to ensure efficiency and improve healthcare outcomes (Ichwani et al., 2021).

Community Health Centers (*Puskesmas*) are primary healthcare facilities that provide both individual health services (*Upaya Kesehatan Perorangan/UKP*) and public health services (*Upaya Kesehatan Masyarakat/UKM*), with a focus on promotive and preventive efforts within their working areas (*Permenkes Nomor 3 Tahun 2023)* . Puskesmas play a vital role in implementing health programs aimed at increasing public awareness and promoting healthy lifestyles, with the ultimate goal of achieving optimal health status. The health programs conducted at Puskesmas are categorized into two types: Essential Health Efforts (*Upaya Kesehatan Wajib*) and Developmental Health Efforts (*Upaya Kesehatan Pengembangan*). Essential Health Efforts contribute significantly to the success of national health development, including improvements in the Human Development Index (HDI), and are aligned with both national and global commitments (Andrianto & Nursikuwagus, 2017).

One of the key strategies in health service development at Community Health Centers (*Puskesmas*) is the Home Visit Program, initiated by the government through local health offices. This program serves as an integral part of Puskesmas efforts to address health problems among patients with chronic conditions and other specific needs. Regular visits are conducted by healthcare workers to collect health-related information, implement disease prevention programs, and promote environmental health. The primary goals of the Home Visit Program are to enhance community self-reliance in managing health issues, strengthen preventive and promotive efforts, and train family members as primary caregivers for patients with chronic illnesses (Adista et al., 2023) (Ramli et al., 2024). However, in many regions, the implementation of this program remains manual, making documentation, monitoring, and evaluation less effective (Putri et al., 2025). The urgency for developing a Home Visit information system lies in the need for faster, more accurate, and integrated services, aligned with Indonesia's Digital Health Transformation agenda launched by the Ministry of Health (Ministry of Health of the Republic of Indonesia, 2021) Therefore, leveraging information systems is expected to improve service efficiency, ensure better quality of community health data, and support the achievement of national health development goals (Hakim et al., 2019).

Considering patients' needs and preferences for home-based healthcare services (Home Visit), along with the advancement of health technology that enables better service delivery, the implementation of an information system becomes highly relevant (Ujung & Nasution, 2023). Such a system not only accelerates documentation processes but also ensures more accurate and timely data, thereby supporting evidence-based decision-making (Marselina et al., 2024). Based on this rationale, the research is entitled "Design of a Prototype Web-Based Home Visit Health Information System at Puskesmas Kemang, Bogor Regency, 2024."

METHOD

This study applied a descriptive research design with a system design approach, utilizing the System Development Life Cycle (SDLC) with the Waterfall model. The Waterfall model is a linear sequential method in which each stage must be completed before moving to the next, ensuring systematic and well-documented development results (Nugraha et al., 2018; Sommerville, 2016)The population consisted of healthcare workers at Puskesmas Kemang involved in the Home Visit program, with purposive sampling applied to select nurses, midwives, and cadres directly engaged in the activity. Data collection instruments included interview guidelines to capture user requirements, observation sheets to document the existing manual workflow, and secondary data analysis of Home Visit reports and organizational documents (Dewi, 2022).

The research procedure followed the Waterfall stages up to the testing phase. First, requirement analysis was conducted to gather user needs through interviews and observations. Second, a system design was developed, including workflow modeling, use case diagrams, and database structures. Third, a prototype implementation was carried out to build the web-based information system according to the design specifications. Finally, testing was performed with end users to ensure that the prototype met functional requirements and operated as expected. These stages provided a structured

approach to system development, ensuring that the resulting prototype effectively addressed the needs of Home Visit services (Roa Romero et al., 2021).

RESULTS AND DISCUSSION

The Home Visit process begins with **patient registration**, either through referral or scheduling by healthcare workers. Next, healthcare staff perform **home visit planning**, which includes identifying patients with chronic conditions or other special needs. During the visit, the staff conduct **examinations and assessments**, collect patient data, and provide counseling or preventive interventions. Afterward, the findings are **documented** in the system, followed by **reporting and evaluation** by Puskesmas staff to monitor service quality and follow-up actions.

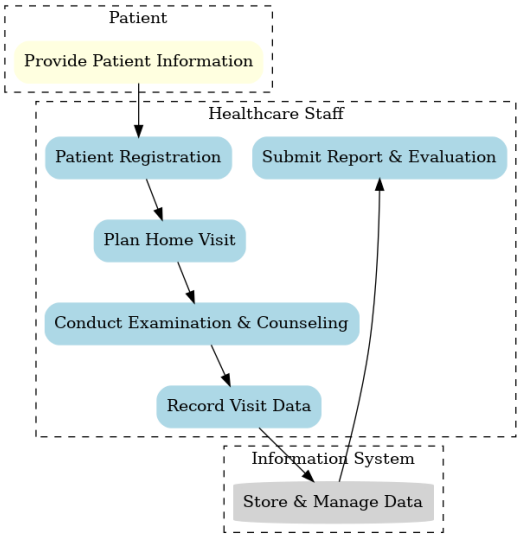


Figure 1. Business Proses Service Home Visit

Based on observations at Puskesmas Kemang, Bogor Regency, there are three computers and staff laptops available to support the system, with adequate internet access through Wi-Fi and Local Area Network (LAN), as well as a standby electricity generator. The **functional requirements** describe the processes that will be implemented in the system and the necessary features, while the **non-functional requirements** refer to supporting aspects such as hardware, software, and user accessibility to ensure smooth system operation. The non-functional requirements include server and client hardware specifications, operating systems, databases, web browsers, and the availability of trained users.

Tabel 1. Functional and Non-Functional Requirements for Users

Tabel 1.1 Kebutuhan Fungsional dan Non Fungsional Petugas

Functional Requirements	Non-Functional Requirements
1. Staff Verification (Login) Page	1. **Software Requirements**
	a) Laptop/Computer
	b) Mouse
	c) Keyboard
	d) Internet Access
	e) CPU (Central Processing Unit)
2. Medical Record Administrator Verification (Login) Page	2. **Hardware Requirements**
	a) MySQL
	b) Operating System
	c) Linux or Windows

	d) Internet Browser
	e) Antivirus
3. Patient Verification (Login)	3. **Human Resources (HR)**
	As users
4. Patient Registration	
5. Appointment Booking by Patient	
6. View and Check Patient Data	
7. Input of Patient Services by Staff	
8. Input of Patient Examination by Staff	
9. Print Examination Results by Staff	

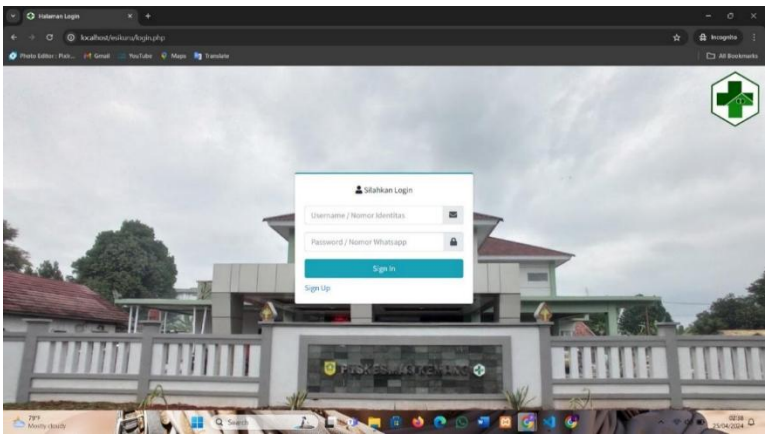
Analysis Functional

Based on the functional requirements analysis obtained from interviews with informants, it was concluded that the application must be simple, easy to understand, fast, and capable of facilitating the patient care process. Therefore, the researcher identified the following functional requirements to be implemented in the system: Verification (Login) Page, Patient Registration, View and Check Patient Data, Input of Service Data, Patient Examination, Print Examination Results, and Reporting.

Tabel 2 Mapping of Functional Requirements to System Features and Outputs

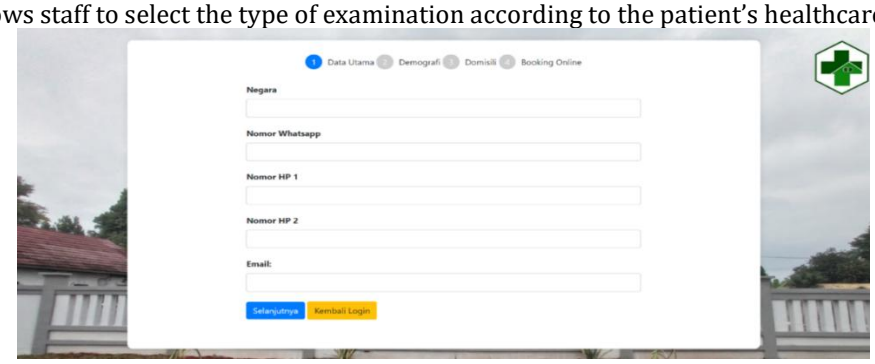
Functional Requirement	System Feature	Expected Output
Verification (Login) Page	Multi-user login (Staff, Medical Record Admin, Patient)	Secure access based on user role
Patient Registration	Registration form for new patients	Patient profile stored in database
View and Check Patient Data	Patient data search and display module	Verified patient information accessible to staff
Input of Service Data	Service input form (treatment, counseling, interventions)	Service records stored in patient history
Patient Examination	Examination input module	Examination results recorded in patient medical records
Print Examination Results	Printable examination report	Hardcopy or PDF report for patients and archive
Reporting	Automatic report generation	Monthly/periodic Home Visit service report for monitoring and evaluation

1) Login Page
   The login page is accessed by authorized staff who possess a unique username and password. This ensures data security and confidentiality, allowing only registered users to enter the system according to their roles and responsibilities.



2) Registering Patient

Patient registration is carried out prior to conducting examinations. During this process, staff can register new patients or continue with existing patient records. Furthermore, the registration feature allows staff to select the type of examination according to the patient's healthcare needs.

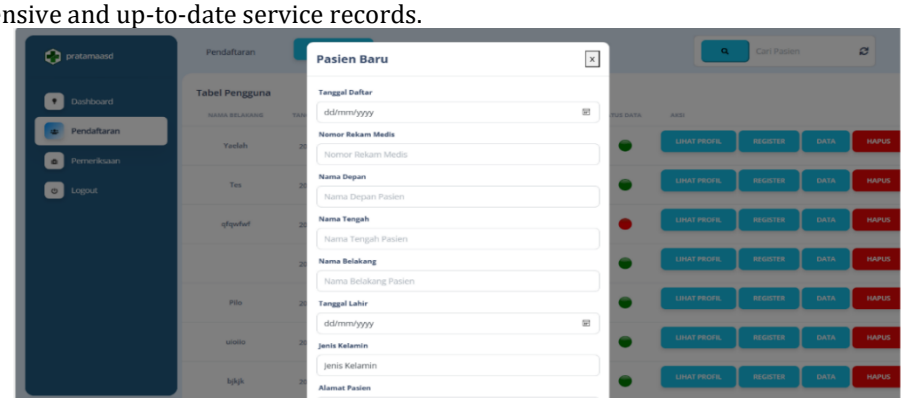


3) View Patient

Patient data that has been registered can be accessed at any time by healthcare staff. In addition, staff are able to review previously registered patient records using the patient data search feature, which enhances accuracy and accessibility of patient information.

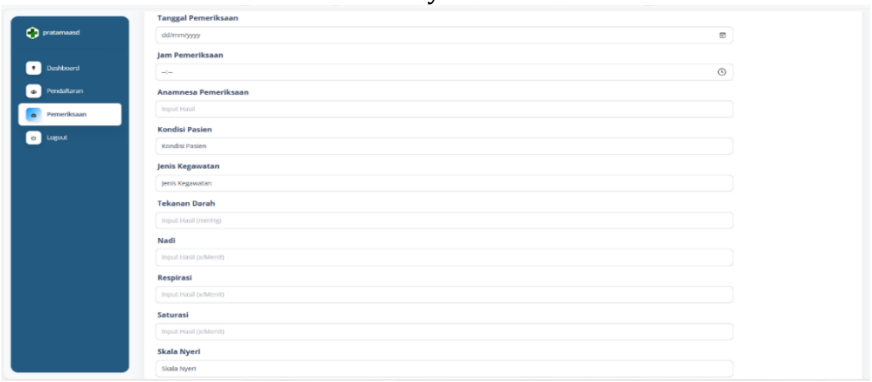
4) Input of Service Data

Input of patient services is performed after a patient has been registered, either through the system or via manual registration. This feature enables staff to document the services provided, ensuring comprehensive and up-to-date service records.



5) Patient Examination

Once the service input has been completed, the patient's record will appear in the examination feature. Healthcare staff can then enter the results of the patient's examination, which are stored as part of the electronic medical record for continuity of care.



6) Print Examination Results
Staff can generate and print examination results that have been entered into the system. These results may be used for internal staff needs, as patient documentation, or as official records for archiving purposes.

Non-Functional Requirements

Based on the analysis of non-functional requirements obtained through interviews and observations at Puskesmas Kemang, Bogor Regency, it was identified that the system requires adequate software, hardware, and human resources (HR) to ensure proper functionality and sustainability. The details are as follows : **Software Requirements** ,**Hardware Requirements** , and **Human Resources (HR).**

1) Software Requirements
The basic software requirements include an operating system, package managers (for Linux and Windows), a graphical user interface (GUI), development tools (if required), networking software, security software, and application software aligned with the system's objectives. In addition, non-functional requirements also emphasize the importance of data security to protect users from unauthorized system access, ensuring that all data traffic can be monitored and controlled properly (Ujung & Nasution, 2023).
2) Hardware Requirements
The hardware components required for the system include a Central Processing Unit (CPU) as the core of the computer, Random Access Memory (RAM) for temporary data and program storage, permanent storage such as a hard drive or Solid State Drive (SSD) for long-term data storage, a motherboard as the backbone connecting all components, a graphics card for graphical tasks, a power supply unit, and peripherals such as a monitor, keyboard, mouse, laptop, and printer to interact with the system. The successful implementation of the information system heavily depends on the adequacy of hardware, as it directly affects user experience and ensures that the system operates effectively and efficiently, while maintaining quality standards in line with technological advancements (Hakim et al., 2019)
3) Human Resources (HR) as Users
The required human resources are staff capable of operating and utilizing the system. This refers to the behavior and competencies of individuals in using the information system, as well as their understanding of each process within it (Pariyasto et al., 2018). Moreover, conducting a human resource needs analysis is essential to evaluate qualifications, competencies, and workload distribution, thereby ensuring optimal utilization of the system (Marselina et al., 2024)

CONCLUSIONS AND RECOMMENDATIONS

The Home Visit services at Puskesmas Kemang, Bogor Regency provide important support for community health, although the current process is still managed manually without a standardized operating procedure. This condition opens an opportunity to strengthen service delivery through the development of a web-based Home Visit Information System, designed to support patient registration, examination documentation, and structured reporting. With the implementation of this system, workflows can become more efficient, data management more accurate, and the overall quality of healthcare services further improved.

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