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# Operations & Claim Data Analytics in Health Insurance: An Empirical Study

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**ABSTRACT**

The health insurance sector in India is experiencing rapid change as medical costs rise, claim volumes increase, and customers expect faster and more transparent services. At the center of this change lies claims management—the point where policy promises are evaluated in real life. This research paper is based on practical exposure gained during a summer internship at The New India Assurance Company Ltd. and examines how operations and claim data analytics influence efficiency, fraud control, customer experience, and financial performance.

Rather than relying only on theory, the study draws from real claim files, observations of day-to-day workflows, and interactions with claim officers, hospitals, and TPAs. It explores the complete claim lifecycle, identifies operational bottlenecks, highlights common fraud patterns, and evaluates the impact of data quality and automation on turnaround time. The study also discusses how modern tools such as predictive analytics, robotic process automation (RPA), dashboards, and AI-based document analysis can strengthen decision-making.

The findings show that delays are most often caused by incomplete documentation, manual processes, and inconsistent hospital billing practices, while customer dissatisfaction arises from communication gaps and lack of clarity in deductions. Overall, the paper emphasizes that a balanced combination of technology, analytics, and customer-focused processes is essential to build an efficient, transparent, and financially sustainable health insurance claims system.

## 1. Introduction

Health insurance plays a vital role in protecting individuals and families from the financial burden of medical emergencies. However, the real value of insurance is realized only when claims are settled smoothly and on time. For most policyholders, the claims process is the most critical interaction they have with an insurer, making it a strong determinant of trust and long-term loyalty. Delays, rejections, or poor communication during this stage can quickly damage customer confidence.

With rising medical inflation and increasing claim complexity, traditional manual methods of claim processing are becoming inadequate. Insurance companies today are required to manage large volumes of claims while maintaining accuracy, controlling costs, and complying with regulatory timelines. In this environment, data analytics has emerged as a powerful enabler—helping insurers detect fraud, reduce turnaround time (TAT), monitor hospital behavior, and improve operational efficiency.

This research paper is grounded in practical learning gained during an internship at The New India Assurance Company Ltd. It aims to connect classroom concepts of operations, analytics, and finance with real-world insurance practices. By studying actual workflows and challenges faced by claim departments, the paper offers a realistic understanding of how analytical tools and process improvements can transform claims management.

## 2. Review of Industry and Company Profile

### *2.1 Overview of the Indian Health Insurance Industry*

The Indian health insurance industry has experienced sustained growth due to increasing healthcare awareness, regulatory reforms, and expansion of cashless hospital networks. The industry comprises public sector insurers, private insurers, standalone health insurers, government schemes, and third-party administrators (TPAs). Key challenges faced by industry include rising claim ratios, hospital-driven cost inflation, fraud risk, and demand for faster settlements.

### *2.2 Profile of The New India Assurance Company Ltd.*

Established in 1919, The New India Assurance Company Ltd. is India's largest public-sector general insurer, operating across domestic and international markets. The company offers a comprehensive range of insurance products, with health insurance being one of its most significant portfolios. The Suit Hub at Bilaspur manages claim scrutiny, coordination with TPAs and hospitals, customer service, and settlement operations.

## 3. Research Objectives and Methodology

### *3.1 Objectives of the Study*

- To analyze the health insurance claim lifecycle and operational workflows
- To identify key causes of delays, rejections, and inefficiencies in claim processing
- To study fraud detection methods and risk analytics practices
- To evaluate customer experience during the claim settlement process
- To assess the budgetary impact of claims and cost leakage

### *3.2 Research Methodology*

The study adopts a descriptive and analytical research design based on: - Direct observation during internship - Analysis of real claim files and workflows - Interaction with claim officers and support staff - Secondary data from industry reports and regulatory guidelines - Application of analytical tools such as process mapping and trend analysis.

## 4. Processing Claims and Operational Efficiency

Claims processing at The New India Assurance follows a structured lifecycle comprising claim intimation, registration, document collection, scrutiny, query resolution, decision-making, settlement, and closure. Analysis reveals that reimbursement claims generally take longer than cashless claims due to documentation delays and customer dependency.

Major operational bottlenecks include inconsistent hospital documentation, manual data entry, uneven workload distribution among officers, and delayed responses to queries. The study highlights the importance of standardization, digitization, OCR-based document processing, and data-driven workload allocation to reduce TAT and improve efficiency.

## 5. Fraud Detection and Risk Analytics

Fraud poses a significant threat to the financial sustainability of health insurers. The study identifies common fraud patterns such as inflated consumables, unnecessary diagnostics, repeated claims, upcoding, and forged documents. Risk analytics techniques, including frequency analysis, outlier detection, rule-based scoring, and predictive modeling, can help identify high-risk claims at preliminary stages.

The research emphasizes the need for machine learning-based fraud scoring models, hospital behavior monitoring dashboards, and automated duplicate claim checks to minimize claim leakage and protect genuine policyholders.

## 6. Customer Experience and Service Quality

The claims process represents the 'moment of truth' for policyholders. Findings indicate that most customer dissatisfaction arises from lack of clarity in deductions, poor communication, and limited understanding of policy terms. Cashless claims offer better customer experience, while reimbursement claims cause financial and emotional stress due to delays.

Improving transparency, providing real-time claim status updates, educating customers at policy issuance, and offering dedicated support for senior citizens can significantly enhance service quality and customer retention.

## 7. Operational Performance and Process Optimization

Operational analysis reveals that uneven workload distribution and manual workflows contribute heavily to inefficiency. Lean Six Sigma tools such as value streaming, fishbone analysis, and DMAIC methodology can be used to reduce cycle time and standardize processes. Dashboard-driven monitoring and RPA implementation are recommended to streamline internal workflows and improve officer productivity.

## 8. Data Quality and Reporting Analytics

Data quality directly impacts claim accuracy, fraud detection, reporting reliability, and financial forecasting. The study highlights frequent data issues such as incomplete fields, inconsistent formats, and manual entry errors. The adoption of centralized data repositories, validation rules, and real-time dashboards using tools like Power BI and Tableau can transform raw claim data into actionable insights.

## 9. Product, Hospital, and TPA-Based Analytics

Comparative analysis across products, hospitals, and TPAs reveals wide variation in claim ratios and processing efficiency. Corporate and senior citizen policies show higher loss ratios, while certain hospitals consistently exhibit higher billing patterns. A hybrid model combining TPAs for routine processing and in-house teams for complex claims is found to be the most effective approach.

## 10. Financial Impact and Cost Optimization

Claims constitute the largest expense for health insurers. High claim ratios, fraud-related payouts, and operational inefficiencies exert pressure on profitability. Analytical interventions such as hospital cost benchmarking, predictive severity modeling, and leakage detection can reduce unnecessary payouts by 10–20%. Digital reimbursement submission and improved underwriting practices are crucial for long-term financial sustainability.

## 11. Findings, Conclusion, and Scope for Future Research

### *11.1 Key Findings*

The study revealed that documentation-related issues are the most common cause of delays across both cashless and reimbursement claims. Manual scrutiny and uneven workload distribution further slow down processing and increase the risk of errors. Hospitals were identified as a major source of cost escalation due to inflated consumables, unnecessary diagnostics, and inconsistent billing practices. From a customer perspective, most dissatisfaction stems not from claim rejection itself, but from a lack of clear communication and limited understanding of policy conditions.

### *11.2 Conclusion*

The internship at The New India Assurance Company Ltd. provided firsthand exposure to the realities of health insurance claim operations. It became evident that claims management is not merely a back-office activity, but a critical function that directly affects customer trust, operational efficiency, and financial stability. While the organization follows structured processes, challenges such as manual workflows, data inconsistencies, and hospital-driven cost inflation continue to impact performance.

The study highlights that technology and analytics are no longer optional tools but strategic necessities. Automation, predictive fraud analytics, standardized documentation, and real-time dashboards can significantly reduce turnaround time, improve accuracy, and control claim leakage. Equally important is a customer-centric approach that emphasizes transparency, timely communication, and education. When combined effectively, operational discipline and data-driven insights can transform claims management into a competitive advantage.

### *11.3 Scope for Future Research*

There is considerable scope for future research in the area of health insurance analytics. Advanced machine learning models can be developed for fraud prediction and claim severity forecasting. AI-based interpretation of medical documents can further reduce manual dependency. Nationwide standardization of hospital documentation and fully integrated digital claim platforms also present promising areas of exploration. Continued research in these domains can help insurers build faster, fairer, and more sustainable claim settlement systems.

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