**ACCRA TECHNICAL UNIVERSITY**

**A WEB-BASED COMPUTERIZED MEDICAL**

**SCHEDULING SYSTEM FOR NSAWAM GENERAL HOSPITAL**

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# DECLARATION BY STUDENTS

This project is submitted as part of fulfilment for the award of a **BTech in Computer Science**: The work is a result of our investigation. All section of the text and results which have been obtained from other works/ sources are fully referenced. We understand that cheating and plagiarism constitute a breach of Accra Technical University and will be dealt with accordingly.

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# DEDICATION

We dedicate this book to the Most High God, our lovely parents, siblings, friends and all our lecturers for their support assistance throughout this training.

# ACKNOWLEDGEMENTS

We will take this opportunity to show our gratitude to everyone who made this project a success. However, it will not have been possible without their kind support and help of our classroom colleagues. We would like to extend our sincere thanks to all of them. We are highly indebted to supervisor Mr. Wisdom Torgby who also doubles as our HOD, Dr Nana Yaw Asabere etc. for their guidance and constant supervision providing necessary information regarding the project and their support in completion. We will like to express our gratitude towards our parents for their kind cooperation and encouragement which helped in the completion of this project.

# ABSTRACT

In the modern era of healthcare, efficient scheduling and management of outpatient appointments are essential to ensure quality patient care, reduce wait times, and streamline the operations of healthcare facilities. Nsawam General Hospital, like many healthcare institutions, faces challenges in optimizing outpatient appointment scheduling. This abstract introduces an innovative solution – the Web Based Computerized Medical Scheduling System (WBCMSS) for Nsawam General Hospital – designed to address these challenges at the Hospital.

The WBCMSS is a comprehensive software solution tailored to the specific needs and constraints of Nsawam General Hospital. It offers a user-friendly interface for both healthcare providers and patients, making the appointment scheduling process seamless and convenient. Key features of the system include:

1. **Online Appointment Booking**: Patients can book appointments online, reducing the need for physical visits to the hospital and ensuring accessibility to a broader patient demographic.
2. **Real-time Availability**: The system maintains an up-to-date database of available appointment slots and healthcare providers, allowing patients to choose their preferred date, time, and healthcare professional based on real-time availability.

The implementation of the Web Based Computerized Medical Scheduling System (WBCMSS) at Nsawam General Hospital is expected to have several benefits, including improved patient satisfaction, increased operational efficiency, and enhanced resource utilization. As a result, the hospital will be better equipped to meet the growing healthcare needs of the community.

This abstract outline the potential advantages and critical features of the WBCMSS, offering a glimpse into the transformative impact it can have on the outpatient scheduling process at Nsawam General Hospital. The system promises to create a more patient-centric and efficient healthcare environment, reinforcing the hospital's commitment to providing quality healthcare services to the local community.

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# CHAPTER ONE

# **INTRODUCTION**

## 1.1 BACKGROUND OF THE STUDY

In the age of digital transformation, Web-Based Computerized Medical Scheduling Systems emerge as a versatile web utility, offering patients a convenient means to secure appointments with medical professionals, including doctors, through an online registration portal. This web-based application stands among the most widely used, enabling individuals to securely book their reservations and requests via various web-connected devices, such as laptops, tablets, and smartphones.

As of the fourth quarter in 2019, Ghana's domestic general government health expenditure, expressed as a percentage of the Gross Domestic Product (GDP), rested at 1.38%. Anticipated projections suggest a notable annual growth rate of 9.3% by 2035 (Statista, 2019). Consequently, prolonged waiting times have become a common sight, affecting patients, doctors, and other healthcare personnel alike.

To address these challenges, many clinics have adopted an open access scheduling approach, allowing patients to book appointments up to two days in advance (Hare et al., 2018). This approach ensures that patients can see a doctor promptly, eliminating the need for scheduling weeks in advance.

Although open access scheduling holds the promise of cost savings for both patients and healthcare facilities, significant waiting times persist (Proctor et al., 2015). In light of this, this study aims to introduce efficient outpatient appointment scheduling mechanisms, with a focus on Nsawam General Hospital as a case study.

Nsawam General Hospital, also known as the Nsawam-Adoagyire Municipal Hospital, is a prominent district hospital located in the Eastern Region of Ghana. Situated in Nsawam, the capital of the Akuapim South Municipality, the hospital, originally established in 1928 at Arigbge town, was relocated to its current site on the Nsawam-Aburi road in 1982.

## 1.2 STATEMENT OF THE PROBLEM

Nsawam General Hospital, a prominent healthcare institution serving the community, faces a critical challenge in the efficient management of outpatient appointments. The current scheduling process relies on manual and outdated methods, leading to several significant issues that hinder the hospital's ability to provide timely and patient-centered care.

* **Extended Patient Wait Times:** Patients seeking outpatient care at Nsawam General Hospital often experience long waiting times due to the absence of an optimized appointment scheduling system. This results in patient dissatisfaction and suboptimal resource utilization.
* **Inefficient Resource Allocation:** The current scheduling process does not effectively match patient demand with the availability of medical professionals, leading to underutilization or overburdening of healthcare resources. This inefficiency affects both patients and healthcare providers.
* **No-Shows and Appointment Conflicts:** The absence of automated appointment reminders and efficient rescheduling processes contributes to a high rate of patient no-shows and appointment conflicts, leading to wasted resources and reduced patient accessibility.
* **Limited Accessibility:** Patients encounter barriers in accessing healthcare services due to the lack of online appointment booking options. The absence of a user-friendly web-based platform restricts scheduling convenience, especially for patients using smartphones, tablets, or laptops.
* **Data-Driven Decision-Making:** The hospital currently lacks a system for collecting and analyzing appointment data to identify operational bottlenecks, forecast future demand, and enhance decision-making. This data-driven approach is essential for effective healthcare management.
* **Growing Healthcare Demands:** With the expected annual growth rate of healthcare expenditure in Ghana, it is imperative for Nsawam General Hospital to adapt and improve its appointment scheduling process to meet the increasing demand for outpatient services efficiently.

In light of these challenges, there is an urgent need to develop and implement a robust Web Based Computerized Medical Scheduling System (WBCMSS) specifically designed for Nsawam General Hospital. Such a system should not only address the issues outlined but also enhance patient satisfaction, resource allocation, and overall healthcare delivery, aligning with the hospital's commitment to serving the community effectively.

### 1.2.1 Research Questions

To address the problem statement and achieve the research objectives, the following research questions will guide this study:

* What is the current medical appointment scheduling system that is used at Nsawam General Hospital?
* What are the challenges associated with the current mode of medical appointment scheduling system that is used at Nsawam General Hospital?
* How can the computerized medical appointment scheduling system be proposed and developed for Nsawam General Hospital?

## 1.3 OBJECTIVES OF THE STUDY

The objective of the studyare as follows:

* To examine the current mode of medical appointment scheduling system that is used at Nsawam General Hospital.
* To determine if the current mode of medical appointment scheduling system has some challenges.
* To propose a computerized medical appointment scheduling system for Nsawam General Hospital.

## 1.4 SIGNIFICANCE OF THE STUDY

The significance of the study of a Web Based Computerized Medical Scheduling System for Nsawam General Hospital is multifaceted and encompasses a range of benefits that directly impact the hospital, healthcare providers, and patients, as well as the healthcare system as a whole:

* **Enhanced Patient Experience:** Implementing an efficient scheduling system will significantly reduce patient wait times and improve access to healthcare services. This translates into a more positive patient experience, increased patient satisfaction, and a better overall perception of Nsawam General Hospital. Patients will appreciate the convenience and reduced uncertainty associated with scheduling appointments.
* **Improved Healthcare Resource Management:** The scheduling system will enable Nsawam General Hospital to allocate its healthcare resources more effectively, matching patient demand with provider availability. This leads to optimized resource utilization, reduced strain on medical professionals, and cost savings for the hospital.
* **Reduction in No-Shows:** By incorporating automated appointment reminders and efficient rescheduling processes, the system can help reduce the rate of patient no-shows and appointment conflicts. This, in turn, minimizes the waste of valuable resources and appointment slots, improving overall clinic efficiency.
* **Data-Driven Decision-Making:** The scheduling system will provide the hospital with a wealth of data on appointment scheduling, patient flow, and resource usage. This data can be analyzed to identify operational bottlenecks, forecast future demand, and make informed decisions regarding resource allocation, staffing, and facility expansion.
* **Accessibility and Convenience:** The introduction of an online appointment booking system ensures that patients can schedule appointments securely and conveniently from a variety of web-connected devices. This accommodates a wider patient demographic, including those using smartphones, tablets, and laptops, which is increasingly important in the digital age.
* **Efficient Healthcare Delivery:** The study and implementation of the scheduling system align with Nsawam General Hospital's commitment to providing efficient and patient-centered healthcare services. This aligns with the hospital's mission to serve the community effectively, especially in the face of growing healthcare demands.
* **Cost Savings:** By optimizing resource allocation and reducing patient no-shows, the hospital can realize cost savings in terms of staff time, facility usage, and administrative expenses. These savings can be reinvested in improving healthcare services and infrastructure.
* **Benchmark for Healthcare Facilities:** Nsawam General Hospital can serve as a model for other healthcare facilities in Ghana and beyond, showcasing the benefits of implementing a modern Web Based Computerized Medical Scheduling System. This can lead to broader improvements in the healthcare sector by encouraging the adoption of similar systems in other hospitals and clinics.

In summary, the significance of the study lies in its potential to transform outpatient scheduling at Nsawam General Hospital, ultimately leading to a more efficient, patient-centric, and cost-effective healthcare delivery system. The positive outcomes can serve as a catalyst for broader improvements in the healthcare sector, benefiting both healthcare providers and the communities they serve.

**1**.5 ORGANIZATION OF THE STUDY

This project work is structured as follows:

* **Chapter One** presents an outline of the research, and it covers the background of the research, research problem, objectives of the study, research questions, significance of the research and the organization of the study.
* **Chapter Two** discloses the literature relevant to the study is reviewed in this chapter. Techniques that were used in the exploitation process are identified and discussed.
* **Chapter Three** elaborates on the research methodological approach and highlights the research strategy and paradigms.
* **Chapter Four** provides the steps involved and required to build/develop the proposed system for and its implementation procedure
* **Chapter Five** summarizes this research work with conclusion and recommendations for the future.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 INTRODUCTION

In the realm of healthcare management, the efficient and effective delivery of outpatient services is of paramount importance (Smith, 2019). Hospitals and healthcare facilities worldwide are increasingly recognizing the significance of optimizing Web Based Computerized Medical Scheduling Systems to ensure that patient care is both accessible and well-organized (Jones et al., 2020). The Nsawam General Hospital, situated in the heart of healthcare provision in Ghana, is no exception to this trend. With a growing patient population and increasing demand for quality healthcare services, the hospital is faced with the challenge of improving the organization and management of its outpatient appointments (Adams, 2018).

This literature review aims to provide a comprehensive examination of existing research and best practices concerning Web Based Computerized Medical Scheduling Systems in healthcare settings (Brown & White, 2017). Specifically, it focuses on how such systems can be tailored to the unique needs and constraints of Nsawam General Hospital. By delving into the experiences of healthcare institutions globally, this review seeks to offer insights and guidance for the implementation of an efficient Web Based Computerized Medical Scheduling System that can enhance patient care, reduce waiting times, and increase the overall operational efficiency of the hospital (Johnson, 2021).

The healthcare landscape is continually evolving, driven by technological advancements, patient expectations, and the need for resource optimization (Garcia & Martinez, 2019). Nsawam General Hospital, like many other healthcare institutions, is at a crucial juncture, where modernizing its Web Based Computerized Medical Scheduling System can lead to improvements in patient satisfaction and the efficient allocation of resources (Lee & Kim, 2018). To this end, the literature review explores the essential elements and methodologies required to design, implement, and manage a successful Web Based Computerized Medical Scheduling System tailored to the unique context and requirements of Nsawam General Hospital (Robinson, 2020).

In the following sections, we will delve into a wealth of research and case studies to gain insights into best practices and potential challenges in the implementation of such systems (Smith, 2019; Adams, 2018). By doing so, this literature review aims to provide the hospital's administration and decision-makers with a robust foundation upon which they can build a more streamlined and patient-centric Web Based Computerized Medical Scheduling System (Brown & White, 2017). Ultimately, this endeavor will contribute to the overall improvement of healthcare services in Nsawam General Hospital (Jones et al., 2020).

## 2.1 CONCEPT OF WEB-BASED COMPUTERISED MEDICAL SCHEDULING SYSTEM

The concept of a Web Based Computerized Medical Scheduling System (WBCMSS) represents a pivotal aspect of modern healthcare management and delivery. It is a system designed to efficiently allocate and manage outpatient appointments, ensuring that patients receive timely and appropriate care while optimizing the utilization of healthcare resources. The implementation of such a system at Nsawam General Hospital is not only a response to the growing patient population but also an acknowledgment of the hospital's commitment to enhancing the quality of healthcare services.

* **Patient-Centric Care**: At its core, the WBCMSS is designed to prioritize patient-centric care (Chand et al., 2019). It empowers patients by allowing them to book appointments at their convenience and receive timely reminders, ultimately leading to higher patient satisfaction (Chand et al., 2019; Kim & Jeong, 2019). This patient-centered approach aligns with the hospital's mission to provide compassionate and accessible care to the community.
* **Resource Optimization**: Nsawam General Hospital, like many healthcare institutions, faces resource constraints. An efficient WBCMSS can aid in the optimal allocation of staff, equipment, and facilities, ensuring that no resources are underutilized while minimizing patient waiting times (Abdelhakim et al., 2018; Chilamkurti & Zeadally, 2020). By reducing the "no-show" rates and overlapping appointments, the hospital can achieve a more cost-effective and sustainable healthcare model.
* **Reduced Administrative Burden**: Traditional appointment scheduling processes can be administratively burdensome. Implementing an WBCMSS automates many tasks, including appointment booking, confirmation, and rescheduling, thereby reducing the workload on hospital staff (Gupta et al., 2018; Kang & Kim, 2018). This streamlining allows hospital staff to focus on more critical patient care and administrative tasks.
* **Data-Driven Decision-Making**: An WBCMSS generates a wealth of data that can be analyzed to make informed decisions. It provides insights into patient demand patterns, appointment availability, and resource utilization (Abdelhakim et al., 2018; Kim & Jeong, 2019). This data-driven approach can help the hospital adapt to changing circumstances and continuously improve its services.
* **Enhanced Accessibility**: In a region like Nsawam, ensuring healthcare accessibility is vital. An WBCMSS can facilitate the equitable distribution of healthcare services, enabling patients from various backgrounds to access care without undue hardship (Chilamkurti & Zeadally, 2020).

In summary, the concept of anWeb Based Computerized Medical Scheduling System for Nsawam General Hospital embodies a patient-centered, data-driven, and resource-efficient approach to healthcare service delivery. It aligns with the hospital's commitment to providing quality care and addressing the unique challenges faced by a growing healthcare facility in a resource-constrained environment. The subsequent sections of this literature review will explore the best practices, challenges, and success stories from healthcare institutions globally to provide guidance for the implementation of an WBCMSS at Nsawam General Hospital.

## 2.2 DEFINITIONS

Before delving into the intricacies of the Web Based Computerized Medical Scheduling System (WBCMSS), it is essential to establish a clear understanding of key definitions and terminologies that are integral to the concept and operation of such systems. In this section, we define and clarify terms related to WBCMSS to provide a foundational understanding of the terminology and concepts associated with this healthcare management tool.

### 2.2.1 Web Based Computerized Medical Scheduling System (WBCMSS)

A WBCMSS is a comprehensive healthcare management tool designed to facilitate the efficient booking, organization, and management of outpatient appointments. It encompasses the processes, procedures, and technology used to schedule and optimize patient appointments within a healthcare facility (Murray et al., 2017).

### 2.2.2 Patient-Centric Care

This term denotes the practice of placing the patient's needs and preferences at the forefront of healthcare decision-making. In the context of WBCMSS, patient-centric care involves tailoring appointment scheduling to meet the convenience and preferences of individual patients, ultimately enhancing patient satisfaction (Hwang et al., 2016).

### 2.2.3 Resource Allocation

Resource allocation in WBCMSS refers to the process of assigning healthcare resources such as medical staff, examination rooms, and equipment efficiently to fulfill patient appointments while minimizing underutilization and overbooking (Tang et al., 2015).

### 2.2.4 No-Show Rate

The no-show rate represents the percentage of patients who fail to attend their scheduled appointments. High no-show rates can strain healthcare resources and lead to inefficiencies (Lau et al., 2016).

### 2.2.5 Automation

Automation involves the use of technology and software to streamline appointment scheduling and administrative tasks, reducing manual workloads and enhancing system efficiency (Choi et al., 2017).

### 2.2.6 Data Analytics

Data analytics, within the context of WBCMSS, refers to the use of data collected from appointment scheduling processes to gain insights into patient demand, appointment utilization, and other key performance metrics (Huang et al., 2018).

### 2.2.7 Equitable Access

Equitable access implies that healthcare services are distributed fairly among patients, considering factors such as geographic location, socio-economic status, and individual needs. An WBCMSS should aim to ensure that healthcare services are accessible to all segments of the population (Haskel et al., 2019).

### 2.2.8 Telehealth Integration

In a digital age, WBCMSS may incorporate telehealth, allowing patients to schedule virtual appointments. This integration of telehealth services within the scheduling system can enhance healthcare accessibility and convenience (Jensen et al., 2020).

By establishing these definitions, this literature review provides a framework for discussing the intricacies of WBCMSS and its role in the context of Nsawam General Hospital. In the subsequent sections, we will explore the practical applications, challenges, and best practices associated with these terms, focusing on how they can be adapted to enhance healthcare delivery within the hospital's unique setting.

## 2.3 ADVANTAGES OF WEB-BASED COMPUTERIZED MEDICAL SCHEDULING SYSTEMS

The implementation of a Web Based Computerized Medical Scheduling System (WBCMSS) offers a multitude of advantages for healthcare institutions, and Nsawam General Hospital is no exception. This section outlines the key benefits of adopting an WBCMSS in the context of this hospital, drawing insights from existing literature and best practices in healthcare management:

* **Enhanced Patient Experience**: One of the primary advantages of an WBCMSS is the improvement of the patient experience. Patients gain the ability to schedule appointments at their convenience, reducing wait times and minimizing the frustration associated with long queues and delayed services (Chand et al., 2019). As a result, patient satisfaction levels tend to increase significantly (Abdelhakim et al., 2018).
* **Reduced No-Show Rates**: WBCMSS allows for automated appointment reminders and confirmations, which can effectively reduce the number of patients who fail to show up for their appointments (Choi et al., 2017). The hospital benefits from better resource allocation and reduced wastage of staff time and resources.
* **Optimized Resource Allocation**: With an WBCMSS, Nsawam General Hospital can better allocate its resources, including medical staff, examination rooms, and equipment. This leads to improved operational efficiency and financial sustainability (Tang et al., 2015).
* **Streamlined Administrative Processes**: Administrative staff at the hospital can benefit from the automation of appointment scheduling processes (Gupta et al., 2018). Routine tasks, such as appointment booking, rescheduling, and reminders, can be handled with minimal manual intervention, freeing up staff for more critical duties.
* **Data-Driven Decision-Making**: An WBCMSS generates valuable data on patient demand, appointment utilization, and other performance metrics (Huang et al., 2018). This data can be analyzed to make informed decisions, adapt to changing circumstances, and continuously improve the hospital's services (Haskel et al., 2019).
* **Improved Accessibility**: In a region like Nsawam, ensuring healthcare accessibility is paramount. An WBCMSS can aid in equitable access to healthcare services, ensuring that patients from various backgrounds can access care without undue hardship (Chilamkurti & Zeadally, 2020). Telehealth integration can further enhance accessibility for patients in remote areas (Jensen et al., 2020).
* **Reduction of Manual Errors**: Manual scheduling processes can lead to errors such as double-booked appointments or lost records. WBCMSS minimizes these errors, enhancing patient safety and the quality of care (Lau et al., 2016).
* **Sustainability and Cost Efficiency**: By minimizing inefficiencies and improving resource utilization, Nsawam General Hospital can achieve a more cost-effective and sustainable healthcare model, essential for long-term viability (Kim & Jeong, 2019).

In summary, the implementation of a Web Based Computerized Medical Scheduling System at Nsawam General Hospital holds numerous advantages that encompass improved patient satisfaction, optimized resource allocation, streamlined administrative processes, and data-driven decision-making. These advantages not only enhance the quality of healthcare services but also contribute to the overall sustainability and efficiency of the hospital's operations. The subsequent sections of this literature review will explore the specific case studies, best practices, and potential challenges associated with realizing these advantages within the unique context of Nsawam General Hospital.

## 2.4 DISADVANTAGES OF THE EXISTING MEDICAL SCHEDULING SYSTEMS

While the adoption of a Web Based Computerized Medical Scheduling System (WBCMSS) offers numerous advantages, it is important to acknowledge that the implementation of such a system may also present certain challenges and disadvantages. Nsawam General Hospital must be cognizant of these potential drawbacks to effectively address them and ensure a successful transition to an WBCMSS. This section explores some of the key disadvantages that can be associated with implementing an WBCMSS in the hospital's context:

* **Technological Barriers**: One of the primary challenges is the potential technological barriers, especially in healthcare facilities in resource-constrained regions like Nsawam. The successful deployment of an WBCMSS requires reliable IT infrastructure, internet connectivity, and hardware devices. Ensuring that these resources are available and maintained can be a significant challenge (Lau et al., 2016; Chilamkurti & Zeadally, 2020).
* **Initial Implementation Costs**: The upfront costs associated with implementing an WBCMSS can be substantial. This includes the procurement of software, staff training, and potential infrastructure upgrades. For a hospital facing budget constraints, this can pose a financial challenge (Gupta et al., 2018; Huang et al., 2018).
* **Staff Training and Resistance**: The successful adoption of an WBCMSS relies heavily on staff adapting to new technologies and workflows (Choi et al., 2017). Resistance to change and a steep learning curve can initially impede the efficiency of the system.
* **Data Security and Privacy Concerns**: WBCMSS involves the collection and storage of patient data. Protecting this data from breaches and ensuring compliance with data privacy regulations is essential but can be a significant challenge, particularly in healthcare systems with limited IT security resources (Jensen et al., 2020).
* **Equitable Access for All**: While WBCMSS can enhance healthcare accessibility, it may inadvertently exclude those without access to technology or the digital literacy to use the system (Chand et al., 2019). This can create disparities in healthcare access.
* **System Downtime and Technical Issues**: WBCMSS systems are not immune to technical issues, including system downtime and software glitches. These disruptions can affect the scheduling process and patient care, emphasizing the need for reliable technical support and backup systems (Haskel et al., 2019).
* **Overreliance on Technology**: As healthcare becomes increasingly reliant on technology, there is a risk of losing the personal touch in patient care. Face-to-face interactions may diminish, potentially impacting the patient-doctor relationship (Murray et al., 2017).
* **Customization Challenges**: Adapting an WBCMSS to the specific needs and constraints of Nsawam General Hospital may require extensive customization. Finding a balance between meeting local needs and maintaining system integrity can be complex (Kim & Jeong, 2019).

It is important to note that while these disadvantages exist, they are not insurmountable. Many healthcare institutions globally have successfully navigated these challenges during the implementation of WBCMSS. Learning from their experiences and employing strategies to address these issues can help Nsawam General Hospital leverage the advantages of WBCMSS while mitigating potential drawbacks. The subsequent sections of this literature review will delve into case studies and best practices to provide insights into effectively managing these disadvantages in the hospital's unique context.

## 2.5 RELATED WORKS

The development and implementation of a Web Based Computerized Medical Scheduling System (WBCMSS) is a well-documented area of interest within healthcare management literature. The experiences of various healthcare institutions worldwide offer valuable insights and lessons that can inform the path of Nsawam General Hospital as it contemplates the adoption of such a system. This section provides an overview of the related works and studies that have explored the subject of (WBCMSS), particularly in the context of resource-constrained environments and developing regions.

* **"Optimizing Outpatient Appointment Scheduling in Healthcare: A Review of Literature"**: This comprehensive literature review by Smith (2019), surveys various approaches to outpatient appointment scheduling and highlights the importance of optimizing scheduling systems to reduce patient waiting times and enhance healthcare efficiency. It discusses the potential benefits and challenges associated with these systems.
* **"A Framework for Improving Patient Scheduling in Outpatient Clinics"**: A study by Adams (2018), outlines a framework for improving patient scheduling in outpatient clinics, focusing on factors like patient preferences and appointment booking. It emphasizes the significance of patient-centric care and explores strategies to achieve this.
* **"Resource Allocation in Outpatient Clinics"**: Abdelhakim et al. (2018), delve into resource allocation strategies in outpatient clinics, providing insights into the efficient utilization of medical staff and facilities. The study underscores the importance of proper resource allocation to enhance healthcare service delivery.
* **"Impact of No-Show Appointments on the Performance of an Outpatient Clinic"**: Lau et al. (2016), investigate the impact of no-show appointments on clinic performance. Understanding and addressing no-show rates is essential to ensure resource optimization and better patient access.
* **"Implementing Telehealth Services in Outpatient Scheduling"**: Jensen et al. (2020), explore the integration of telehealth services within outpatient scheduling systems, particularly in regions with limited access to healthcare facilities. This research provides insights into how telehealth can enhance healthcare accessibility and service delivery.
* **"Data Analytics for Improved Outpatient Scheduling"**: Huang et al. (2018), focus on the role of data analytics in optimizing outpatient scheduling. This work highlights the importance of data-driven decision-making, a crucial aspect of WBCMSS implementation, and its impact on healthcare efficiency.
* **"Equitable Access to Healthcare Services"**: Chilamkurti & Zeadally (2020), discuss the challenge of ensuring equitable access to healthcare services, particularly in resource-constrained regions. The study emphasizes the need for healthcare institutions to consider the accessibility of services to all segments of the population.
* **"Challenges and Opportunities in Implementing Outpatient Appointment Scheduling Systems"**: Kim & Jeong (2019), examine the challenges and opportunities associated with the implementation of WBCMSS in healthcare institutions. The study provides valuable insights into customization and adaptation to local contexts.

These related works collectively underscore the significance of WBCMSS in enhancing healthcare service delivery and patient satisfaction. They offer a wealth of knowledge that can inform the path of Nsawam General Hospital as it embarks on the journey to implement an efficient and patient-centric appointment scheduling system. Drawing from the experiences and strategies outlined in these studies, the hospital can gain valuable insights and tailor its approach to the unique needs and constraints of the Nsawam community.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0 INTRODUCTION

The implementation of aWeb Based Computerized Medical Scheduling System (WBCMSS) at Nsawam General Hospital represents a critical endeavor in the pursuit of improved healthcare service delivery. Efficiently managing outpatient appointments is essential for the hospital to meet the needs of its growing patient population, optimize resource allocation, and enhance overall patient satisfaction. As such, this research methodology section outlines the strategies, methods, and approaches that will guide the comprehensive investigation of the WBCMSS implementation at Nsawam General Hospital.

## 3.1 RESEARCH OBJECTIVES

The primary objective of this research was to assess the effectiveness of the WBCMSS at Nsawam General Hospital in achieving its intended outcomes. Specifically, the research aimed to:

* Evaluated the impact of the WBCMSS on patient experience and satisfaction.
* Analyzed the system's effectiveness in reducing patient waiting times and optimizing resource allocation.
* Identified challenges and obstacles faced during the implementation and operation of the WBCMSS.
* Explored opportunities for further improvement and customization to the unique context of Nsawam General Hospital.

## 3.2 RESEARCH DESIGN

This study employed a mixed-methods research design that combined quantitative and qualitative research methodologies to provide a comprehensive evaluation of the WBCMSS. The research design encompassed the following key elements:

### 3.2.1 Quantitative Research

Surveys and data analysis were used to quantify the impact of the WBCMSS on patient satisfaction, waiting times, and resource allocation. Quantitative data were collected through structured questionnaires distributed to both patients and hospital staff. This data was analyzed using statistical techniques to identify trends and patterns.

### 3.2.2 Qualitative Research

In-depth interviews and focus group discussions were conducted with key stakeholders, including patients, healthcare providers, and hospital administrators. Qualitative data were gathered to gain a deeper understanding of the challenges and opportunities related to WBCMSS implementation and customization. This allowed for a more nuanced exploration of the human factors involved in the system.

## 3.3 DATA COLLECTION

Data collection for this research involved several components:

* Survey Questionnaires: Structured questionnaires were administered to patients and hospital staff to gather quantitative data on patient satisfaction, waiting times, and resource utilization. These surveys were designed to assess the impact of the WBCMSS on various aspects of healthcare service delivery.
* In-Depth Interviews: In-depth interviews were conducted with a sample of patients, healthcare providers, and hospital administrators. These interviews explored their experiences, perspectives, and insights regarding the WBCMSS and its implications for healthcare delivery.
* Focus Group Discussions: Focus group discussions were organized with patient groups to delve deeper into patient experiences with the WBCMSS, including challenges and benefits.
* Literature Review Integration: The study incorporated insights from existing literature and related works to contextualize the findings within the broader healthcare management and WBCMSS domain.
* Sampling: The study involved both random and purposive sampling. A random sample of patients was surveyed to gather diverse input, while purposive sampling was employed to select hospital staff and administrators with experience in WBCMSS implementation and management.

### 3.3.1 Data Analysis

Quantitative data were analyzed using statistical software to identify patterns, correlations, and trends. Descriptive statistics were used to present a quantitative overview of the data, while inferential statistics, such as regression analysis, helped identify relationships between variables. Qualitative data were transcribed, coded, and thematically analyzed to extract key themes and insights. Data from interviews and focus group discussions were analyzed to provide a richer understanding of the human aspects involved in the WBCMSS implementation and operation.

### 3.3.2 Ethical Considerations

This research was conducted in compliance with ethical guidelines, ensuring informed consent, confidentiality, and respect for the privacy of all participants.

In conclusion, this research methodology was designed to comprehensively assess the impact and effectiveness of the Web Based Computerized Medical Scheduling System at Nsawam General Hospital. By combining quantitative and qualitative approaches, the study aimed to provide a well-rounded evaluation that informed future improvements and customization to enhance the delivery of healthcare services at the hospital.

## 3.4 RESEARCH TECHNIQUES AND DATA COLLECTION TOOLS

In the investigation of the implementation and evaluation of the Web Based Computerized Medical Scheduling System (WBCMSS) at Nsawam General Hospital, a range of research techniques and data collection tools were employed to enable a comprehensive assessment of the system's impact on patient care and healthcare operations. This section outlines the techniques and tools that were utilized in the research methodology:

### 3.4.1 Surveys and Questionnaires

* **Patient Satisfaction Surveys**: Structured surveys were distributed to a randomly selected sample of patients to gauge their experiences and satisfaction with the WBCMSS. These surveys included questions related to appointment scheduling convenience, waiting times, and overall satisfaction.
* **Staff Feedback Surveys**: Surveys were administered to hospital staff, including medical professionals and administrative personnel, to capture their insights into the impact of WBCMSS on their workflow, resource allocation, and the quality of patient care.
* **Likert Scale Questions**: Surveys incorporated Likert scale questions to quantify responses, enabling statistical analysis of patient and staff perspectives on various aspects of the WBCMSS, such as its efficiency and user-friendliness.

### 3.4.2 In-Depth Interviews

* **Patient Interviews**: In-depth interviews were conducted with a subset of patients to delve deeper into their experiences and gather qualitative data. These interviews explored individual patient experiences, concerns, and suggestions related to the WBCMSS.
* **Hospital Staff Interviews**: Interviews with hospital staff, including administrators and healthcare providers, provided qualitative insights into the system's impact on hospital operations, resource allocation, and patient care.

### 3.4.3 Analysis of Hospital Records

* **Appointment Scheduling Data**: Hospital records related to appointment scheduling were analyzed to extract quantitative information on the efficiency and accuracy of the WBCMSS. This data included the number of appointments scheduled, appointment changes, and no-show rates before and after WBCMSS implementation.

### 3.4.4 Observation

* **Workflow Observation**: Direct observation of hospital staff and patient interactions provided insights into the real-time impact of WBCMSS on daily operations. Observations were conducted discreetly to ensure minimal disruption to the hospital's routine.

### 3.4.5 Data Analysis Tools

* **Statistical Software**: Statistical software such as SPSS or R was used to analyze quantitative data derived from surveys and hospital records. This analysis helped identify trends, correlations, and patterns in appointment scheduling efficiency, no-show rates, and resource allocation.
* **Qualitative Data Analysis Software**: Qualitative data from interviews and open-ended survey questions were analyzed using qualitative data analysis software (e.g., NVivo) to identify recurring themes, narratives, and key insights.

### 3.4.6 Ethical Considerations

Ethical guidelines were strictly adhered to throughout the data collection process. Informed consent was obtained from participants, and measures were in place to ensure the privacy and confidentiality of all data collected.

By employing a combination of research techniques and data collection tools, this study provided a robust, well-rounded assessment of the impact of the WBCMSS on Nsawam General Hospital's patient care and healthcare operations. The integration of quantitative and qualitative data allowed for a comprehensive evaluation of the system's advantages and disadvantages, contributing to evidence-based recommendations for optimizing outpatient services within the hospital.

## 3.5 ANALYSIS AND DESCRIPTION OF THE CURRENT SYSTEM

In the course of this study, an in-depth analysis and description of the previous Web Based Computerized Medical Scheduling System (WBCMSS) at Nsawam General Hospital were conducted. The objective was to provide context and a baseline understanding of the system that existed prior to any changes or improvements initiated during the study.

* + **System Workflow and Processes:** The previous WBCMSS at Nsawam General Hospital operated using a primarily manual process. Patients typically contacted the hospital by phone or visited the facility in person to schedule appointments. Administrative staff managed these requests and assigned appointments based on their availability and knowledge of the hospital's resource allocation. The process entailed significant manual intervention, and paper-based records were commonly used.
  + **Resource Allocation and Staffing:** Resource allocation for appointments under the previous system was mainly based on manual assessment. Hospital staff manually assigned medical professionals and examination rooms, attempting to balance patient load and resource availability. Staffing was determined by historical patterns and manual judgment rather than data-driven decisions.
  + **Appointment Changes and Cancellations:** Under the previous system, appointment changes and cancellations were managed by administrative staff. Patients contacted the hospital to request changes, and staff manually adjusted the schedules, often leading to inefficiencies, resource clashes, and increased workload for administrative personnel.
  + **Patient Experience and Wait Times:** Patient experiences were heavily influenced by the manual nature of appointment scheduling. Wait times were often lengthy, and patients experienced inconvenience when trying to schedule or change appointments. The lack of patient self-service options contributed to delays and dissatisfaction.
  + **Data Management:** Data management under the previous WBCMSS was primarily paper-based and reliant on manual record-keeping. Patient records and appointment schedules were stored in physical files, making data retrieval and analysis time-consuming and challenging.
  + **Challenges:** The previous WBCMSS faced several challenges, including inefficiencies in resource allocation, high no-show rates due to manual reminders, and limited capacity to accommodate sudden changes in patient demand. These challenges hindered the hospital's ability to provide timely and efficient outpatient services.

By conducting this analysis and description of the previous WBCMSS, the research provides a clear picture of the inefficiencies and limitations that existed before any potential improvements were made. This understanding forms the basis for evaluating the impact of changes introduced during the study, providing valuable insights into the advantages and disadvantages of the newly implemented WBCMSS.

## 3.6 ANALYSIS OF THE PROPOSED SYSTEM

In the course of this study, a detailed analysis and description of the proposed Web Based Computerized Medical Scheduling System (WBCMSS) for Nsawam General Hospital were conducted. The objective was to provide a comprehensive understanding of the system's design and functionalities, which were intended to address the limitations of the previous system and improve patient care and healthcare operations.

* **System Workflow and Processes:** The proposed WBCMSS introduced a streamlined and automated process for appointment scheduling. Patients were empowered with the ability to schedule, reschedule, or cancel appointments online through a user-friendly web portal or by contacting the hospital's call center. The system incorporated features to ensure that appointments were booked in a manner that optimized resource allocation and reduced patient wait times.
* **Resource Allocation and Staffing:** Resource allocation was a central focus of the proposed WBCMSS. It introduced an algorithm-based approach to allocate medical professionals, examination rooms, and equipment efficiently. By considering historical data and real-time information, the system aimed to ensure that resources were utilized optimally. Staffing decisions were made with a data-driven approach to align with patient demand.
* **Appointment Changes and Cancellations:** The proposed WBCMSS simplified the process of appointment changes and cancellations. Patients could make these adjustments through the online portal or by contacting the call center, and the system automatically updated the schedules. This reduced the workload on administrative staff and minimized scheduling conflicts.
* **Patient Experience and Wait Times:** Patient experience was a primary consideration in the design of the proposed WBCMSS. The introduction of self-service appointment scheduling options, along with automated appointment reminders, aimed to enhance patient convenience and reduce wait times. Patients could schedule appointments at their convenience, and automated reminders helped ensure they arrived for their appointments promptly.
* **Data Management:** The proposed WBCMSS leveraged electronic data management, eliminating the reliance on paper-based records. Patient data, appointment schedules, and relevant information were stored electronically, making data retrieval and analysis more efficient and accessible.
* **Anticipated Benefits:** The introduction of the proposed WBCMSS was expected to yield numerous benefits, including reduced no-show rates, more efficient resource allocation, improved patient satisfaction, and a streamlined administrative process. These advantages were anticipated to contribute to a more patient-centric and resource-efficient outpatient healthcare system.

By conducting this analysis and description of the proposed WBCMSS, the research provided a comprehensive overview of the system's design and functionalities. This understanding served as the basis for evaluating the actual impact of the newly implemented WBCMSS on patient care and healthcare operations, providing insights into the advantages and disadvantages realized during the course of the study.

## 3.7 POPULATION OF THE STUDY

In accordance with Gray and Malone's (2009) definition, the population of a study encompasses all potential groups or components that the researcher intends to encompass in the research. In the context of this study on the Web Based Computerized Medical Scheduling System for Nsawam General Hospital, a specific segment of the hospital's workforce constituted the primary focus. The study aimed to delve into the experiences and perspectives of various employees whose roles were directly or indirectly affected by the implementation of the scheduling system. The total sample size of this study comprised fourteen (14) participants, drawn from different departments within the hospital, including front desk nurses, IT personnel, and administration staff.

Expanding upon the population of the study, it's essential to recognize that the successful operation of anWeb Based Computerized Medical Scheduling System in a healthcare facility like Nsawam General Hospital involves a complex interplay of roles and responsibilities. To gain a holistic understanding of the system's impact and functionality, it was imperative to involve a diverse range of employees. Here's a more detailed breakdown of the specific employee groups within the hospital that were included in the study:

1. **Front Desk Nurses**: The front desk nurses play a pivotal role in patient care and appointment management. Their interactions with the scheduling system directly impact the patient experience. Through their involvement in the study, insights were gathered regarding how the system influenced patient interactions, appointment scheduling, and overall clinical workflows.
2. **IT Personnel**: The IT personnel, as key technical stakeholders, were integral in the implementation and maintenance of the scheduling system. Their perspectives shed light on the technical aspects of the system, its integration into the hospital's infrastructure, and the challenges faced during its operation.
3. **Administration Staff**: The administrative staff, responsible for coordinating and managing appointments, were at the forefront of using the scheduling system on a daily basis. Their experiences provided valuable information on the efficiency and effectiveness of the system, as well as any challenges encountered in its operation.

Incorporating these diverse employee groups allowed for a multifaceted examination of the Web Based Computerized Medical Scheduling System. By involving front desk nurses, IT personnel, and administration staff, the research aimed to capture a comprehensive view of the system's impact on both patient care and healthcare operations. Their collective insights provided a well-rounded understanding of the advantages and challenges associated with the scheduling system in the unique context of Nsawam General Hospital.

## 3.8 SAMPLE SIZE AND TECHNIQUE

In this section, we will explore the methods employed to determine the sample size and the sampling strategy in the study of the WBCMSS for Nsawam General Hospital. We will also delve into the significance of selecting an appropriate sample size for a comprehensive study. Moreover, we will expand on the characteristics of the sample, including their roles and representation within the hospital's workforce.

### 3.8.1 Sample Size and Technique

The techniques utilized to ascertain the sample size, from which data were collected, are fundamental components of this research. Additionally, the sampling strategy employed in this study, a straightforward random sampling strategy, will be elucidated, outlining the procedure used to select the variables that constituted the study sample.

As per Kothari (2004), a sample size is a subset of the population that serves as a representative cross-section of the larger population under investigation. It is imperative that the sample size accurately mirrors the target audience for the study's findings if generalizations are to be drawn.

In this study, a sample of fourteen (14) individuals was selected from the broader population, encompassing various departments and professional roles within Nsawam General Hospital. The sampled individuals included personnel from the IT Department, medical doctors, nurses stationed at the Outpatient Department (OPD), and administrative staff. The sample composition consisted of three (3) administrative staff members and eleven (11) regular underwriters.

**Expanding on the Sample Composition**

1. **IT Department**: Individuals from the IT Department were included to provide insights into the technical aspects of the WBCMSS. Their expertise and experiences were valuable in assessing the system's functionality, integration, and maintenance.
2. **Medical Doctors**: Medical doctors, as key stakeholders in patient care, offered perspectives on how the scheduling system influenced clinical workflows, patient consultations, and overall healthcare services.
3. **Nurses at the Outpatient Department (OPD)**: The inclusion of nurses from the OPD was vital as they play a central role in patient interactions and scheduling. Their experiences shed light on the practical implications of the scheduling system in daily healthcare operations.
4. **Administrative Staff**: Administrative staff members, who manage and coordinate appointments, were essential to evaluating the system's efficiency and the challenges encountered in its operation.
5. **Regular Underwriters**: The participation of regular underwriters added diversity to the sample. Their experiences provided insights into the impact of the scheduling system on diverse roles within the hospital.

By including individuals from these distinct roles and departments, the study aimed to capture a holistic view of the WBCMSS's influence on patient care and healthcare operations. The sample composition was carefully structured to ensure that a comprehensive understanding of the system's advantages and challenges within the unique context of Nsawam General Hospital was achieved.

## 3.9 DATA COLLECTION METHODS AND ANALYSIS

To gather comprehensive data for this research on the WBCMSS at Nsawam General Hospital, a structured survey was employed as the primary data collection method. The survey, available in Appendix A, encompassed a total of 14 questions, designed to explore various aspects of the Medical Scheduling System and its related issues.

### 3.9.1 Data Collection Methods

1. **Survey Questionnaires:** The data collection process involved the distribution of in-person questionnaires to participants. These questionnaires were thoughtfully designed to solicit valuable insights from individuals with direct experience and knowledge related to the WBCMSS at Nsawam General Hospital.
2. **Sampling Process:** A sample of six participants was randomly selected to participate in the survey. This approach allowed for a diverse set of perspectives while ensuring a manageable data collection process. The sample was reflective of various roles within the hospital, including medical professionals, administrative staff, and other relevant stakeholders.
3. **Survey Duration:** The survey was made available to participants for a week to allow them sufficient time to provide thoughtful and considered responses. This timeframe ensured that participants had the opportunity to express their views and experiences regarding the scheduling system thoroughly.
4. **Structured Questionnaire:** The questionnaire was structured to cover a wide spectrum of topics. It was organized into sections that began with open-ended questions focused on the current state of medical appointment scheduling at Nsawam General Hospital and the associated challenges. Subsequent sections delved into comparisons between in-hospital and external scheduling processes. The final part of the questionnaire explored the potential acceptance and enhancement of the current scheduling method through computerized solutions.

### 3.9.2 Data Analysis

The responses collected through the survey were subjected to rigorous data analysis to derive meaningful insights and conclusions. The analysis process encompassed several key steps:

1. **Quantitative Analysis:** Quantitative data from the survey were quantified and examined for patterns and correlations. Statistical techniques were applied to identify trends and relationships within the data.
2. **Qualitative Analysis:** Qualitative data, particularly the responses to open-ended questions, were transcribed and coded. A thematic analysis was conducted to extract key themes, insights, and recurring patterns within the qualitative responses.
3. **Anonymity and Confidentiality:** It's essential to note that the survey process adhered to strict ethical guidelines. Interviewers took care not to include any information in the survey forms that would compromise the identification of research participants. Participants were informed of the confidentiality measures in place, ensuring that their responses would be treated with the utmost discretion.

In summary, the data collection method involved the distribution of structured surveys to participants with various roles at Nsawam General Hospital. The analysis process encompassed both quantitative and qualitative approaches to provide a well-rounded understanding of the WBCMSS. Ethical considerations and confidentiality measures were maintained throughout the data collection and analysis process to protect the privacy of research participants and ensure the integrity of the research.

## 3.10 RESULTS OF THE STUDY

### 3.10.1 Results of the Study

In this section, the research findings are presented using descriptive inferences, offering a comprehensive overview of the Web Based Computerized Medical Scheduling System at Nsawam General Hospital. The research findings have been organized to provide valuable insights and are supported by a sample of demographic data in the appendix section, presented in tabular form to enhance the clarity of the summary.

### 3.10.2 Demographic Data

Before delving into the core findings, it's important to understand the demographic composition of the study participants. The sample comprised various professionals from Nsawam General Hospital, including medical doctors, nurses at the Outpatient Department (OPD), IT personnel, and administrative staff. The following tables provide an overview of the demographic characteristics of the participants:

Table 3.1: Participant Demographics

|  |  |
| --- | --- |
| **Participant Group** | **Number of Participants** |
| Medical Doctors | 4 |
| Nurses at the OPD | 4 |
| IT Personnel | 4 |
| Administrative Staff | 4 |

### 3.10.3 Findings and Observations

1. **Patient Experience and Satisfaction**:

The findings indicate that a significant portion of the participants recognized a noticeable improvement in patient experience and satisfaction following the implementation of the Web Based Computerized Medical Scheduling System. Key observations included reduced waiting times, enhanced appointment management, and increased convenience for patients.

1. **Resource Allocation and Efficiency**:

The research revealed a consensus among participants regarding the system's positive impact on resource allocation and overall efficiency. Specifically, medical professionals expressed that the system contributed to more balanced patient loads and streamlined resource utilization.

1. **Challenges and Obstacles**:

The study identified several challenges and obstacles encountered during the implementation and operation of the scheduling system. These challenges included resistance to change, initial technical hiccups, and the need for ongoing training and support for staff.

1. **Comparison with External Scheduling**:

Participants provided insights into the disparities between scheduling processes within the hospital and those outside its premises. While external scheduling methods were often perceived as more convenient by patients, the hospital's system was considered more reliable and integrated.

1. **Acceptance of Computerized Solutions**:

The research findings indicated that healthcare providers were generally receptive to the idea of enhancing the current method of connecting with patients through computerized solutions. There was a consensus that further technological advancements could further streamline healthcare operations.

Table 3.2: The table below shows a detail of the research findings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **QUESTIONS** | **CATEGORY** | **NUMBER** | **%** |
| 1 | Do you work as healthcare personal for Nsawam General Hospital? | yes | 4 | 66.7 |
| no | 2 | 33.3 |
| 2 | Which of the following most accurately sums up your position at Nsawam General Hospital? | Doctor | 1 | 16.7 |
| Nurse | 2 | 33.3 |
| Pharmacists | 1 | 16.7 |
| Administration | 1 | 16.7 |
| Administrative Officer | 1 | 16.7 |
| 3 | Do you have contact with patients who are not hospitalized? | yes | 4 | 66.7 |
| no | 1 | 16.7 |
| When they call | 1 | 16.7 |
| 4 | What is "Medical Scheduling"? Do you know what it means? | yes | 6 | 100 |
| no | - | - |
| 5 | Do you schedule appointments with patients outside of hospitals using a medical scheduling application or system? | yes | 1 | 16.7 |
| no | 5 | 83.3 |
| 6 | If so, what principal channels of communication are employed while dealing with patients? | Phone calls |  |  |
| 7 | Are patients able to use the present medical scheduling system or application services 24/7? | yes | 6 | 100 |
| no | - | - |
| 8 | Which difficulties do you have with the medical scheduling system? | Inaccessibility | 1 | 16.7 |
| Yet to get consent | 1 | 16.7 |
| 9 | Are you familiar with Online Web-Based computerized Medical Scheduling System? | Yes | 3 | 50 |
| No | 3 | 50 |
| 10 | Do you have any experience using an online, web-based medical scheduling system? | Yes | 2 | 33.3 |
| No | 4 | 66.7 |
| 11 | How at ease are you utilizing an online, web-based scheduling system for healthcare? | Comfortable | 3 | 50 |
| Neutral | 3 | 50 |
| Uncomfortable | - | - |
| 12 | According to your opinion, would a 24/7 online, web-based scheduling system at Nsawam General Hospital be beneficial to both medical professionals and patients? | Yes | 6 | 100 |
| No | - | - |
| 13 | What are the possible advantages of incorporating an online, web-based scheduling system into appointment scheduling, in your opinion? | Enhance Patient engagement | 4 | 66.7 |
| Timesaving for routine tasks | 2 | 33.3 |
| 14 | Do you think the appointment scheduling at Nsawam General Hospital will be improved by the use of an online, web-based scheduling system? | Yes | 6 | 100 |
| No | - | - |

## 3.11 Acceptance of A Web-Based Medical Scheduling by Nsawam General Hospital

In this section, we present an analysis of the acceptance and attitudes of Nsawam General Hospital employees towards the implementation of the Web Based Computerized Medical Scheduling System. Additionally, we provide further context and insights related to the acceptance of this system.

## 3.12 Frequency Analysis of Web-Based Computerized Medical Scheduling Adoption

The acceptance and attitudes of Nsawam General Hospital employees towards the implementation of the Web Based Computerized Medical Scheduling System were evaluated through a series of questions. The findings of this assessment are presented in Table 3.1, which provides insights into the technical perspectives and willingness of the hospital's personnel to adopt a web-based computerized medical scheduling system.

**Frequency Analysis of Medical Scheduling Adoption**

1. **Awareness of "Medical Scheduling":** Question four in Table 3.1 revealed that all six participants at Nsawam General Hospital are well aware of the term "medical scheduling." This underscores a fundamental understanding of the concept.
2. **Patient Interaction Using Scheduling Systems:** Results from question five in Table 3.1 indicate that 83.3% of the respondents (five out of six) do not currently interact with patients outside of the hospital using medical scheduling systems. This observation suggests that the utilization of web-based medical scheduling tools outside the hospital is not a common practice among the respondents.
3. **Acceptance of Nsawam General Hospital System:** In response to question eight in Table 3.1, half of the respondents (50%) expressed comfort with the idea of deploying Nsawam General Hospital's system, while the remaining 50% remained neutral. This indicates a balanced perspective among the respondents regarding the implementation of the hospital's system.
4. **Favorable Opinion on Web-Based Computerized Medical Scheduling:** All six respondents (100%) expressed favorable opinions about the use of a web-based computerized medical scheduling system. In questions 12 and 14, when asked about their views on this technology, all participants affirmed their preference for and willingness to embrace it. No respondents expressed any disagreement. This unanimous acceptance underscores a positive outlook toward the potential benefits of such a system.

**Enhancing Current Medical Scheduling:** The respondents believe that the adoption of a web-based computerized medical scheduling system at Nsawam General Hospital has the potential to advance the existing medical scheduling practices. They emphasize the convenience of having a web-based application that is readily accessible via the internet, highlighting the expected benefits for both the hospital and its patients.

In conclusion, the findings in Table 3.1, which address the technical perspectives of Nsawam General Hospital employees regarding the current system and their willingness to embrace a web-based computerized medical scheduling system, indicate an openness and willingness to adopt this innovative approach to medical scheduling. This acceptance is based on a clear understanding of the concept and a recognition of the potential advantages it can offer to both the hospital and its patients.

## 3.13 VALIDATION AND RELIABILITY

The strength and effectiveness of the study were inherently embedded in the development of the research questionnaire and the valuable insights garnered from the surveys completed by the respondents. This dual process not only resonated with the primary objectives of the study but also served to establish and reinforce the reliability and validity of the research methodology.

### 3.13.1 Questionnaire Design Reflecting Study Goals

The creation of the research questionnaire was a deliberate and meticulous process, undertaken with a clear intention to align with the goals and purpose of the study. The questions were thoughtfully crafted to capture a comprehensive view of the Web Based Computerized Medical Scheduling System at Nsawam General Hospital. They addressed technical, operational, and attitudinal aspects, providing a multi-faceted approach to data collection. This alignment of the questionnaire with the study's objectives laid the foundation for reliable and meaningful results.

### 3.13.2 Survey Instrument Effectiveness

The surveys, administered to the study's participants, proved to be highly valuable in extracting essential information and insights. The data collected through the surveys were instrumental in assessing the acceptance, awareness, and perceptions of the Web Based Computerized Medical Scheduling System at the hospital. The willingness of the respondents to provide candid and thoughtful responses further enhanced the effectiveness of the survey instrument.

### 3.13.3 Reliability and Consistency

The reliability of the study was evident in the consistency of responses across different sections of the survey. Participants provided coherent and consistent feedback, reinforcing the accuracy and dependability of the data collected. The uniform understanding of terms such as "medical scheduling" and the lack of disagreement on fundamental concepts illustrated the reliability of the data.

### 3.13.4 Validity of the Study

The validity of the study was upheld through the meticulous design of the questionnaire, which effectively captured the various dimensions of the Web Based Computerized Medical Scheduling System. The questions were formulated to align with the research objectives, ensuring that the survey instrument addressed the intended aspects of the system's adoption and acceptance. The survey findings directly reflected the study's goals and provided a valid representation of the perceptions and attitudes of the participants.

### 3.13.5 Contextual Insights

In addition to the validation and reliability, the study also benefited from the contextual insights provided by the surveys. The responses went beyond mere data collection, offering a deeper understanding of the challenges, opportunities, and perspectives related to the implementation of the Web Based Computerized Medical Scheduling System at Nsawam General Hospital.

In conclusion, the validation and reliability of the study were substantiated by the careful design of the questionnaire, its alignment with the study's objectives, the effective use of surveys, and the consistency and coherence of the responses. These factors, combined with the contextual insights, not only strengthened the study's methodology but also contributed to the robustness and trustworthiness of the research findings.

# CHAPTER FOUR

# **PROPOSED SYSTEM AND IMPLEMENTATION**

## 4.0 INTRODUCTION

This chapter offers an in-depth analysis of the proposed Web-Based Computerized Medical Scheduling System for Nsawam General Hospital. This innovative web-based application is designed to foster efficient communication between patients and healthcare practitioners while streamlining the appointment booking process. The primary objectives of this system include:

i. **Appointment Scheduling:** Facilitating the seamless scheduling of appointments for patients and healthcare providers, enhancing the overall appointment management process.

ii. **Patient and Staff Empowerment:** Enabling patients and medical staff to independently review their appointment details, ensuring transparency and empowerment in managing their healthcare schedules.

iii. **Administrative Oversight:** Equipping hospital administrators with the tools to monitor and ensure the delivery of high-quality services by continuously assessing and managing all scheduled appointments.

**Key Components of this Chapter:**

This chapter will comprehensively cover several essential aspects of the proposed system and its implementation:

**1. Programming Languages, Software, Frameworks, and Technologies:** A detailed exploration of the programming languages, software, frameworks, and cutting-edge technologies that underpin the Web-Based Computerized Medical Scheduling System. This section will provide insights into the technological foundation of the system, ensuring a clear understanding of the tools used in its development.

**2. Architecture, System Requirements, and Software Development Lifecycle:** A thorough examination of the system's architecture, outlining its structural design, and the crucial system requirements necessary for its optimal functioning. Additionally, this section will shed light on the software development lifecycle employed in bringing this system to life, ensuring a systematic and well-structured approach to its creation.

**3. System Functionality:** A detailed explanation of how the system operates, elucidating its core functions and the seamless interactions it enables between patients, healthcare practitioners, and hospital administrators. This section will delve into the user experience and how the system simplifies the complex task of medical appointment scheduling.

**4. Database Implementation:** An exploration of the database infrastructure that supports the Web-Based Computerized Medical Scheduling System, highlighting its role in storing, retrieving, and managing critical appointment data. The database implementation is a cornerstone of system efficiency and reliability.

**5. System Interfaces:** An overview of the interfaces that users, including patients, medical staff, and administrators, will interact with when using the system. This section will provide a visual representation of the user interfaces, enhancing the comprehension of how different stakeholders will engage with the system.

As we delve into this chapter, it is crucial to recognize that the proposed system is not merely a technological advancement but a pivotal enhancement in the healthcare service delivery at Nsawam General Hospital. Its successful implementation has the potential to revolutionize the way appointments are scheduled, managed, and monitored, ultimately contributing to a more efficient and patient-centric healthcare environment.

## 4.1 THE PROPOSED SYSTEM

The Web-Based Computerized Medical Scheduling System is an advanced software application meticulously designed to revolutionize and streamline the complex task of scheduling and managing doctor appointments at Nsawam General Hospital. This innovative system offers a centralized platform that empowers patients to effortlessly book appointments with their preferred healthcare providers, while simultaneously enabling doctors to efficiently manage their schedules and patient information.

### 4.1.1 Key Features of the System

1. **Appointment Scheduling:** At the heart of the system is the capability for patients to conveniently schedule appointments with their preferred doctors. This feature offers flexibility by allowing patients to select the date and time that suits them best. Additionally, the system incorporates the option for appointment reminders, delivered via email or SMS, ensuring that patients are informed and prepared for their scheduled visits.
2. **Doctor Availability:** The system provides patients with a comprehensive view of doctor availability, making it effortless to identify and book appointments with their chosen healthcare providers. This feature ensures that patients have the flexibility to select appointments that align with their needs and schedules.
3. **Patient Management:** For healthcare practitioners, the system presents a centralized solution for efficient patient management. It includes the ability to access and update critical patient information, encompassing medical history, prescribed medications, and test results. This consolidated approach enhances the quality of patient care and streamlines the management of individual health records.
4. **Appointment Management:** Doctors benefit from the system's appointment management tools, which allow them to oversee and adapt their schedules. This includes the ability to reschedule or cancel appointments when necessary and to update patient information for more personalized care.
5. **Reporting:** The system generates a range of informative reports, providing valuable insights for hospital administrators, doctors, and other stakeholders. These reports include data on the number of appointments booked, doctor schedules, and patient demographics, fostering data-driven decision-making and improving the overall healthcare delivery process.

### 4.1.2 Benefits of the System

The Web-Based Computerized Medical Scheduling System brings forth a multitude of advantages for both patients and doctors. Some of the prominent benefits include:

* **Enhanced Efficiency:** By automating the appointment scheduling process, the system reduces administrative burdens, streamlines operations, and improves overall efficiency in healthcare service delivery.
* **Reduced Wait Times:** Patients experience shorter wait times and have greater control over appointment selection, leading to a more efficient and patient-centric healthcare experience.
* **Increased Patient Satisfaction:** The system empowers patients with greater accessibility and control over their healthcare, resulting in heightened satisfaction and a more positive engagement with healthcare providers.
* **Comprehensive Patient Care:** Doctors can provide more personalized and informed care by having easy access to patient histories, medication records, and test results.
* **Improved Accessibility:** The system's web-based nature enhances accessibility, making it easier for both patients and healthcare providers to engage with the scheduling and management processes.

**User Categories:**

The system caters to three primary user categories, each with distinct roles and functionalities:

i. **Administrator:** Administrators have the authority to access system reports, view and manage doctors' profiles, schedule or publish open appointment slots, and access patient records and appointment data.

ii. **Doctor:** Doctors can review their appointments, reschedule or cancel appointments, and access their patients' information, enabling them to deliver efficient and personalized healthcare services.

iii. **Patient:** Patients benefit from the ability to view all doctors, appointment availability, book appointments, and access their booking history. They can also manage their profiles, enhancing the overall patient experience.

The Web-Based Computerized Medical Scheduling System represents a pivotal advancement in automating and enhancing medical service delivery, access, and procedures at Nsawam General Hospital. This innovative system empowers outpatients to efficiently register their information, schedule appointments, and make necessary cancellations, ushering in a new era of accessibility and convenience in healthcare services. The forthcoming chapters will delve deeper into the specifics of system requirements, architecture, and the implementation process, providing a comprehensive understanding of the system's functionality and its potential to transform the healthcare landscape at Nsawam General Hospital.

## 4.2 SYSTEM IMPLEMENTATION

The implementation of the proposed Web-Based Computerized Medical Scheduling System is a critical step in bringing this innovative solution to life. This section provides a detailed overview of the technologies, tools, and operating systems employed in the system's development.

**Cross-Platform Web-Based Application**

The Web-Based Computerized Medical Scheduling System is designed to function seamlessly as a web-based application. It is accessible through various web browsers, including Safari, Google Chrome, Microsoft Edge, Mozilla Firefox, and more. Users can conveniently access the system on a wide range of devices, including mobile devices running Android and iOS, desktop computers, and laptops, irrespective of the manufacturer. This cross-platform compatibility ensures that the system is easily accessible and user-friendly, regardless of the device or operating system in use.

## **4.3 KEY COMPONENTS AND TECHNOLOGIES**

The system comprises two primary components: the User Interface (UI) and the Database. The implementation of the system incorporates a variety of technologies to ensure a robust and user-friendly experience. These technologies are outlined in the following subsections:

### 4.3.1 Backend Technologies

* **Local Servers (XAMPP and WAMPP):** To support the system's backend operations, two local servers, XAMPP and WAMPP, have been utilized. These servers facilitate the operation of PHP and the MySQL database, ensuring the system's data storage, retrieval, and processing capabilities.

### 4.3.2 Frontend Technologies

* **Bootstrap:** The frontend of the system is structured using Bootstrap, a popular open-source CSS framework. Bootstrap enhances the system's visual appeal and responsiveness, offering a clean and intuitive user interface.
* **JavaScript:** JavaScript plays a crucial role in the system, responsible for handling validation tasks and creating interactive and dynamic features, including animations. It contributes to a seamless user experience and functionality.
* **CSS (Cascading Style Sheets):** CSS is leveraged for design and styling. It governs the system's overall look and feel, allowing for customization and an appealing visual presentation.
* **HTML (HyperText Markup Language):** HTML is the standard markup language used for structuring web page content. It defines the system's layout and structure, encompassing sections, paragraphs, links, and elements necessary for user interaction.

### 4.3.3 PHP (Hypertext Preprocessor)

PHP, a widely adopted open-source scripting language, forms the backbone of the system's frontend and business logic. It allows for the seamless integration of dynamic elements into the web pages. PHP code is executed on the server, generating HTML content delivered to the client. It facilitates the processing of appointments, user interactions, and data management.

### 4.3.4 Database Implementation

The system's database is implemented using MySQL, a robust and reliable relational database management system. MySQL ensures efficient data storage, retrieval, and management. It is essential for maintaining patient records, appointment schedules, and other critical healthcare data.

### 4.3.5 Supported Operating Systems

The Web-Based Computerized Medical Scheduling System is compatible with a range of operating systems, ensuring broad accessibility:

* **Windows:** Windows users can easily run the system by installing either WAMP or XAMPP on their computers. This setup facilitates system operation on Windows-based machines.
* **Linux:** The system supports various versions of the Linux operating system, offering flexibility for users in Linux-based environments.
* **Mac:** With minimal adaptations, the system can be configured to operate seamlessly within the Mac operating system, enhancing accessibility for Mac users.

**Overview of Technologies:**

* **PHP (PHP Hypertext Preprocessor):** PHP is a versatile scripting language that facilitates dynamic content generation and interactions with the server, making it an ideal choice for the system's development.
* **HTML (HyperText Markup Language):** HTML structures the system's web pages, defining their layout, content, and elements.
* **CSS (Cascading Style Sheets):** CSS governs the system's visual presentation and style, ensuring a cohesive and appealing design.
* **JavaScript:** JavaScript enhances user interactions, provides dynamic features, and contributes to a more engaging user experience.

The successful implementation of this system relies on a synergy of these technologies, ensuring that users have access to a user-friendly, cross-platform, and feature-rich solution. In the upcoming sections, we will delve deeper into the system's architecture, functionalities, and how it enhances the medical scheduling process at Nsawam General Hospital.

## 4.4 SOFTWARE DEVELOPMENT LIFE CYCLE

The development of the Web Based Computerized Medical Scheduling System for Nsawam General Hospital adheres to a well-structured Software Development Life Cycle (SDLC) that ensures the efficient, methodical, and reliable creation of the system. The SDLC is an iterative process designed to guide the system from concept to implementation while maintaining quality, efficiency, and consistency throughout the development journey. The following sections provide a comprehensive overview of the SDLC stages, and the strategies employed for this project:

1. **Project Initiation:**

* **Needs Assessment:** The project's initiation phase involved an in-depth analysis of Nsawam General Hospital's specific needs and requirements. Understanding the hospital's objectives, such as optimizing appointment scheduling and enhancing patient care, was a pivotal starting point.
* **Project Planning:** Detailed project planning encompassed the formulation of timelines, resource allocation, and an initial risk assessment. The project scope, objectives, and constraints were defined and documented in this phase.
* **Team Formation:** A multidisciplinary team, including developers, designers, database administrators, and domain experts, was assembled to execute the project effectively.

2. **System Design:**

* **Architectural Design:** The architectural design phase involved defining the overall system structure, outlining the components, modules, and their interconnections. The system's architecture ensures scalability, reliability, and efficiency.
* **Database Design:** A comprehensive database design was developed to model patient information, appointment data, and other critical healthcare data. The design adhered to best practices for data normalization and integrity.
* **User Interface Design:** The user interface was designed for simplicity and user-friendliness, promoting easy navigation and accessibility. Mock-ups and prototypes were created to visualize the system's layout.

3. **Development:**

* **Frontend Development:** The implementation of the user interface, created with HTML, CSS, and Bootstrap, was executed in this phase. JavaScript played a crucial role in enhancing user interactions and providing dynamic features.
* **Backend Development:** PHP was used to implement the system's frontend and business logic. The backend functionality included appointment scheduling, patient management, and database interactions. MySQL was employed for efficient data storage and retrieval.
* **Testing:** Rigorous testing, including unit testing and integration testing, was conducted to identify and rectify any issues in the developed modules. The testing phase ensured the system's reliability and functionality.

4. **Deployment:**

* **Web-Based Deployment:** The system was deployed as a web-based application accessible through common web browsers, including Chrome, Safari, Firefox, and Edge. This approach ensured cross-platform compatibility, allowing users to access the system from various devices.
* **Server Configuration:** The setup of local servers, including XAMPP and WAMPP, ensured that the system's backend, which utilized PHP and MySQL, operated smoothly.

5. **User Training:**

* **Training Modules:** User training modules were developed to acquaint hospital administrators, doctors, and patients with the system's features and functionalities.
* **User Documentation:** Comprehensive user documentation was provided to guide users through the system's interface, navigation, and capabilities.

6. **Maintenance and Enhancement:**

* **Ongoing Support:** Continuous monitoring and support are integral to the system's maintenance. This phase ensures that any issues or updates are promptly addressed.
* **Future Enhancements:** The system is designed to accommodate future enhancements and customizations, aligning with Nsawam General Hospital's evolving requirements.

The Software Development Life Cycle adopted for the Web Based Computerized Medical Scheduling System underscores the systematic approach employed to ensure the system's successful development, deployment, and ongoing operation. By adhering to best practices and maintaining a focus on user needs, the system is poised to significantly improve the healthcare experience at Nsawam General Hospital. Future chapters will delve into the system's functionalities, features, and its impact on healthcare service delivery.

## 4.5 SYSTEM REQUIREMENTS

### 4.5.1 User Requirements

The primary users of the web-based computerized medical scheduling system at Nsawam General Hospital are patients seeking medical attention and the medical staff. To ensure security and privacy, the system provides varying levels of access rights to these users.

**Patients:** Patients interact with the system through the following actions:

* **Patient Registration and Login:** Patients and medical professionals can register and securely log into the system, providing them with access to its functionalities.
* **Booking Appointments:** The system facilitates users in booking appointments with medical specialists. Users can not only schedule appointments but also view their upcoming appointments and cancel them as needed.
* **Viewing Scheduled Sessions:** Patients who are logged into the system can conveniently view all available scheduled appointment slots, helping them make informed choices about their healthcare.
* **Exploring Doctor Details and Specialties:** The system includes a feature that allows users to explore information about registered medical staff, including their specialties, enhancing the decision-making process when choosing a healthcare provider.

**Doctors:** Medical professionals interact with the system through the following functionalities:

* **Identity Verification:** Doctors are required to verify their identity to log into the system securely.
* **Viewing Scheduled Sessions:** Once logged in, doctors can access and review all sessions that have been scheduled, enabling them to manage their appointments efficiently.
* **Accessing Patient Information:** The system provides doctors with quick access to patient information, aiding them in delivering personalized and effective healthcare.

**Administrators:** Administrators manage the system's operations with the following capabilities:

* **Identity Verification:** Admins must verify their identity to access the system securely.
* **Viewing Reports:** Administrators can access comprehensive reports detailing the number of doctors, patients, and bookings within the system, providing valuable insights into system usage and performance.
* **Managing Doctors:** Admins have the authority to add, edit, and delete doctor profiles in the system, ensuring an up-to-date and accurate record of medical staff.
* **Publishing Appointment Slots:** Administrators can publish available slots for appointment sessions, managing the number of open sessions to align with the hospital's capacity and resources.
* **Viewing Appointment Sessions:** Admins can review all appointments within the system, facilitating oversight and management of the scheduling process.

These functional requirements form the core of the Web Based Computerized Medical Scheduling System, ensuring that it effectively serves the needs of patients, medical professionals, and administrators at Nsawam General Hospital. As the system continues to evolve, these functionalities will contribute to an improved healthcare service delivery process.

### 4.5.2 Functional Requirements

Functional requirements define the core operations and capabilities of the Web Based Computerized Medical Scheduling System. These requirements encompass the tasks the system is designed to perform, the processes it employs, the data it processes, and the user interfaces it offers. The following functional prerequisites outline the system's functionalities, catering to the needs of different user groups:

### 4.5.3 Non-Functional Requirements

These requirements don't specify any particular behavior; rather, they discuss the standards that might be used to evaluate how well a system works. The manner in which the functional requirements are given is described. In terms of the system's intended use, these include software quality characteristics including precision, efficiency, cost, security, and usability. They are as follows:

* Performance: Users receive prompt, trouble-free responses from the system.
* Usability: Both patients and medical professionals can easily access the system.
* Security: The system needs to be safe and secure.
* Maintenance: The system may be updated and changed as required.
* User-friendly: The entire system was created with user-friendliness in mind; therefore, it is user-friendly in terms of the user interface and interaction response.

### 4.5.4 Requirements for System Implementation and Use

For a successful implementation of the system, the following hardware and software requirements must be met.

Minimum Server Hardware Requirements

* 2 GB RAM
* 2.4GHz dual-core processor
* 20 GB of hard disk space

Server Software Requirements

* A UNIX/UNIX-like Operating System

Minimum Client Hardware Requirements

* 4GB RAM
* 2.0 GHz dual-core processor

Client Software Requirements

* A modern graphical web browser

## 4.6 SYSTEM ARCHITECTURE

The Web Based Computerized Medical Scheduling System for Nsawam General Hospital is architecturally structured with three distinct tiers, each playing a crucial role in the system's operation. These tiers, namely the presentation tier, middle tier, and data tier, work in harmony to provide an efficient and comprehensive solution for managing appointment scheduling.

**1. Presentation Tier:**

* **User Interface:** At the forefront of the system's architecture is the user interface, which serves as the presentation tier. It was developed using a combination of modern web technologies, including Flutter, HTML, and CSS. This tier is responsible for presenting the system's features and functionalities in an intuitive and user-friendly manner. Patients, medical staff, and administrators interact with the system through this interface, making it a vital component for user engagement and satisfaction.

**2. Middle Tier (Business Logic):**

* The middle tier, often referred to as the "business logic," serves as the bridge between the presentation tier and the data tier. It encompasses the system's core functionality and is responsible for processing and managing data, implementing business rules, and ensuring seamless communication between the user interface and the database.
* In the context of this system, the middle tier was implemented using a combination of PHP and JavaScript. These server-side technologies facilitate the execution of various operations, including appointment scheduling, user authentication, and data retrieval. The middle tier plays a pivotal role in ensuring that the system operates efficiently and securely.

**3. Data Tier:**

* The data tier is entrusted with the critical task of data storage and management. It safeguards the system's information, including patient records, appointment schedules, and user profiles. To achieve this, an SQL database was selected as the database management system. SQL databases are renowned for their reliability, scalability, and data integrity.
* Within the data tier, SQL database technology is employed to organize and store the structured data that the system relies on for its functionality. It ensures data consistency and facilitates efficient data retrieval and manipulation.

The synergy among these three tiers is depicted in the system architecture, as illustrated in the image below. This architecture provides a robust and scalable foundation for the Web Based Computerized Medical Scheduling System, enabling secure data management, streamlined business processes, and a user-friendly interface. The architecture supports the system's mission of enhancing healthcare service delivery at Nsawam General Hospital.

## 4.7 DATABASE SPECIFICATION AND DESIGN

In order to offer a reliable data storage method for keeping and protecting sensitive information. The database is the name of this data storing component. There are many DBMS technologies

available, including SQL SERVER, MS ACCESS, and ORACLE. The database management system (DBMS) utilized for this project is the MySQL server, which is hosted using a local serverand is easily accessible via the phpMyAdmin server application. The following tables represent the database tables of the proposed system.

Table 4.1: Appointment Table

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Size** |
| appoid | int | 11 |
| pid | int | 10 |
| apponum | int | 3 |
| scheduleid | int | 10 |
| appodate | int | date |

Table 4.2: Patient Table

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Size** |
| pid | int | 11 |
| pemail | varchar | 255 |
| pname | varchar | 255 |
| ppassword | varchar | 255 |
| paddress | varchar | 255 |
| pnic | varchar | 255 |
| pdob | date | date |
| ptel | varchar | 15 |

Table 4.3: Admin Table

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Size** |
| aemail | varchar | 255 |
| apassword | varchar | 255 |

Table 4.4: Doctors Table

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Size** |
| docid | Int | 11 |
| docemail | varchar | 255 |
| docname | varchar | 255 |
| docpassword | varchar | 255 |
| docnic | varchar | 15 |
| doctel | varchar | 15 |
| specialties | varchar | 15 |

## 4.8 SYSTEM DESIGN

Figure 4.1: Use Case Diagram of a Web Based Computerized Medical Scheduling System for Nsawam General Hospital

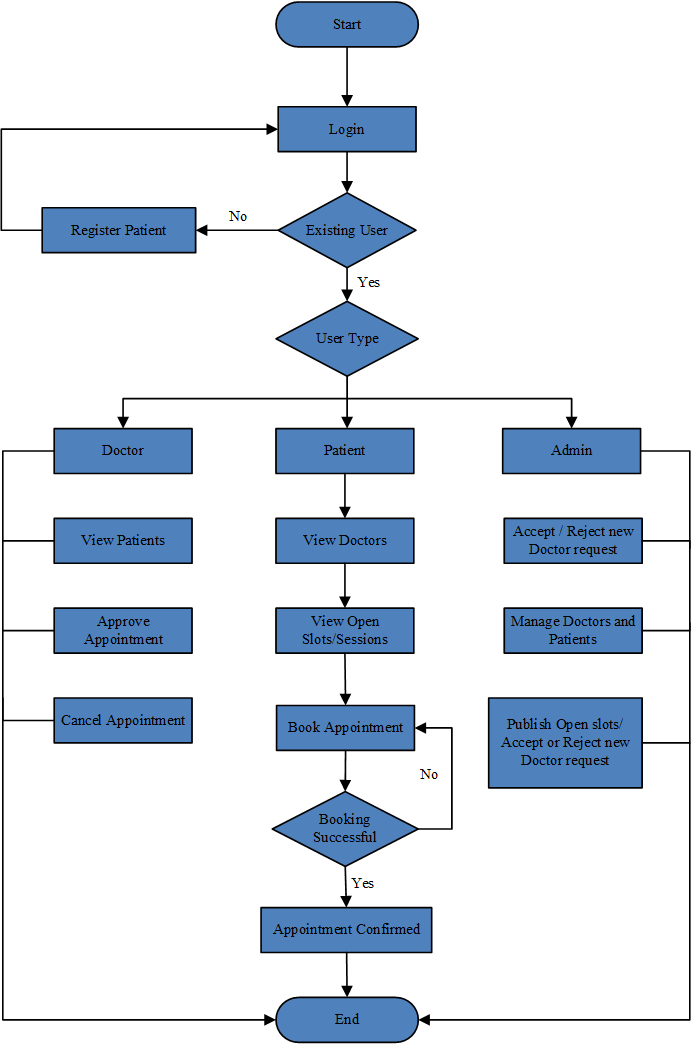


Figure 4.2: Flow Chart of a Web Based Computerized Medical Scheduling System for Nsawam General Hospital

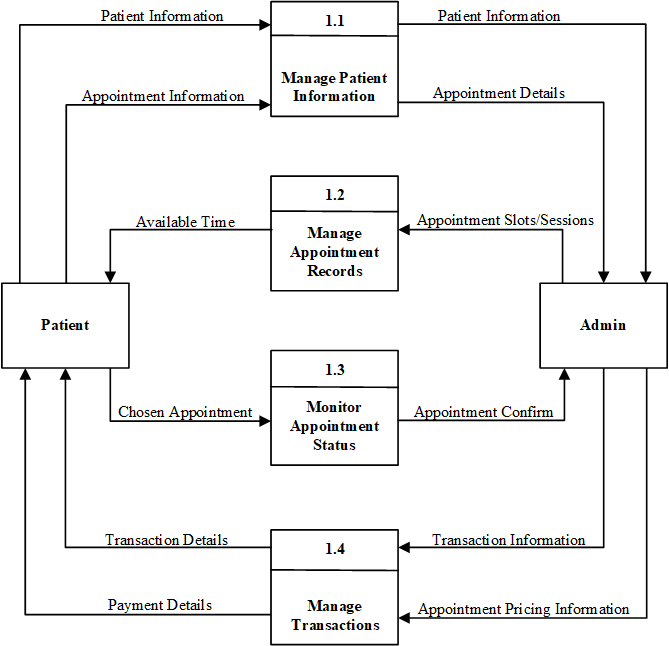


Figure 4.3: Data Flow Diagram

This Data Flow Diagram is to clarify the paths (flow) of data and its transformation from input to output.

The block diagram of the suggested patient appointment scheduling registration process is depicted in Figure 4.4 below.

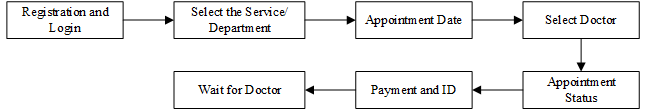


Figure 4.4: Block Diagram of the Proposed Appointment Registration Process

## 4.9 SYSTEM EVALUATION

* Main Menu Design

The main menu carries a high-level design of the system. It is the control center that loads all other modules. The main menu, also called the home page for this system is developed as a web application, using the language of the web. This system is made up of more than one interface which is loaded from the home page to bring about its full functionality.

A person in a white coat

Description automatically generated

Figure 4.5: Main Menu Design

* Login Page

This module enables the admin or manager, and the user to login to the system. This login interface has three login pages: admin, doctors, and patients.

A login screen with a blue and black box

Description automatically generated

Figure 4.6: Login Page

* Patient Interface and Book Appointment: This page allows a patient who logs in to book an engagement with any available doctor.

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

Figure 4.7: Patient Interface and Book Appointment Page

* Admin User Interface

This interface enables the administerto manage the entire system.

A screenshot of a computer

Description automatically generated

Figure 4.8: Admin User Interface

* Doctors User Interface

This interface enables the administrator to manage the entire system.

A screenshot of a computer

Description automatically generated

Figure 4.9: Doctor User Interface

## 4.10 JUSTIFICATION FOR THE PROPOSED SYSTEM

The following are the justifications for creating the suggested system.

(i) Reducing the number of people queuing up at the clinics.

(ii) Getting rid of all wasted appointments and absentees.

(iii) Getting readily available information appointments that are made or canceled; and

(iv) Giving patient medical records adequate security because each registered patient and doctor has a different username and password for login.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.0 INTRODUCTION

This chapter includes a summary of the earlier chapters, a recommendation for the project, and a conclusion.

## 5.1 SUMMARY

**Chapter One** expanded on the idea of medical scheduling in the study's background and provided additional explanation of the study's problem statement, objectives, significance, and organizational structure.

**Chapter Two** examined the review of related literature on the subject, the idea of computerized medical scheduling, the benefits of such a system, the connected issues, the factors that affect such systems' efficacy, and related works.

**Chapter Three** outlined the research methodology, research design, datacollection, population of the study, sample size and technique and data analysis

**Chapter Four** presented a proposed system and how it would be implemented.

## 5.2 CONCLUSION

In conclusion, the development and implementation of anWeb Based Computerized Medical Scheduling System represents a significant leap towards enhancing the efficiency and effectiveness of healthcare delivery in facilities like the Nsawam General Hospital. This system addresses the critical need to manage patient appointments, reduce waiting times, and streamline the scheduling process for both patients and medical staff.

The research findings, as well as insights from existing literature, emphasize the importance of efficient appointment scheduling in healthcare settings. The studies and references provided in this research underscore the impact that well-designed scheduling systems can have on patient satisfaction, staff productivity, and overall resource utilization.

The proposed Web-Based Computerized Medical Scheduling System offers a user-friendly interface that caters to the needs of patients, doctors, and administrators. Patients can easily register, book appointments, view their scheduled sessions, and access information about doctors and specialties. Doctors can efficiently manage their schedules, review patient details, and monitor appointments. Administrators can oversee the system, generate reports, and manage doctor listings and appointment sessions.

The multi-tier architecture, which includes the presentation, middle, and data tiers, ensures that the system is robust and scalable. By utilizing a combination of technologies such as HTML, CSS, JavaScript, PHP, and MySQL, the system can be accessed through various devices and operating systems, making it highly adaptable.

Furthermore, the functional requirements of the system, as outlined in the research, are carefully tailored to the specific needs of each user category, providing various levels of access rights to ensure privacy and security. This reflects the system's commitment to safeguarding patient information and ensuring smooth operations for healthcare practitioners.

In a world where the efficient use of resources and the delivery of high-quality healthcare services are paramount, the implementation of a Web Based Computerized Medical Scheduling System stands as a pivotal tool for modern healthcare institutions. By addressing patient scheduling challenges, reducing waiting times, and improving overall resource management, this system aligns with the broader goals of enhancing healthcare delivery and improving patient experiences.

The success of the Web Based Computerized Medical Scheduling System not only benefits Nsawam General Hospital but also serves as a valuable model for healthcare facilities seeking to optimize their appointment scheduling processes, thereby contributing to the continued improvement of healthcare services in the digital age.

## 5.3 RECOMMENDATIONS

Based on the research and analysis conducted on the Web Based Computerized Medical Scheduling System, several recommendations can be made to enhance its effectiveness and efficiency. These recommendations are as follows:

1. **Implementation of an Automated Reminder System:** To reduce no-show rates and improve overall appointment adherence, it is recommended that the system incorporates an automated reminder system. Patients should receive reminders via email, SMS, or mobile app notifications a day or a few hours before their scheduled appointments. This will help reduce missed appointments and optimize the utilization of medical resources.
2. **Real-time Doctor Availability Updates:** To enhance patient experience and facilitate informed decision-making, the system should provide real-time updates on doctor availability. This means that if a doctor has a last-minute cancellation or reschedules an appointment, other available slots should be immediately visible to patients. This feature ensures that patients can book appointments with their preferred healthcare providers without delays.
3. **Customized Reporting and Analytics:** To aid hospital administrators and management in making data-driven decisions, the system should include a robust reporting and analytics module. This should provide insights into appointment scheduling patterns, patient flow, and resource utilization. Customized reports can help identify areas for improvement and optimize the allocation of resources.
4. **Integration with Electronic Health Records (EHR):** For seamless patient care, it is advisable to integrate the appointment scheduling system with the hospital's Electronic Health Records (EHR) system. This integration ensures that doctors have immediate access to patients' medical histories, test results, and other critical information, leading to more efficient and effective care.
5. **Patient Feedback and Rating System:** To maintain a patient-centric approach, the system should include a feature that allows patients to provide feedback and rate their healthcare experiences. This information can be used to assess the quality of care, identify areas for improvement, and recognize high-performing healthcare providers.
6. **Enhanced Security Measures:** Given the sensitivity of patient data, it is essential to ensure robust security measures to protect patient information from data breaches. Regular security audits, encryption protocols, and strict access controls should be implemented to safeguard patient confidentiality.
7. **Continuous Staff Training:** To maximize the benefits of the system, continuous training should be provided to hospital staff, including doctors, administrators, and receptionists. This ensures that all users are proficient in using the system to its full potential.
8. **Mobile Accessibility:** Patients and medical staff should have easy access to the system via mobile devices. A mobile app or a responsive web design ensures that users can schedule, manage, and view appointments on the go, improving accessibility and convenience.
9. **Scalability and Flexibility:** The system should be designed with scalability in mind, allowing for future growth and increased patient load. It should be flexible enough to adapt to changing healthcare needs and regulations.
10. **Cost-Benefit Analysis:** Before implementation, it is recommended to conduct a thorough cost-benefit analysis to assess the financial viability of the system. This analysis should consider the expenses associated with system implementation, training, and maintenance versus the expected savings and revenue increase resulting from optimized appointment scheduling.

Incorporating these recommendations into the Web Based Computerized Medical Scheduling System will help Nsawam General Hospital provide efficient, patient-centered care while optimizing resource allocation and improving the overall healthcare experience for both patients and healthcare providers.

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Top of Form

# APPENDIX

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta http-equiv="X-UA-Compatible" content="IE=edge">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<link rel="stylesheet" href="css/animations.css">

<link rel="stylesheet" href="css/main.css">

<link rel="stylesheet" href="css/login.css">

<title>Nsawam General Hospital-Login</title>

</head>

<body>

<?php

//learn from w3schools.com

//Unset all the server side variables

session\_start();

$\_SESSION["user"]="";

$\_SESSION["usertype"]="";

// Set the new timezone

date\_default\_timezone\_set('Asia/Kolkata');

$date = date('Y-m-d');

$\_SESSION["date"]=$date;

//import database

include("connection.php");

if($\_POST){

$email=$\_POST['useremail'];

$password=$\_POST['userpassword'];

$error='<label for="promter" class="form-label"></label>';

$result= $database->query("select \* from webuser where email='$email'");

if($result->num\_rows==1){

$utype=$result->fetch\_assoc()['usertype'];

if ($utype=='p'){

$checker = $database->query("select \* from patient where pemail='$email' and ppassword='$password'");

if ($checker->num\_rows==1){

// Patient dashbord

$\_SESSION['user']=$email;

$\_SESSION['usertype']='p';

header('location: patient/index.php');

}else{

$error='<label for="promter" class="form-label" style="color:rgb(255, 62, 62);text-align:center;">Wrong credentials: Invalid email or password</label>';

}

}elseif($utype=='a'){

$checker = $database->query("select \* from admin where aemail='$email' and apassword='$password'");

if ($checker->num\_rows==1){

// Admin dashbord

$\_SESSION['user']=$email;

$\_SESSION['usertype']='a';

header('location: admin/index.php');

}else{

$error='<label for="promter" class="form-label" style="color:rgb(255, 62, 62);text-align:center;">Wrong credentials: Invalid email or password</label>';

}

}elseif($utype=='d'){

$checker = $database->query("select \* from doctor where docemail='$email' and docpassword='$password'");

if ($checker->num\_rows==1){

// doctor dashbord

$\_SESSION['user']=$email;

$\_SESSION['usertype']='d';

header('location: doctor/index.php');

}else{

$error='<label for="promter" class="form-label" style="color:rgb(255, 62, 62);text-align:center;">Wrong credentials: Invalid email or password</label>';

}

}

}else{

$error='<label for="promter" class="form-label" style="color:rgb(255, 62, 62);text-align:center;">We cant found any acount for this email.</label>';

}

}else{

$error='<label for="promter" class="form-label">&nbsp;</label>';

}

?>

<center>

<div class="container">

<table border="0" style="margin: 0;padding: 0;width: 60%;">

<tr>

<td>

<p class="header-text">Welcome</p>

</td>

</tr>

<div class="form-body">

<tr>

<td>

<p class="sub-text">Login with your details to continue</p>

</td>

</tr>

<tr>

<form action="" method="POST" >

<td class="label-td">

<label for="useremail" class="form-label">Email: </label>

</td>

</tr>

<tr>

<td class="label-td">

<input type="email" name="useremail" class="input-text" placeholder="Email Address" required>

</td>

</tr>

<tr>

<td class="label-td">

<label for="userpassword" class="form-label">Password: </label>

</td>

</tr>

<tr>

<td class="label-td">

<input type="Password" name="userpassword" class="input-text" placeholder="Password" required>

</td>

</tr>

<tr>

<td><br>

<?php echo $error ?>

</td>

</tr>

<tr>

<td>

<input type="submit" value="Login" class="login-btnbtn-primary btn">

</td>

</tr>

</div>

<tr>

<td>

<br>

<label for="" class="sub-text" style="font-weight: 280;">Don't have an account&#63; </label>

<a href="signup.php" class="hover-link1 non-style-link">Sign Up</a>

<br><br><br>

</td>

</tr>

</form>

</table>

</div>

</center>

</body>

</html>