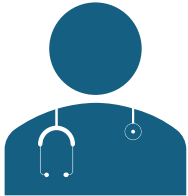


**“To Study Developing a Healthcare Benefits
Management System for Instant Detection of
Fraud Through Analysis of Historical
Medical Records”**

Master of Business Administration (MBA)
in
Hospital and Health Management

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INTRODUCTION



The healthcare sector in India faces a significant **urban-rural divide**, with rural areas heavily reliant on public healthcare facilities. However, there's a **notable disparity in hospital distribution**, with **private institutions outnumbering public ones**.

This indicates a **reliance on the private sector for healthcare services, particularly in urban areas**.



India **allocates only 2.6 % of its GDP to healthcare**, falling far behind global counterparts.

This lack of investment exacerbates challenges within the healthcare sector, hindering infrastructure development and the quality of services provided.



Instances of healthcare fraud, **ranging from medical negligence to illegal disposal of medical waste, pose significant threats to public health and the environment**.

The World Health Organization attributes millions of deaths annually to medical errors and negligence, emphasizing the severity of the issue.

INTRODUCTION



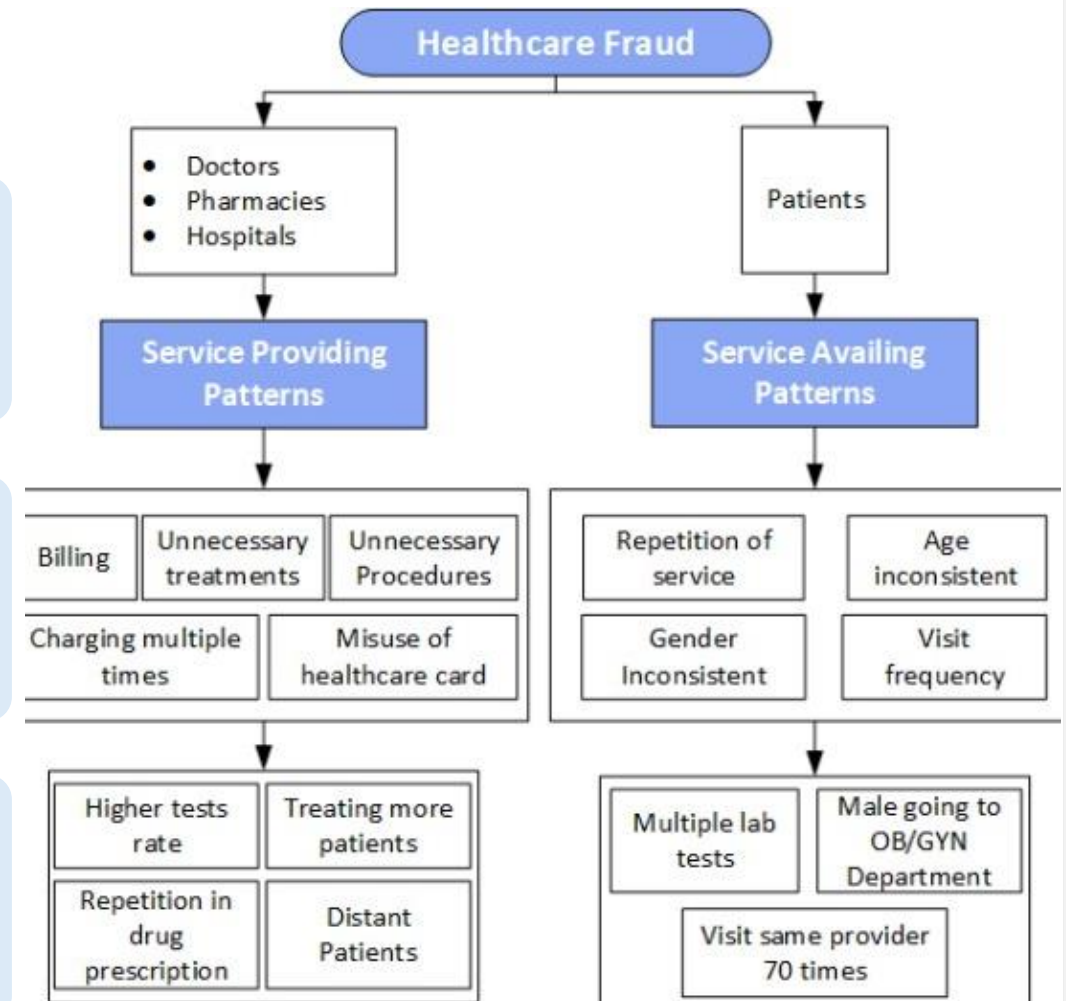
This dissertation aims to **explore various dimensions of healthcare fraud within the Indian context, analyzing patterns of fraud in service provision and availing.**



It seeks to **propose strategies and interventions for fraud detection and prevention** tailored to the Indian healthcare landscape.



Ultimately, the **goal is to contribute to the development of a more robust and accountable healthcare system in India.** Prioritizing the well-being of the populace and safeguarding against fraudulent practices are central objectives in this endeavor



AIM & OBJECTIVES

Aim:

To develop a novel framework for detecting fraud in healthcare systems by leveraging historical medical data, focusing on the entities of patients, doctors, and services.

Objectives:

The study's objectives are:

1. To **understand five years (2013-2019) of insurance claim transactional data** from the chosen local hospital.
2. With a view to **build a fraud detection system** to address the problem of health care fraud insurance claims data set will be used.
3. With the objective of minimizing the prevalence of improper payments in the United States Health and Human Services (HHS) programs, particularly Medicaid and the Children's Health Insurance Program (CHIP), it is proposed to consider and analyze trends in the payment data and the data from the cases examined under the False Claims Act..



METHODOLOGY

- **Study Setting:** The study will **utilize secondary data** sourced from healthcare databases and insurance records across various regions in India. These databases contain **anonymized patient records, provider information, billing details, and claims data from multiple healthcare facilities.**
- **Study Participants:** Participants include individuals whose data are included in the secondary databases, such as **patients** who have utilized healthcare services, **healthcare providers** (doctors, nurses, pharmacists), **insurance company representatives, and regulatory authorities.**
- **Study Design:** The research will adopt a **retrospective observational study design**, analyzing existing secondary data without direct interaction with study participants. **The focus will be on identifying patterns and trends related to healthcare fraud** based on the available data.
- **Data Collection Method:** Data will be **collected from pre-existing healthcare databases maintained by hospitals, insurance companies, and regulatory bodies.** These databases contain information on patient demographics, diagnoses, treatments, prescriptions, billing codes, and claims processing.



METHODOLOGY

- **Plan for Data Analysis:** Data analysis will involve **descriptive and thematic analysis** methods to identify patterns and trends related to healthcare fraud. Descriptive methods will be used to summarize the **characteristics of fraudulent activities**, while thematic analysis will involve **identifying recurring themes or patterns** in the data related to fraud detection and prevention.
- **Sampling Technique:** **Convenience sampling** will be employed, where available secondary data from multiple healthcare facilities and insurance companies will be included in the analysis. The data will be selected **based on its relevance to the research objectives and the availability of comprehensive information**.
- **Sample Size:** The sample size **will be determined by the volume and completeness of the secondary data** available for analysis. The goal is to **include a representative sample of healthcare transactions and claims to ensure the robustness of the findings**.
- **Ethical Considerations:** The study involves secondary data, ethical approval, and informed consent are not applicable. However, **measures will be taken to ensure data privacy and confidentiality by existing regulations and guidelines governing the use of healthcare data for research purposes**.

RESULTS

- The research is done on five years' worth of insurance claim transactional data from a nearby hospital (2013, 2014, 2015, 2016, 2017, 2018, 2019). These are hospital staff members who are using insurance plans that the hospital administration has made available. Each employee is assigned an insurance policy based on their designation

ATTRIBUTES IN DATASET	DATASET
ATTRIBUTES VALUE UNIQUE NO. OF SERVICE ID's	1206
UNIQUE NO. OF DOCTORS ID's	486
UNIQUE NO. OF SPECIALITY ID's	62
TOTAL NO. OF TRANSACTIONS	441506

RESULTS

1. Rule Generation Engine

The rule generation engine is the first stage of the fraud detection process. It involves creating a set of rules based on historical data to flag potentially fraudulent activities. These rules are derived from known patterns of fraud and can include criteria such as:

- Unusual billing amounts
- High frequency of specific services
- Billing for services not rendered

Upcoding or misrepresentation of services

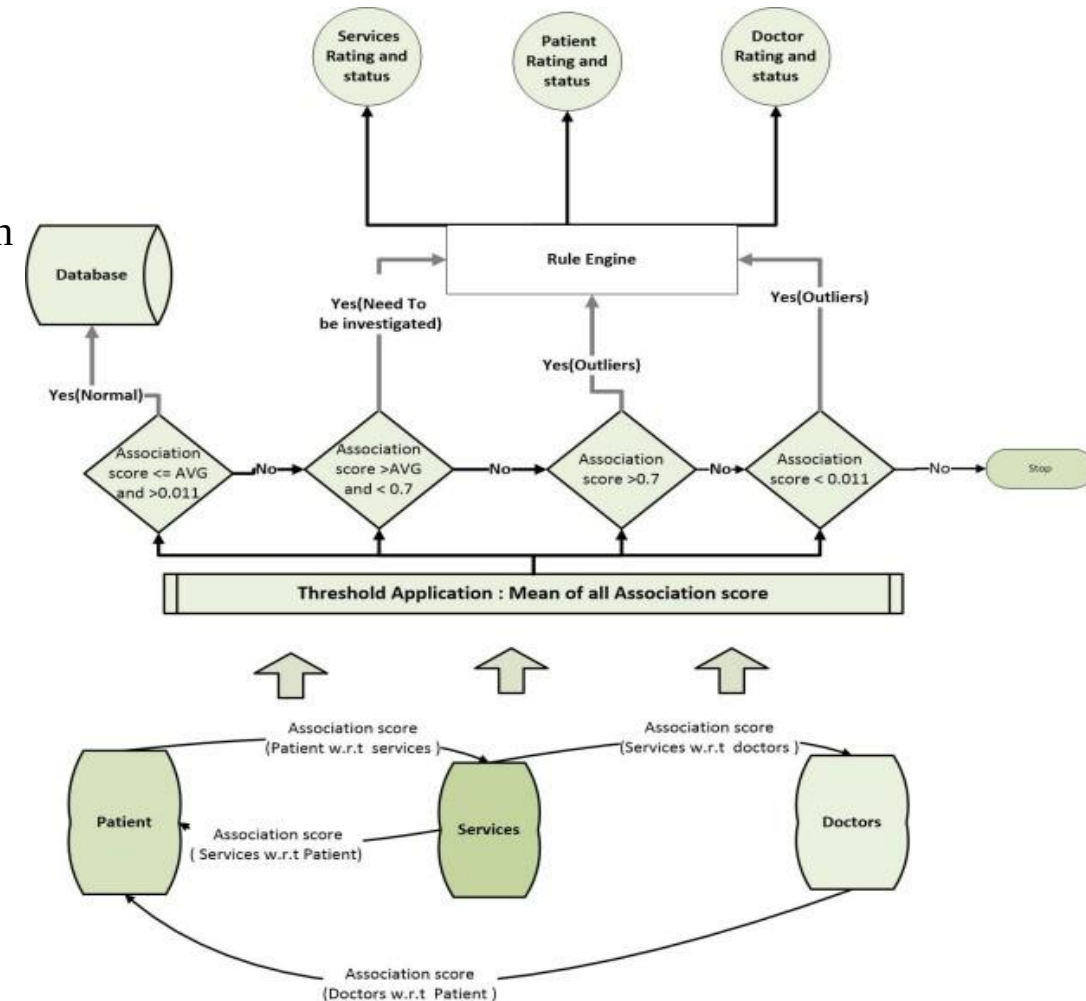
2. Similarity Function

The similarity function is applied to compare current transactions against the established rules. This function evaluates the similarity between new claims and historical fraudulent patterns, helping to identify anomalies that may indicate fraud. The similarity function involves:

- Comparing attributes such as service types, billing amounts, and frequency of services.

Using statistical and machine learning techniques to measure the deviation of new claims from normal behaviour.

3. Association Scores Calculation and Rule Engine Processing



Doctors and patients compute association scores, followed by forwarding cases to a rule engine for further processing, based on these scores.

RESULTS

Analysis of insurance claim data from local hospital staff spanning 2013-2019 reveals a consistent yearly rise in employee insurance expenses, attributed to healthcare fraud. A **fraud detection algorithm** is employed on the dataset, presenting select findings to illustrate patterns, with figures displaying a subset of the results to elucidate the analysis

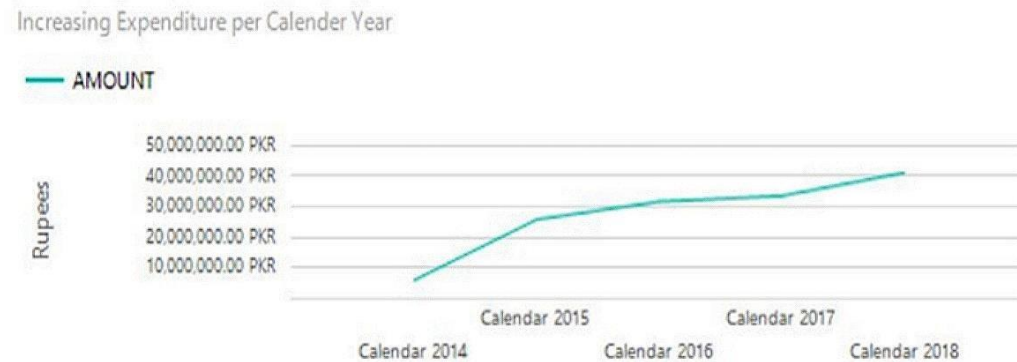
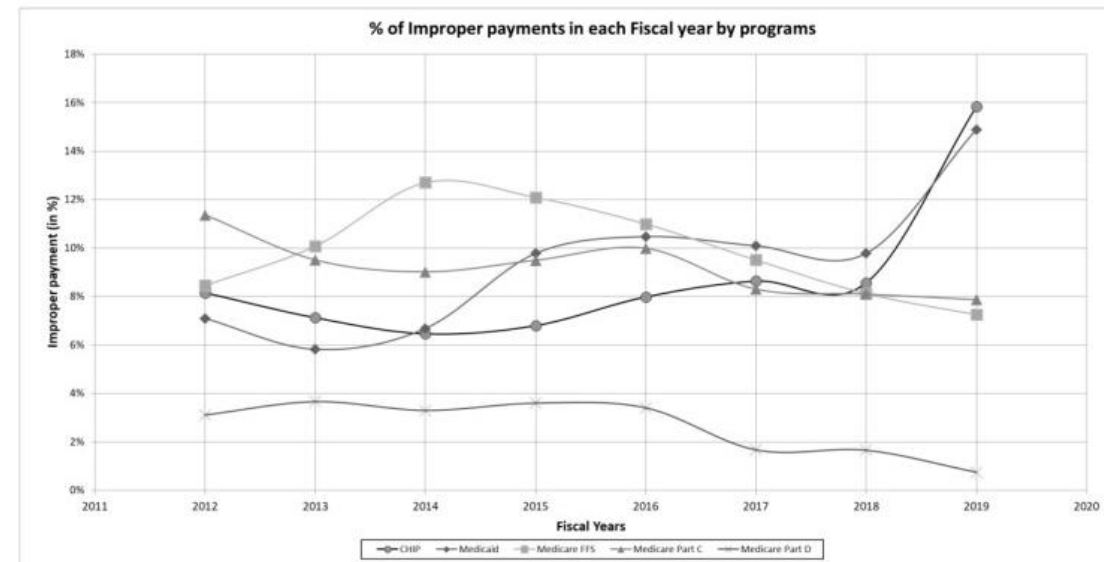


Fig . 3 Year wise insurance amount utilization.

Steady improper payment percentage in state-administered programs such as Medicaid and CHIP. Source: Annual Improper Payments Datasets – Payment Accuracy 2020 downloaded from [Payment Accuracy.gov](https://www.paymentaccuracy.gov/) Children's Health Insurance Program (CHIP) Medicare Fee- For-Service (FFS)

showcases the percentages of **improper payments spanning from 2012 to 2019 in various US federal programs overseen by the Health and Human Services (HHS)**. These erroneous payments encompass fraud, underpayment, overpayment, and unknown payment categories across Medicaid, Medicare Fee-For-Service (FFS), Medicare Part C, Medicare Part D, and CHIP. Fig. 4 illustrates a consistent upward trend in improper payments within Medicaid and CHIP programs over the specified





CONCLUSION

1. **Highlighting financial losses**, compromised patient care, and erosion of trust within the healthcare system due to fraud **impacts various stakeholders**, emphasizing the need for robust detection mechanisms.
 2. Discussing the **potential of advanced analytics and machine learning in detecting healthcare fraud** due to their ability to efficiently analyze large datasets and identify complex fraud patterns, addressing limitations of traditional methods.
 3. Addressing **challenges associated with implementing novel fraud detection frameworks** in real-world healthcare settings, including **data privacy concerns, technological infrastructure, and stakeholder cooperation**, which are critical for successful deployment.
 4. Discussing the importance of integrating the proposed framework with existing healthcare management systems to **facilitate timely detection and prevention of fraudulent activities, emphasizing the need for seamless integration for effectiveness**.
 5. Emphasizing the importance of **continuous monitoring and evaluation** of the fraud detection framework's performance through periodic assessments, feedback mechanisms, and iterative improvements to ensure ongoing effectiveness in combating fraud.
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RECOMMENDATIONS

- Developing **standardized protocols and guidelines** tailored to the Indian healthcare context can provide clear frameworks for fraud detection and prevention, ensuring consistency and effectiveness across the industry.
 - Establishing interdisciplinary task forces comprising healthcare professionals, data scientists, and legal experts can leverage diverse expertise to drive comprehensive fraud prevention initiatives, addressing technical, operational, and legal aspects effectively.
 - Investing in user-friendly interfaces and training modules can promote widespread adoption of fraud detection technologies among healthcare personnel, enhancing their capabilities and efficiency in identifying fraudulent activities.
 - Collaborating with international organizations and experts allows for the exchange of best practices and technological advancements in healthcare fraud detection, enabling the adoption of globally proven strategies tailored to the Indian context.
 - Conducting regular audits and reviews of healthcare transactions to identify emerging fraud patterns and adapt detection algorithms accordingly ensures that fraud detection measures remain up-to-date and effective in detecting evolving fraudulent practices
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THANK YOU