



Chapter 1

THE PROBLEM AND ITS BACKGROUND

1.1 Background of the Study

Medical emergency response plays a vital role in reducing fatalities and minimizing long-term health impacts in life-threatening situations. Time is a very crucial factor in determining the severity of emergency situations, which emphasizes the importance of a timely and adequate emergency response, especially in medical circumstances that require immediate aid. However, across many communities, such as Barangay New Cabalan, response times are often plagued with unintended delays due to some logistical problems and communication challenges. Responders often lack the precise information, and familiarity with certain areas which significantly affects their ability to reach people who seek urgent medical attention. Quick access to accurate location and medical data is crucial in emergencies, combining this element provides critical factor to have an efficient emergency response.

Without an organized emergency response system, most emergency units especially those in rural and semi-urban Barangays experiences complications, which hinders their efforts and leaving residents vulnerable to the consequences of slow response times. For instance, first responders



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frequently struggle to locate individuals in distress without a precise information on the location or awareness of the medical history of their patients, which can lead to potentially preventable escalations in emergency situations.

The RESCUE System (Resident Emergency Solution with Call and Utility-based Emergency Response) is designed to address this issue by utilizing mobile technology and SIM-based location tracking. By enabling residents to register personal details and medical records, the system allows emergency responders to access this information instantly during emergencies, significantly improving the speed and effectiveness of their responses. This system aims to create a safer environment by improving communication and coordination between residents and emergency services, potentially serving as a model for other communities.

This study aims to develop and implement this system in Barangay New Cabalan as a model for other communities facing similar issues. By improving response times and coordination, the system seeks to create a safer environment for residents and establish a framework that other communities can adopt to strengthen their own emergency response capabilities.



1.2 Theoretical and Conceptual Framework

1.2.1 Theoretical Framework

Emergency Management Theory

This theory suggests that technology can play a vital role in managing emergency situations to reduce the impact of disasters on human lives. It highlights the importance of timely response, efficient communication, and access to crucial information—key elements of the RESCUE System.

1.2.2 Conceptual Framework

Technology-Driven Emergency Response Framework

The conceptual model focuses on using mobile technology and location-based services for faster emergency response. The framework incorporates the registration of residents' personal and medical data into a secure system, accessible to emergency responders during an emergency call, ensuring timely and appropriate care.

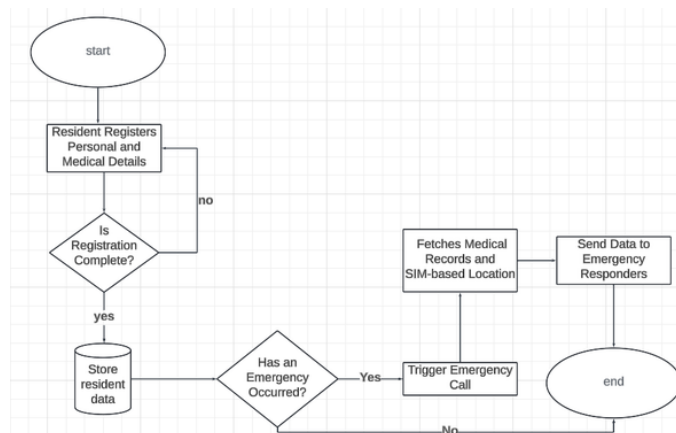


Figure 1. Technology-Driven Emergency Response Framework



System Architecture

The system architecture of the RESCUE system is designed to ensure efficient handling of emergency situations by utilizing a database to store residents' personal and medical records. The system is composed of three primary components:

1. **Resident.** A resident can register their personal and medical details into the system, ensuring that in the event of an emergency, these records can be accessed by responders.
2. **RESCUE System.** This central system stores the resident data, retrieves medical records when an emergency occurs, and sends relevant information, including the resident's location and medical history, to the emergency responders.
3. **Emergency Responder.** These responders access the information sent by the RESCUE system, including real-time location and medical data, to quickly address the needs of the affected resident during an emergency.

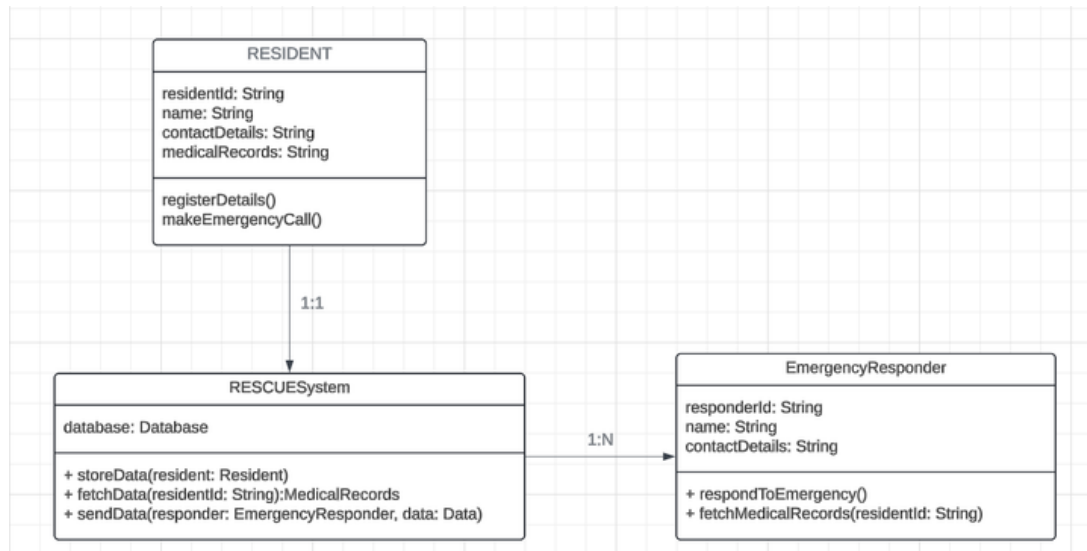


Figure 2. UML Class Diagram of RESCUE

1.3 Statement of the Problem

1. How can we develop a centralized database that provides real-time location data and medical information to reduce emergency response times?
2. What system architecture can securely store and allow access to medical records for emergency responders?
3. How can communication channels be maintained even during network disruptions caused by disasters?
4. What data privacy and security measures should be implemented to protect residents' personal information?



5. How can we ensure the long-term sustainability and maintenance of the RESCUE system?
6. How can the RESCUE system be designed to ensure it is user-friendly for both residents and emergency responders, especially in high-stress, time-sensitive situations?
7. Are residents familiar with how to contact emergency services in Barangay New Cabalan?
8. What challenges do residents face during emergencies, such as delays in response or difficulty contacting help?
9. How do residents perceive the responsiveness of local emergency services?
10. How can the RESCUE system be integrated with existing emergency response frameworks and technologies to improve overall system efficiency and coordination among responders?

1.4 Significance of the Study

Residents of Barangay New Cabalan. The system will provide quicker emergency response times, potentially saving lives and improving safety during critical situations.



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Emergency Responders. Access to real-time location data and residents' medical records will enable responders to deliver faster and more effective care.

Future Researchers. The system can serve as a case study for further research on technology-driven emergency response solutions.

1.5 Scope and Limitation of the Study

This study will focus on the design, development, and implementation of a comprehensive emergency solution, a mobile-based application system for Barangay New Cabalan, a local community in Olongapo City, with a priority to enhance the emergency response capabilities of the local barangay emergency unit, and to improve communication and coordination between the residents and barangay health services, creating a collaborative environment emphasizing the objective of enhancing the safety and well-being of the community. The system's primary functions include SIM-based location tracking that enables and simplify real-time sharing of coordinates, secured access to the patients' medical records for the immediate assessment of their condition and medical history, and a streamlined communication between responders and residents. The study will be conducted solely within areas of constituents of Barangay New Cabalan.



However, despite of the stated target focus, this study has a limitation. As the study will be conducted in Barangay New Cabalan, the research and the system may not be applicable to other barangays or communities without modification. The unique needs, resources, and challenges of Barangay New Cabalan are the primary focus, so the scalability of this research may be constrained by the differences in framework or needs in other communities. Data privacy regulations may restrain access to sensitive medical information of the patients. Additionally, the system's reliability to a stable cellular network coverage could potentially limit its effectiveness, due to some geographic limitations of network coverage within the isolated areas of the barangay.

1.6 Definition of Terms

SIM Card-based Location Tracking. A technology used to identify a person's location via their mobile phone's SIM card during an emergency call.

Medical Records. Personal health information stored in the system, accessible to emergency responders during critical situations.

Emergency Response. Actions taken by emergency services, such as health personnel, police, or firefighters, to assist individuals in crisis.



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Medical Records. Records or documents that contains a patient's personal health information, which can provide essential information for emergency responders.

Response Time. The amount of time taken from when an emergency call is made to when responders arrive on the scene.



Chapter 2

RESEARCH METHODOLOGY

2.1 Research Design

This study will employ a quantitative research design to assess the effectiveness and feasibility of the proposed RESCUE System in improving emergency response times in Barangay New Cabalan. Quantitative research is appropriate for this study as it involves the systematic collection and analysis of numerical data to identify trends, relationships, and patterns among variables.

The research will primarily focus on collecting data through structured surveys distributed to residents and emergency responders in Barangay New Cabalan. The survey includes both closed-ended questions and Likert-scale items designed to measure respondents' perceptions, experiences, and challenges related to emergency response.

2.2 Locale of the Study

This study will be conducted in Barangay New Cabalan, one of the 17 urban barangays in Olongapo City. The barangay features a diverse population comprising both residential and small commercial zones. With an estimated population of 35,000 residents, Barangay New Cabalan hosts public facilities, including schools and a barangay healthcare center.



The primary healthcare facility of the city, James L. Gordon Memorial Hospital, is located approximately 7.8 kilometers from the barangay. This distance poses significant challenges for emergency responders, particularly in urgent situations. Additional factors such as traffic congestion and unexpected delays often inflate travel times, with response durations ranging from 35 to 40 minutes. These logistical issues further complicate the ability to provide timely and efficient emergency care, highlighting the need for improved emergency response systems in the area.

2.3 Population and Sampling Techniques

The target population for this study includes two primary groups:

Residents of Barangay New Cabalan - The individuals living in the barangay who will use the RESCUE system and benefit from improved emergency response times.

Barangay Organization (including Local Emergency Response Unit)
- The local governing body and emergency responders who will use the RESCUE system to enhance their coordination, communication, and overall response effectiveness during emergencies.

Given the estimated population of 35,000 residents, a representative sample size will be determined using stratified random sampling. This method ensures that both residents and emergency responders are proportionally



represented in the survey, allowing for diverse perspectives on emergency response challenges and the feasibility of the RESCUE System.

To achieve this, the population will be divided into two strata:

Residents

Barangay Organization

Slovin's formula is a common method for determining a sample size when the population size and desired margin of error are known. Given a confidence level of 95% and a margin of error of 5%, Slovin's formula will ensure sufficient data for analysis.

Slovin's Formula:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n represents the Sample Size;

N represents the Population (35,000);

e represents the margin of error (0.05%).

$$n = \frac{35,000}{1 + 35,000(0.05)^2}$$

$$n = \frac{35,000}{1 + 35,000(0.0025)}$$

$$n = \frac{35,000}{1 + 87.5}$$



$$n = \frac{35,000}{88.5}$$

$$n = 396$$

Thus, the sample size required for this study is approximately 396 respondents.

2.4 Research Instrument

This study will use three main tools for data collection: surveys, interviews, and a system prototype test. These tools will help gather both quantitative and qualitative data to evaluate the RESCUE System's potential to improve emergency response times.

2.4.1 Structured Survey - A survey will be used to collect information from residents and emergency responders in Barangay New Cabalan. The survey will include:

Demographic Questions to gather basic details like age, gender, and role.

Yes/No Questions to measure familiarity with emergency response processes and potential challenges.

Likert-scale Questions to assess perceptions of the system's effectiveness and usability.

The survey will be available in both online and paper formats to accommodate different preferences.



2.4.2 Interviews - A small group of emergency responders and community leaders will participate in one-on-one interviews. These interviews will explore their experiences with emergency responses and their views on how the RESCUE System could help. The goal is to gain deeper insights into the specific challenges they face and gather suggestions for system improvements.

2.4.3 System Prototype Testing - If a prototype is ready, a pilot test will be conducted with selected participants. This will help evaluate how easy the system is to use and whether it can reduce emergency response times in real-life scenarios. Feedback from this test will guide further improvements to the system.

These instruments will provide the necessary data to determine if the RESCUE System can meet the community's needs and improve emergency services.

2.5 Data Gathering Procedure

To make sure we gather reliable and comprehensive data for evaluating the RESCUE System's impact, we'll go through a step-by-step process. This process is designed to get real, meaningful insights from the residents of Barangay New Cabalan and our local emergency responders.

2.5.1 Planning Phase



Identifying Participants: The first step is to pinpoint our target participants. We're looking at two groups here: residents of Barangay New Cabalan and the emergency responders who serve this community.

Creating Survey and Interview Tools: We'll develop a survey packed with Yes/No questions to capture residents' and responders' thoughts, experiences, and expectations. For a deeper dive, we'll also create interview questions to understand their current challenges and needs better.

Getting Permissions: Before we dive in, it's crucial to get approval from the barangay officials. This ensures that everything we do complies with ethical guidelines, including data privacy laws.

2.5.2 Data Collection Phase

Survey Distribution: We'll distribute surveys among the chosen residents and emergency responders. Depending on each participant's preference and access to digital tools, these surveys will be available in both online and paper formats.

Conducting Interviews: We'll hold one-on-one interviews with a small group of emergency responders and local leaders. This step is



key for gaining insights into how they see the RESCUE System working in real-life scenarios.

System Testing: If a prototype of the RESCUE System is ready, we'll run a pilot test with a few residents and responders. This will let us see how the system performs in terms of usability and if it helps reduce emergency response times.

2.5.3 Data Validation

Checking for Completeness and Consistency: After collecting all the data, we'll review it to ensure everything is filled out properly and consistently.

Initial Analysis: We'll conduct a quick analysis using frequency and percentage analysis to evaluate the Yes/No responses and start looking for any trends or patterns that stand out.

2.5.4 Data Consolidation and Preparation for Analysis

Compiling and Encoding Data: All responses will be consolidated into a single dataset. We'll encode responses to the Yes/No questions and organize the interview data so it's easy to analyze. This will allow us to categorize the data based on frequency and percentage analysis, making it straightforward to identify trends and key insights from the survey and interview responses.



Data Cleaning: This involves dealing with any gaps or inconsistencies to ensure we're working with a complete and clean dataset.

2.6 Statistical Treatment of Data

Since our research approach is quantitative, we'll focus on statistical techniques to analyze residents' perceptions and assess the system's potential impact on emergency response effectiveness.

Frequency and Percentage Analysis

We will use frequency and percentage analysis for categorical and binary questions (e.g., yes/no responses and demographic details). This approach will allow us to identify common trends and patterns within the data, such as the percentage of residents familiar with emergency contact procedures. By calculating the frequency of responses and their corresponding percentages, we can summarize key insights and assess the overall awareness and needs of residents regarding emergency services.