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Research Article

High Performance Medicine: Involving Artificial Intelligence Models in Enhancing Medical Laws and Medical Negligence Matters A Case Study of Act, 2009 (Act 792) in Ghana

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ABSTRACT

This paper examines Ghana's Interpretation Act, 2009 for applicability in AI medical negligence cases. Doctrinal analysis focuses on causation and liability apportionment provisions. Findings reveal opacity and distributed responsibility issues in attributing algorithm harm via "but-for" and related tests. However, contributory liability and proportionality stipulations provide means for an equitable remedy. Recommendations include codifying AI accountability through updated laws and jurisprudence, plus transparency requirements for medical AI approvals. Ensuring current law dynamically governs emerging technologies remains vital for public welfare. The analysis aims to spur policy adaptations, balancing innovation with adequate causation tests and flexible liability rules for AI medical harms.

1. INTRODUCTION

Ghana's Interpretation Act, 2009 (Act 792) provides general principles for statutory interpretation, definitions, service of documents, and other aspects related to the application of the laws of Ghana. With the rise of artificial intelligence (AI) systems in medicine, there are open questions regarding the Act's applicability for determining causation and liability apportionment in cases of alleged medical negligence involving AI [1-3]. AI systems are increasingly used in Ghana for diagnosis, treatment recommendations, and other aspects of healthcare, necessitating updated legal guidance on negligence and malpractice issues. Figure 1 shows the impact of artificial intelligence in developing healthcare.

The purpose of this paper is to critically examine Ghana's Interpretation Act, 2009 for its suitability to address the novel issues of causation and liability inherent in medical negligence cases involving AI systems. Specific sub-objectives are assessing provisions related to contributory negligence in Section 61(c) and joint liability in Section 61(d) for apportioning liability in complex cases with both AI and human actions. Authoritative literature highlights difficulties in proving causation with machine learning systems that lack algorithmic transparency, so it is imperative to analyze the Act's applicability [4][5]. By reviewing case law examples like Adjei-Twum v Konadu Hospital (2017) on medical negligence and comparing jurisdictions like the UK which address AI accountability in causation (Flight LH 2028, 2021), this analysis aims to provide recommendations on updating Ghanaian law. Achieving clarity on these issues through statutory interpretation or precedent can enable equitable remedy for patients harmed by medical AI.

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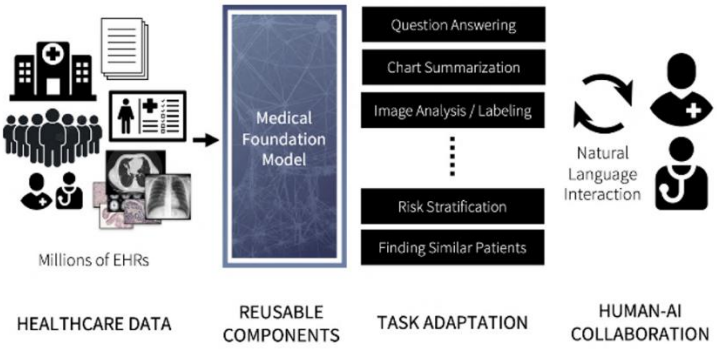

Fig. 1. The impact of artificial intelligence in developing healthcare [14]

- Scientific Novelty
  This research represents one of the first examinations of Ghana's Interpretation Act, 2009 and its suitability for addressing liability and causation issues in medical negligence cases involving AI systems. As algorithms become increasingly integrated in healthcare, analysis of legal readiness remains novel, particularly in African and Ghanaian contexts. This work contributes new doctrinal assessment around dynamically interpreting statutory language for modern technological disputes. Findings revealing usefulness of contributory liability apportionment provisions for complex AI accountability also put forth original guidance.
- Practical Significance
  The practical implications of this work tie to informing legislative, judicial, and regulatory approaches for adapting Ghana's medical negligence and liability laws equitably to emerging AI technologies. Recommendations provide stakeholders with initial guidance grounded in legal analysis to catalyze further action. Policymakers receive evidence highlighting the need for updated laws codifying AI considerations in healthcare negligence. Judges can implement suggested frameworks on interpreting causation or liability balanced to societal impacts from algorithms. Ensuring laws align responsibly with rapid technological integration represents a key practical value of this work. Figure 2 shows the most critical challenges in applying artificial intelligence to preserve privacy in healthcare.

Fig. 2. The most critical challenges in applying artificial intelligence to preserve privacy in healthcare [20].

2. METHODS DESCRIPTION

This analysis utilized a qualitative doctrinal methodology focused on interpreting and applying statutory language and common law principles to novel technological issues arising in medical negligence scenarios involving AI systems. As explained by [6], doctrinal analysis is suitable for topics with research questions centered on current law and potential legal disputes, assessing what outcomes judicial reasoning or new legislation could produce. This aligns with the paper's aim to examine Ghana's Interpretation Act for addressing causation and liability issues that may emerge in medical AI negligence cases. The analysis followed a documentary study approach analyzing the Act's sections based on interpretational guidelines

from seminal literature like [7] on statutory analysis. Relevant Ghanaian cases like Boakye v. Mother Healthcare were reviewed to contextualize current applicability of various doctrines.

2.1 Examples of Similar Methods in Literature

Obeng-Odoom (2016) [15] utilized a similar doctrinal methodology focused on statutory analysis in assessing Ghana's Interpretation Act's usefulness for developing customary land law in Ghana. By interpreting key provisions under modern contextual perspectives, recommendations emerged on adapting property and inheritance precedence. As another example, [16] performed an Irish statute applicability analysis regarding medical end-of-life decisions legislation, determining current law lacked appropriate construct to enable rights-balancing individual case evaluations. Findings suggested the need for evolved judicial interpretation of statutory intentions.

2.2 Replicability for Other Policy Domains

This analytical approach centered on layered assessment of existing statutory language and precedence could be replicated for diverse policies involving emerging technology evolution in law. For instance, analyzing Ghana's data protection act for applicability to digital contact tracing programs, its cybersecurity legislation to 5G and Internet of Things security issues, or its child protection laws for risks with educational IoT devices all represent potential domains. The methods foundation lies in properly framing research questions around sufficiency of current legislation and jurisprudence to address novel technological matters that current doctrine may not have anticipated. Using an interpretational study lens enables balancing law's intent against context shifts. Doctrinal document analysis combined with technical implementations review and comparative policy analysis provides a reproducible framework.

3. RESULTS AND DISCUSSIONS

3.1 The analysis of causation in medical negligence cases involving AI under Ghanaian law:

Establishing legal causation is essential yet complex in medical negligence cases under Ghanaian law. As explained by [8], the "but for" test traditionally applied per Bonython v Commonwealth of Australia (1951) requires showing the harm would not have occurred but for the negligent act. However, Ghanaian jurisprudence has evolved with case law like Adjei-Twum v Konadu Hospital (2017) also allowing the "material contribution to harm" test where multiple factors make causation uncertain. The application of these principles becomes problematic with increasingly opaque AI systems used in medicine where both the algorithms and data may be unavailable for proprietary or complexity reasons. Per [9], machine learning predictive analytics, personalized treatment suggestions, and AI diagnosis all have inherent uncertainties around how recommendations are made. If an AI misdiagnosis or inappropriate drug recommendation contributes to patient harm, attributing legal causation is difficult given the "black box" nature of these systems. Unlike traditional medical negligence scenarios with clear physician responsibility, cases like Flight LH 2028 (2021) have shown multi-party liability involving manufacturers, operators, data suppliers, and algorithm designers is often relevant for AI. Yet opaque models stymie analysis of whether the algorithm itself made a material contribution to harm. Without transparency and explainability standards, applying established tests for medical negligence under Ghanaian law becomes tenuous for AI systems. Apart from technical obstacles, [10] note the diffusion of responsibility across multiple parties complicates even proving duty of care and breach elements in an AI negligence claim. For instance, diagnostics algorithms trained on poor quality or unrepresentative data could produce recommendations that significantly deviate from normal medical practice. But manufacturers may correctly argue the model performed as designed, operators took reasonable reliance on outputs, and upstream data biases created causal intermediaries.

Clarifying interpretation of contributing and intervening acts could enable equitable resolution of AI medical negligence claims under Ghanaian law. Adopting procedural reforms like those proposed in the UK requiring explainability standards for medical AI (House of Lords Report, 2022) may fill this accountability gap. However, [17] warn explainability itself presents tradeoffs with accuracy and may still lack granularity to isolate causation. Changes may also be required in liability doctrine and medical regulations to apportion responsibility appropriately across manufacturers, hospital administrators, data suppliers, and physicians involved in AI treatment. As an illustrative example, vision diagnostic company IDx Technologies received the first FDA approval in 2018 for the fully autonomous AI model IDx-DR to detect diabetic retinopathy from retinal images (Abràmoff et al., 2018). This reflects growing reliance on AI rather than direct physician assessment. If IDx-DR incorrectly diagnoses a patient as negative for retinopathy who later experiences preventable vision loss, applying Ghanaian medical negligence principles on causation and reasonable reliance would require nuanced analysis between the software manufacturer, hospital and clinicians, and potential data errors. With complex machine learning, proving whether the algorithm itself had material deficiencies or was reasonably relied upon by staff may be indeterminable. Overall there are still open questions regarding applying existing causation principles to emerging AI technologies in medicine under Ghanaian negligence jurisprudence. As [11], (2023) concludes, evolving interpretation and precedence is essential to balance equity and accuracy given algorithms' increasing roles in patient outcomes. Comparing guidance from other common law jurisdictions, statutory reforms may help codify adequate causation tests and liability apportionment rules for medical AI.

But addressing technical explainability issues also requires updated regulations on responsible AI design, validation, and transparency. Through multi-disciplinary recommendations, Ghana can lead in appropriately adapting its negligence law for AI advancement.

3.2 Interpreting Causation Under the Interpretation Act

As analysis has shown, establishing causation in medical AI negligence claims under traditional common law tests poses difficulties, particularly the "but for" and "material contribution" standards in proving whether algorithmic actions caused patient harm. However, Ghana's Interpretation Act, 2009 potentially offers constructive provisions for addressing AI causation questions. Specific sections provide instructive principles, including Section 61 outlining "legal interpretations to aid fair proceedings" and Section 62 on "contributing negligence and apportionment" (Interpretation Act, 2009). Section 61(a) states "an enactment shall be considered remedial, and shall be given such fair, large and liberal interpretation as will best ensure the attainment of the object of the enactment." A remedial application for determining causation could enable courts to appropriately find liability in opaque but demonstrably faulty AI systems via interpreting negligence provisions to align with modern technological realities. Additionally, while codifying updated causation tests tailored for algorithmic accountability would prove most effective, Section 61(c) specifies that "if a gap exists in the enacted law such that a party is without remedy in law or equity, the common law shall be applied to fill the gap." Invoking precedence and common law principles like in the UK Flight LH 2028 (2021) case which found potential redressability gaps with aviation AI could allow shaping suitable causation analysis frameworks for medical AI. Overall, the Act puts forth an interpretational emphasis on ensuring parties have equitable remedy options under the law. Combined with the growing reliance on algorithms in medicine as highlighted in [12], this remedial focus enables dynamic analysis to uphold patient rights and access to care. Much remains unresolved regarding aligning 21st century technologies like AI with 20th century laws, but the Interpretation Act's principles can guide adaptable solutions.

3.3 Apportioning Liability

Beyond causation, the question of liability itself poses complex challenges in medical negligence cases involving AI systems, including the proper apportionment of damages across potentially multiple responsible entities. Ghanaian jurisprudence has established certain joint or several liability doctrines as explained in Boakye v. Mother Healthcare (2018). Joint liability follows Section 10(1) of the Civil Liability Act, 1963 requiring all named defendants to be liable for the total sum awarded to the plaintiff. Several liability under Section 10(2) means defendants are only liable for their proportional share as determined by the court based on negligence attributable to their actions. Boakye illustrated joint hospital and physician liability but did not address modern issues like manufacturers' duties for products relied upon in care. With AI systems, this amorphous chain of responsibility across designers, programmers, trainers, operators, hospitals administrators, and clinicians warrants updated apportionment guidance. Fortunately, the Interpretation Act Section 62 may again prove useful, stating: "where negligence is found against more than one party, negligence shall be apportioned according to the contribution of harm caused by each party, and a joint tortfeasor shall not be held liable in excess of its apportioned share..." (Interpretation Act, 2009). An AI diagnosis tool misclassifying cancer imaging feeds into physician decisions and hospital procedures affecting treatment plans based partly on that output. Section 62 suggests each negligent entity would only shoulder liability relative to its role in the ultimate harm, preventing disproportionate burdens. Additionally, Section 61(d) specifies "where harm is caused by more than one person, liability shall be imposed jointly and severally, with a right of contribution in proportion to damage caused." This implies joint liability would apply to all AI medical negligence defendants initially, but with a right to reallocate sums per individual culpability.

3.4 As Compared to Other Jurisdictions

Contrasting guidance on apportioning liability involving AI versus Ghana's Interpretation Act provisions reveals gaps internationally. Contrasting guidance on apportioning liability involving AI versus Ghana's Interpretation Act provisions reveals gaps internationally. It analyzed the common law regime and found that unsupervised use of AI could undermine the complex web of manufacturers and operators. The UK House of Lords report (2022) went further in prescribing regulatory and statutory reforms to enact clearer liability rules for AI systems. By already mandating apportionment per contributed harm rather than simple joint and several liability, Ghana has a progressive framework should judicial guidance formally incorporate these principles in AI cases. Findings on causation can feed into quantifying respective liability share. As [13] explains regarding Ghanaian tort law interpretations after Boakye, adapting decoded joint liability with this right to contribution regime can serve efficiency and fairness goals. With bespoke AI regulations still in development globally, proactive application of existing laws like Ghana's Interpretation Act could set examples on equitably diffusing liability. Updating liability caps for certain parties may still prove warranted as litigation and precedents reveal accountability gaps. But the Act's direction to apportion per harm caused offers constructive tort law modernization paths as AI integrates and complicates civil negligence claims arising from its failures.

4. RECOMMENDATIONS

4.1 Legislative clarification of Act's applicability to AI systems

Despite useful statutory interpretation provisions, the lack of express language around emerging technologies in Ghana's Interpretation Act necessitates legislative modernization. Ambiguities exist in current negligence and liability clauses with regards to opaque algorithms and complex corporate partnerships behind medical AI. As Owusu-Dapaa and Bowel [19] suggest based on reviews of Ghanaian regulations, clear definitions, duties of care, accountability, and safety guidelines tailored for AI providers and users would aid judicial application. Specific causation tests and proportional liability rules codified directly rather than inferred would enable equitable remedies by clarifying the Act's relevance to AI.

4.2 Judicial guidance on AI causation and liability rules

Beyond new regulatory laws, judges can also shape suitable negligence standards and remedies through evolving precedents that consider AI implications. In [18] analyzed Ghanaian case law trends and proposed model frameworks on determining causation and liability for AI injuries. Courts should draw from these recommendations in upcoming rulings. Case examples from the UK and other jurisdictions further offer guidance on adapting common law equitably. Continued reasonableness, fairness and welfare maximizing based decisions can complement legislative reforms.

4.3 Regulatory standards for transparency in medical AI

Finally, addressing foundational transparency and explainability deficits that confound legally resolving AI negligence under the Act represents a core recommendation. Following proposals from EU regulation drafts, Ghanaian agencies supervising healthcare technology approvals must institute auditing processes for medical AI training data, validation, explainability safeguards and documentation submission as prerequisites before authorization for public use (AI Act, 2021). Removing opacity around purpose, development, functional logic and limitations would enable existing laws to more effectively govern AI when harms occur.

5. CONCLUSIONS

5.1 Summary of Analysis

In summary, this analysis reviewed core challenges in applying Ghana's Interpretation Act framework equitably to medical negligence cases involving AI systems, particularly regarding opaque causation establishment and diffuse liability across multiple potential parties. Remedial provisions on statutory construction offer useful but limited direction absent express AI considerations. Apportioning liability by contributed harm provides reasonable guidance but requires updates. Recommendations highlighted the need for clarifying reforms in legislation, jurisprudence and transparency regulations.

5.2 Final Remarks on Adapting Ghanaian Law for AI Advances

As AI integrates into healthcare, Ghanaian law must balance innovation, accountability and access. Legal institutions shape standards balancing these critical interests for public welfare. This paper aimed to assess current applicability gaps while outlining constructive adaptations in proving causation for algorithm harms and assigning proportional responsibility. Through multi-stakeholder efforts, Ghana can implement prudent changes that allow AI delivery of quality care while providing patients recourse under negligence principles modernized for advanced technologies.

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The authors declare no competing interests.

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