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Healthcare Fraud: A Systematic Literature Review

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1. INTRODUCTION

The goal of our research is to conduct a systematic review to identify the types of fraud, detection and prevention methods, and the impacts of fraud within the public healthcare sector. While various studies address different aspects of healthcare fraud, there's this important one by Villegas-Ortega et al. (2021). Their study focuses on delineating, detecting occurrences, and comprehending the elements influencing health insurance fraud (HIF).

The research provides an in-depth examination of fraud in the healthcare sector, listing six interpretations, 22 manifestations, and 47 determining elements associated with health insurance fraud. Their work is pioneering in mapping out the intricacies and subtleties of healthcare fraud. Our study seeks to broaden the understanding provided by Villegas-Ortega et al. (2021). by specifically emphasizing on frauds within public healthcare policies. While Villegas-Ortega et al. (2021) offers a holistic perspective of health insurance fraud, our work distinguishes itself by exploring the categories of fraud, identification and deterrence techniques, and their effects particularly within the public health system. The goal of our study is to conduct a methodical examination to categorizing the forms of fraud, identification and deterrence techniques, and the effects of fraud within the public health system.

The article is divided into six sections. The first is this introduction, which explains the purpose and objectives of the study. The second section describes the research method and how we conducted the literature review, including the criteria for selecting articles. The third section presents the theoretical foundation, defining key concepts and structuring the study's context. In the fourth section, we classify, code, and analyze the selected articles, detailing how each contributes to the research questions. The fifth section discusses the results, showing what was learned from the reviewed articles. And finally, the sixth section summarizes the main findings and suggests areas for future research, seeking advancements in combating fraud in the public health sector.

Presented the gaps for future research in the field. Given the absence of clear fraud indicators in the public sector, this comprehensive review aims to fill a knowledge gap by presenting cues identified in the literature that could aid in the detection of fraud within the studied area.

Furthermore, the objective of this review is to outline and identify the causes or factors that influence and the consequences or occurrences related to fraud in the public health sector. In doing so, we aim to answer the following questions: Question 1: What constitutes fraud in public healthcare? and Question 2: How does fraud in public health policies manifest themselves? The resulting aim to pave the way for more effective interventions to prevent, detect, and respond to fraudulent activities.

2. ARTICLE CLASSIFICATION

Few crimes involve as many different organizations working to combat it as fraud does. Law enforcement agencies, various government departments and sections, the Serious Fraud Office (SFO), specialized private investigation firms, multiple entities within local authorities, and private companies are among the most notable participants in this field Button (2011).

Healthcare fraud extends beyond borders and is a global concern. Although much of the available literature focuses on fraudulent activities within the public sector related to 'welfare,' multiple studies underscore this aspect (Banerjee et al., 2008; Brooks et al., 2017; Chaudhury et al., 2006; Francis, 2010; Goddard, 2015; Prenzler, 2021).

Corporate offenses transcend simple accounting issues; they represent a social event that impacts both the private and public domains. Their prominence has started the wake of sequential accounting scandals that have unfolded over the recent decades. These offenses are intricate, elusive, and challenging to comprehend, identify, or quantify. According to the Federal Bureau of Investigation (FBI), these transgressions revolve around financial matters, aimed primarily at preventing financial losses, protecting equity and ownership/services, or achieving a competitive edge (Federal Bureau of Investigation FBI, 2019).

Every form of corporate wrongdoing, including deceit and unethical behavior, leads to restricted growth and development opportunities for companies or nations. These illicit activities do not yield any benefits for nations; rather, they contribute to financial instability and disorder, hinder conducive investment environments, and may even lead to bankruptcy (Johnson-Rokosu,

2013).

In preventing and identifying fraudulent behaviors, these studies generally assess how effective these measures, such as data analytics (Perols et al., 2017), whistleblower systems (Vandekerckhove, 2018; Latan et al., 2021), and internal control (Zakaria et al., 2016; Chenhall, 2003; Shonhadji and Maulidi, 2022), are. There remains an ongoing interest in recording methods aimed at controlling fraudulent activities.

Worldwide, expenditures on healthcare services exceed seven billion dollars, yet between 10% and 25% of these funds are directly wasted due to corrupt practices. This amount exceeds the projected annual estimate set for achieving universal health coverage by 2030 (Jones and Jing, 2011; World-Bank, 2019).

Fraud within the healthcare system (HS) is often referred to discussions about corruption due to its typical involvement with power abuses (Vian, 2020). In global competition, companies, nations, governments, and institutions grapple with fraud concerns, seeking understanding, risk reduction, and effective countermeasures (Erbuğa, 2022).

They actively address obstacles to sustainability and financial stability while intensifying detection of fraud risks and promoting regulatory environments, and both public and private sectors develop frameworks, regulations, and whistle blower hotlines to combat fraud and corruption, affirming a strong moral stance against wrongdoing and benefiting stakeholders internally and externally (Erbuğa, 2022).

So, we conducted a systematic literature review based on a scientifically structured domain, specifically using methods, theories, and widely utilized frameworks presented in tables and figures to obtain information from reported data and content. These information were analyzed to understand the types of methods previously employed, theories, and frameworks applied, aiming to identify research gaps concerning methods, theories, and frameworks based on the compiled information.

The structure used was the Theory, Construction, Characteristics and Methodology (TCCM) developed and applied by (Paul and Rosado-Serrano, 2019). Consequently, considering these objectives, we believe that we can provide important for future studies and new research areas. To accomplish this goal, we classified and systematized over 160 articles on fraud and public sector fraud. We selected articles published from 1995 to 2023 that examined healthcare fraud. Out of these, only 82 were analyzed for containing the research keywords and for falling within the scope of quantitative typology

Database Selection	CAPES Journals - Access: CAFe
Keywords used in the search	Frauds - Public Sector - Health
Full-text Articles Available	160 articles in the international literature
Method	Systematic Literature Review
Time frame	1995 a 2023

Tabela 1. Systematic Review Outline

as a method for detecting fraud and/or corruption.

The substantial volume of scholarly articles addressing this topic, as demonstrated by our literature review, serves as strong evidence of the relevance of the study, both in the market and in academia. In more comprehensive terms, we also offer a concise descriptive history and summary of each article's contributions. It is notable that while corruption isn't the primary focus here, a few articles related to this subject were integrated into the analysis because they contain the keywords used in our search on the CAPES Periodicals Portal accessed via CAFe.

Having conducted a review of the articles, we briefly discussed various aspects of the studies, including methodology, types of applications, operational tools, etc. More specifically, while we broaden the discussion on general aspects of fraud, the article's primary focus isn't solely to investigate fraud. Instead, it primarily aims to identify fraud indicators within public sector health policies.

Therefore, our objective is to conduct a systematic review to identify the types of fraud, detection / prevention methods, and the impacts of fraud within the public healthcare sector.

In this article, our goal is to present a systematic review of the literature on prominent studies on fraud, methods, and analyses conducted over the past 28 years, specifically focusing on fraud within the public healthcare sector. So, for a better understanding of the research, we show Table 1.

Sought relevant articles, particularly those most cited in public healthcare fraud. Categorized the various forms of fraud outlined in the articles.

In the field of public healthcare, the landscape of deceptive practices includes different types, from undue billing practices to record falsification and even instances of bribery. Each type of fraud presents unique challenges and consequences within the public health sector. For instance, inappropriate billing practices not only burden financial resources but also compromise the integrity of the system.

Falsification of records jeopardizes the accuracy of patient information, potentially leading to diminished care. Illustrating these types with real cases sheds light on their severity and real-world consequences. Moving onto identification and deterrence strategies, a thorough examination reveal different approaches employed, ranging from audits and data analysis to specific technological solutions.

However, while these methods have proven effective to various degrees, their limitations in addressing new or complex fraud schemes remain noteworthy. Finally, taking into account the impacts of these fraudulent activities, their negative impacts on healthcare quality become apparent. Not only do they hinder service provision, but they also significantly influence the allocation of resources, increasing healthcare expenses and skewing equitable distribution, and so denying access for those in need.

To address our research questions, we conducted a topic-specific systematic literature review using a model called Theory, Construction, Characteristics, and Methodology (TCCM). Systematic reviews enable responses to clearly defined questions Tricco et al. (2018). This model is also followed by Villegas-Ortega et al. (2021) that review occurrences and factors of health insurance fraud from 2006 to 2020.

This whole examination aims to identify possible signs of fraud within the public sector, particularly in healthcare policies, where obvious signs of fraudulent activities are lacking.

The goal is to identify the causes, manifestations and influencing factors of fraud in public healthcare. The aim is to facilitate for better interventions, detection, and responses to combat fraud, acting as a reference for decision-making in public health policies worldwide.

We reviewed studies related to our research goal, including peer-reviewed articles listed in international databases. Our search spanned from 1995 to 2023, including all articles found using the mentioned keywords. There were no location or language limitations in our search. However, we excluded conference presentations, proceedings, editorials, letters, and books, limiting our analysis to scientific articles.

Search Strategies: To ensure the inclusion of relevant studies, we initially used studies that met defined search criteria, focusing on targeted keywords related to "Fraud in public healthcare."

Data Processing, Evaluation, and Study Quality: Following the search strategies and identification of potential studies (e.g. Villegas-Ortega et al. (2021)), our review process unfolded as follows: we build an Excel

matrix, listing all studies characterized by name, code, among other characteristic. For the initial database screening, the studies were sorted by titles and authors, eliminating duplicates.

Subsequently, we evaluated the titles, abstracts, and conclusions of selected studies, considering the study's eligibility criteria. After selecting potential studies, we performed a comprehensive reading, enabling us to identify those that directly aided to the research questions (Theoretical Fraud, Practical Construction, Characteristics, and Methodology) within the matrix.

We then analyzed the suitability of the content of the papers to address our research questions, avoiding any conjecture or bias. We excluded from our analysis studies that did not contribute to or weren't relevant to the questions. We reviewed 160 pairs of articles included in the study, which included qualitative and quantitative analyzes, Furthermore, we used the SCImago Journal Rank (SJR) to evaluate the academic impact of academic journals taking into account the number of citations of the manuscript (Ardito et al., 2015).

3. RESULTS

A total of 160 studies were identified based on the selection criteria. Subsequently, 5 redundant studies were removed and then the titles, abstracts, and conclusions of 155 studies were examined, from which 155 full texts were retrieved. During this process, 81 studies related to fraud detection techniques, data mining models, processes, activities, or other aspects not related to factors and manifestations in public healthcare were excluded. Eventually, 74 studies were included in our study.

The study questions along with their respective answers are presented below.

RQ1: What constitutes fraud in public healthcare?

After a detailed analysis in search of an answer to this first question, no specific terms for fraud were found in the public sector. However, two articles provided definitions, and five others presented concepts for terminology. It is worth noting that the articles address corruption, listed as fraudulent acts. Therefore, definitions and concepts of corruption were added to the results.

Corruption, defined as "the misuse of entrusted power for private gain" (Transparency International, 2016), is "a global wicked problem that cuts

across all sectors, including energy, construction, transportation and storage, public procurement, politics, and healthcare" (Li et al., 2020). Fraud is the "offense of intentionally deceiving someone in order to gain an unfair or illegal advantage" (Transparency International, 2016). It is a "deception or intentional misrepresentation that the person or entity makes knowing that the misrepresentation could result in an unauthorized benefit for the person, entity or another part" (, NHCAA). According to Villegas-Ortega et al. (2021), fraud in healthcare insurance can be related to "criminal act as a violation of civil law according to the law. Behaviours range from intentional misrepresentation of services provided to inadequate documentation for Medicare/Medicaid" (Gasquoine and Jordan, 2009).

Villegas-Ortega et al. (2021) also indicate that health insurance fraud can be defined as an "abuse of the system of a for-profit organization without necessarily having direct legal consequences, while prescription fraud is defined as the illegal acquisition of prescription drugs for personal use or profit and could be observed in many ways" (Aral et al., 2012) and "deception or intentional misrepresentation used to obtain illegal benefits"(Joudaki et al., 2016). Finally, Villegas-Ortega et al. (2021) also indicate health insurance fraud as "a severe federal crime and includes filing claims with the intention of "defrauding"" (Dolan and Farmer, 2016) and "an act based on deceit or intentional misrepresentation to obtain illegal benefits regarding the coverage provided by health insurance" (Villegas-Ortega et al., 2021).

RQ2: How does fraud in public health policies manifest?

Based on the concepts presented, a word cloud was generated for conceptual simplification. The results are presented as depicted in Figure 1. We identified that fraud manifests itself in various ways, "such as performing" "unnecessary services", "falsifying records", "separating invoices", and "misrepresented coding". Therefore, we classified these manifestations according to the concepts presented in the studies. In this regard, we present the manifestations found in the analyzed studies as follows.

4. INDICATORS OF FRAUD IN PUBLIC HEALTH STUDIES

Fraud in the public health sector appears in various forms and includes various stakeholders. One common type is fraud committed by healthcare providers, which includes ghost billing, document forgery, and over-utilization

Figura 1. Definition of Fraud

of services (Gasquoine and Jordan, 2009; Li et al., 2008). Fraud committed by insured individuals encompasses identity theft, falsifying coverage details, and document alteration (Gasquoine and Jordan, 2009; Li et al., 2008; Jiménez-Rodríguez et al., 2018). Additionally, insurance companies may participate in fraudulent activities by submitting false benefit claims or altering reimbursements (Gasquoine and Jordan, 2009; Matloob et al., 2020; Li et al., 2008; Jiménez-Rodríguez et al., 2018).

Prescription alteration is another form of fraud, where prescriptions are forged or needless medications are prescribed, resulting in financial gain through misleading medical records or other misleading practices (Aral et al., 2012; Li et al., 2008; Sommersguter-Reichmann et al., 2018). A rise in the percentage of duplicated patient records is another sign, both typically (Joudaki et al., 2016; Sommersguter-Reichmann et al., 2018) and particularly in pharmacies (Joudaki et al., 2016; Matloob et al., 2020).

A notable rise in the average cost of prescription medication claims (Joudaki et al., 2016; Matloob et al., 2020; Rönnerstrand and Lapuente, 2017; Vian, 2020), and an increased ratio of claims referred to high-cost pharmacies

Other types of fraud include splitting, that each step of a procedure is billed separately (Li et al., 2008; Sommersguter-Reichmann et al., 2018), and incorrect coding, which includes charging for more expensive services than those performed (Li et al., 2008; Sommersguter-Reichmann et al., 2018). Administrative nepotism, that recruitment practices are used to favor political supporters, harms the ability of the scheme's employees (Fusheini and Eyles, 2016). Employee-related issues such as absence of internal checks, opportunities for crime, and unlawful performed are also significant factors (Maulidi, 2023).

We conducted an analysis of these fraud indicators within public health studies, examining various forms of fraudulent activities across healthcare systems. This analysis combines diverse research views on fraudulent practices in public healthcare, highlighting the need of tackling these activities to preserve the honesty and efficiency of healthcare delivery.

5. VARIABLES OF FRAUD STUDIES IN THE PUBLIC HEALTH SECTOR

The studies have used different variables to detect fraud in public health. For instance, Aral et al. (2012) focused on the commercial name and price of drugs, prescription IDs, patient demographics, and diagnoses to identify fraud in medical prescriptions by analyzing characteristic combinations in databases. Li et al. (2020) used text and metadata of tweets to detect corruption reports on Twitter, using natural language processing and topic models to group user experiences.

Aboutorabi et al. (2016) made the analysis using informal payments in the hospital system by examining demographic and hospitalization-related variables, identifying relationships between patient characteristics and the incidence of such payments. Azzam et al. (2023) introduced a blockchain-based system to guarantee the integrity and security of government documents, using specific technologies and components of the SECHash system.

Potin et al. (2023) analyzed public contracts in France, concentrating on factors such as contract duration, advertising period, number of offers, and contract price to detect frauds and improve the data accuracy. Baltussen et al. (2006) evaluated the effectiveness and financial sustainability of Mutual Health Organizations in Ghana by examining their organizational structure and financial management.

Massi et al. (2020) applied grouping methods and outlier validation to detect hospital fraud in cases of heart failure in Lombardy. Joudaki et al. (2016) identified physicians suspected of fraud and abuse in Iran through cluster analysis and differentiation using information on physicians and medication prescriptions. Lewis and Hendrawan (2019) analyzed the effect of political coalitions on government spending and local corruption in Indonesia by examining public spending, health services, education, infrastructure, and corruption perceptions.

Rönnerstrand and Lapuente (2017) investigated the connection among corruption perception in the health sector and antibiotic consumption in the EU, using variables like regional socioeconomic indicators. Matloob et al. (2020) developed a fraud detection model based on insurance claim transaction data, employing association scores, rule generation, and similarity functions. Li et al. (2008) identified anomalous patterns and suspicious behaviors in healthcare systems using insurance claims data, demographic characteristics, service provider behavior, treatment patterns, and financial data.

Novita and Anissa (2022) investigated the impact of data analytics tools on the effectiveness of auditors in detecting fraud in Indonesia's public sector. These studies utilized various statistical techniques, including machine learning models, text analysis, clustering, Mann-Whitney and Kruskal-Wallis tests, and regression analysis methods such as regression discontinuity design and linear regression. These techniques were applied to analyze everything from medical prescriptions and tweets about corruption to hospital data and government spending, all aiming to identify and mitigate fraud and corruption in the public health and governance sectors.

6. CONCLUSION

This study offers a comprehensive summary of fraud in the public healthcare sector and corporate domains, highlighting its complexity and negative effects on financial stability and social well-being. It stresses the importance of identifying and preventing fraudulent activities, based on broad research that emphasizes the prevalence and global concern of healthcare fraud. A systematic literature review spanning nearly three decades was conducted, specifically targeting fraud in public healthcare. The study identifies types of fraud, assesses detection and prevention methods, and pinpoints research gaps using a systematic method involving approach, databases, and keywords, compiling over 160 relevant articles.

The investigation examines fraud appearances in public healthcare, such as prescription manipulation, patient duplication, and increased medical costs, involving actors like service providers, insured individuals, insurance companies, and recruitment policies. It reviews various statistical techniques used to investigate fraud, corruption, and anomalies within public healthcare and governance. These studies use contemporary technological tools like machine learning, blockchain, OCR, and statistical software (e.g., SPSS, Python) to analyze data and detect anomalies. Research methods vary, in-

cluding cross-sectional surveys, statistical tests, machine learning models, blockchain systems, and regression discontinuity designs.

Collectively, these studies aim to strengthen fraud detection mechanisms, clarity, and responsibility in public healthcare. Future research could refine predictive models, incorporate new technologies like blockchain and AI, examine network relationships to reveal corruption, combine multifaceted data sources, improve fraud detection education, set up performance benchmarks, encourage data-sharing initiatives, and create real-time monitoring systems. These efforts aim to improve honesty and clarity in public healthcare and governance through technological innovations and interdisciplinary approaches.

Despite the large volume of research on healthcare fraud, many significant gaps remain. There is a need for comprehensive reviews and reports of the efficiency of fraud detection methods across different healthcare systems and a detailed research of how new technologies like blockchain and AI can transform fraud deterrence. Additionally, there is an absence of targeted studies on the social and economic effects of healthcare fraud on different demographic groups, particularly in low- and middle-income countries.

Our findings highlight the importance of creating adaptable, effective strategies to combat healthcare fraud. This study makes a significant contribution by carefully reviewing over 160 articles, offering a detailed overview of fraud types, detection methods, and impacts within the public healthcare sector. By identifying important knowledge gaps, our work establishes the foundation for future studies to develop better approaches, eventually improving the public healthcare systems.

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