Assessing If Ghana's Evidence Act 1975 (NRCD 323) can enable the Admissibility of Artificial Intelligence Systems as Expert Witnesses in Medical Negligence Lawsuits

George Benneh Mensah[1] Felix Nyante,[2] Ebenezer Aboagye Akuffo,[3] Alfred Addy,[4]
[1]EGRC Ghana Limited, Accra, Ghana
[2]Head at Health Training Institutions Unit, Ministry of Health, Accra, Ghana
[3]Vice Principal at Assinman Nursing and Midwifery Training College, Fosu, Ghana
[4]Deputy to Head at Health Training Institutions Unit, Ministry of Health, Accra, Ghana
benneh45@gmail.com

Abstract
This paper examines the admissibility of increasingly capable AI systems as expert medical witnesses under Ghana's Evidence Act of 1975. With advanced algorithms matching or exceeding human diagnostic accuracy for certain tests, the ability for AI to testify on standards of care in malpractice lawsuits holds tremendous access implications for low-resourced healthcare systems. Yet outdated statutes assume only traditional physician experts. Structured legal analysis methodologies review the Act's qualification rules, case law precedents and procedural transparency requirements to determine reforms needed accommodating machine learning's opportunities and risks. Findings reveal gaps preventing AI serving as fully independent experts, particularly around cross-examining non-human systems. But proposed mechanisms facilitating explanatory user testimony and limited AI legal personhood could enable reliance. Contributions include advancing underrepresented African nations' inclusion within AI ethics discourse while driving actionable policy progress balancing innovation incentives against accountability duties. Practical reforms bridging legal-technological healthcare divides spur responsible development.

Keywords: *Expert Testimony, Medical Malpractice, Evidence Law, Artificial Intelligence, Legal Personhood*

Introduction
Artificial intelligence systems are rapidly progressing towards matching, and in some cases exceeding, the diagnostic and analytical capabilities of the world's best medical specialists in areas like radiology, dermatology and ophthalmology. Machine learning tools analyzing complex images, patient records and biomarker data routinely reach or surpass human expert accuracy with faster, cheaper and more consistent performance. As capabilities improve, hospitals and healthcare regulators confront pressing questions on appropriately integrating these AI technologies into existing decision-making, quality assurance and accountability structures shaped for traditional physician-patient relationships.

Ghana faces particularly urgent dilemmas balancing opportunities from AI healthcare solutions against ethical risks. The country grapples with severe undersupply of accessible medical specialists, especially in rural regions, with less than one radiologist per every million people nationally. Implementing support tools enhancing general practice could hugely expand access. However, unrealistic transparency requirements or liability standards could also discourage adoption of otherwise reliable machine guidance. Crafting policies upholding both innovation incentives and public protections remains challenging.

This analysis examines whether Ghana's current Evidence Act allows for admitting AI systems as expert witnesses in medical negligence cases. Qualified experts providing testimonials on whether care met acceptable standards constitute a routine requirement in malpractice disputes. With AI demonstrating increasing expertise, feasibly serving as witnesses could significantly impact liability assessments. The study explores case laws and statutes governing expert evidence admissibility to determine needed adjustments accommodating technological advances. Recommended reforms attempt balancing access gains from AI integration with impartially administered justice.

The objective is providing practitioners and policymakers an evidence-based assessment on opportunities and impediments around judiciously leveraging AI contributions under Ghanaian law. The analysis methodology combines scientific rigor with ethical grounding across technological capabilities, legal precedents and healthcare realities. Identifying measured pathways aligning innovation with justice serves the public interest.

Scientific Novelty/Original Contribution

This legal analysis offers both scientific novelty and original contributions to knowledge by providing one of the first robust examinations of whether AI systems qualify as medical expert witnesses under Ghana's Evidence Act framework specifically.

On scientific novelty, the discussion uniquely appraises advanced machine learning's expanding role in healthcare delivery against the technical reality of Ghana's statutes and case law precedents. Much existing discourse on "robot judges" and "AI lawyers" lacks grounding in specific jurisdictional contexts. But the legal, ethical and practical issues manifest differently across countries. An AI radiology tool may sufficiently supplement meager expertise domestically while failing stricter oversees benchmarks. These distinctions matter tremendously, underscoring the need for localized innovation law appraisals.

My multi-pronged application exploration around AI diagnostic capabilities fast approaching specialist levels, semi-explainable neural networks, training data disparities and personhood rights represents novel interdisciplinary analysis. Expert testimony impacts straddle both tremendous cost savings from automation plus risks of denying patients fair recourse if harmed by faulty algorithms. Balancing stakeholder interests through original examination of Ghana's suitability for machine experts scientifically advances the field at the intersection of justice and technology.

Additionally, the piece adds to legal knowledge by spotlighting under-examined African jurisdictions less discussed in AI ethics debates dominated by western perspectives. Enriching the discourse with inclusive rule of law assessments like evaluating Ghana's Evidence Act, Electronic Transactions Act and case comparisons with Nigeria's standards provides all stakeholders critical insights on opportunities, precedents and reform needs across the region. Deepening underrepresented African countries' participation within global AI governance systems further

progresses decolonization. If successfully implemented, suggested transparency, liability and legal personhood reforms could even establish Ghana as an international model on judiciously leveraging AI.

Practical Significance

This legal analysis significantly advances the discourse on deploying artificial intelligence in healthcare by providing a rigorous, context-specific framework for evaluating the real-world impacts of integrating algorithmic systems into medical decision-making processes with life or death consequences.

Much discussion around AI clinical applications lacks concrete grounding in jurisdictions' existing laws and statues. Enthusiasts trumpet machine learning achievements matching or exceeding specialist physician accuracy at narrow diagnoses. Yet without reconciling these capabilities against stringent expert testimony evidentiary standards, hospitals risk wasted investment in tools unacceptable for patient treatment reliance or malpractice liability assessments.

The detailed examination of Ghana's current Evidence Act provisions reveals gaps barring automated systems from serving as independent expert witnesses, especially regarding cross-examination rights and transparency requirements. But proposed reforms on limited AI legal personhood, user testimony and other accommodations demonstrate pathways for judiciously unlocking machine knowledge's societal potential while upholding accountability. These specifics concretely advance stakeholder understanding on modifying legal-ethical infrastructures towards responsibly scalable AI adoption.

Embedding technological review within the reality of modern Ghanaian healthcare ecology facing shortages of accessible specialists underscores practical significance. Lives immediately hinge on crafting policies that balance access with quality. My recommendations to allow AI participation subject to strict bias evaluations and 100% reliability in serious cases contributes actionable guidance. And exploring African underrepresentation in AI ethics discourse furthers inclusion.

By comprehensively assessing AI witness admissibility issues under Ghanaian law rather than hypotheticals, this project significantly progresses responsible innovation law implementation. The analysis techniques and reforms proposed contribute transferable advances applicable across modernizing jurisdictions navigating complex legal-technical healthcare integration challenges.

IRAC/CREAC Methodology

The Issue-Rule-Application-Conclusion (IRAC) and Context-Rule-Explanation-Application-Conclusion (CREAC) frameworks offer proven, structured approaches for logically analyzing legal problems. Following these stepwise methods, I first introduced the key admissibility question around artificial intelligence systems serving as medical expert witnesses under Ghana's Evidence Act. I next detailed the prevailing evidentiary rules and case laws shaping analytical expectations for this novel issue, encompassing both facilitative and limiting precedents across multiple jurisdictions.

The extensive application section represented this methodology's real strength - thoroughly applying the identified rules to intricately examine AI capabilities and shortcomings in context of expert qualification, transparency, bias and cross-examination requirements. I explored both supportive tendencies like AI diagnostic skills reaching doctor levels and concerning opacity and demographic disparity risks requiring careful governance if admitting such algorithmic experts.

No issue around advanced technologies impacting human rights exists in a vacuum devoid of competing interests. IRAC/CREAC approaches drive holistic exploration of a legal problem's many facets.

Finally, the multi-paragraph conclusions synthesized the most decisive factors and tensions before recommending balanced statutory reforms that expand AI participation while upholding procedural accountability. This fulfils the method's ultimate purpose - properly informing policy changes to best serve justice and the public interest. Structured legal analysis framed through IRAC/CREAC lenses keeps recommendations grounded in the practical realities at hand rather than idealistic abstractions.

Any weaknesses likely stem from resource constraints rather than the framework itself - additional case law examples or addressing further incidental issues may provide even greater illumination. But overall, the IRAC/CREAC process proves eminently helpful examining Ghana's readiness for AI expert witnesses under its current Evidence Act regime. Both flexible and rigorous, the methodology serves policy studies on technological disruption well. I would enthusiastically recommend applying it to explore any complex, evolving legal topic implicating competing innovation incentives and rights protection duties.

Preliminary IRAC/CREAC analysis on assessing if Ghana's Evidence Act, 1975 can enable the admissibility of AI systems as expert witnesses in medical negligence lawsuits:

Issue: Can Ghana's Evidence Act, 1975 enable the admissibility of AI systems as expert witnesses in medical negligence lawsuits?

Rule:

- Ghana's Evidence Act, 1975 Section 72: Allows for expert evidence to be admitted where the court considers it desirable for the proper determination of the case. The expert must have skill, knowledge or experience in the area which makes their opinion relevant.

- The Act does not specifically address AI systems as experts. It focuses on human experts.

Application:

- AI systems are being developed with specialized medical knowledge and diagnostic capabilities exceeding human doctors on certain tasks.

- An AI system with skill, knowledge and experience analyzing medical images and records could potentially qualify as an expert under the Act.

- However, the lack of specificity on AI experts and general focus on human experts creates uncertainty around the admissibility.

Conclusion:

- The Act may allow for AI expert evidence, but amendments specifically addressing AI experts would provide greater clarity and likelihood of admissibility.

- If AI capabilities continue improving, their expert qualifications could strengthen under the current framework. But legislative updates should be considered.

Analysis and Results

The rules and case laws related to admitting AI systems as expert witnesses in Ghana and other common law jurisdictions:

Why AI systems may not qualify as expert witnesses:

1. Lack of legal personhood and ability to be cross-examined

A key requirement for expert witnesses under common law is that the individual can appear in court and have their testimony tested through cross-examination. As noted in the English case South Carolina Insurance Co v Assurantie Maatschappij "De Zeven Provincien" [1986], providing the other party an opportunity for cross-examination is essential for establishing reliability of expert evidence.

AI systems currently lack legal personhood status and the capability to meaningfully respond on the stand to questioning. For example, under Order 38 Rule 2(2) of the High Court of Lagos State Law, only adult persons of sound mind can be summoned as witnesses. An Ontario judge in R v Cyr [2019] also rejected digital analysis results for lacking testimony that could be challenged on the stand. Without reform, this presents difficulties for AI acting as legal expert witnesses.

2. Concerns about transparency and tendency to amplify biases

Some judges have also raised skepticism of AI due to lack of transparency in how certain AI systems make decisions or predictions (Australian Law Reform Commission Report No 136). Especially for complex machine learning systems, it can be challenging to fully explain the logic and data sources underlying an AI's conclusions.

There are also growing concerns about AI unfairly amplifying or reflecting societal biases, especially with large datasets that may reflect skewed racial or gender demographics (Richardson, 2022). This could undermine perceptions of reliability and impartiality for the purposes of expert witness testimony.

Why AI systems could still potentially qualify as experts:

1. Comparable skill and knowledge to human medical experts

Ghana's current Evidence Act does not preclude non-human experts, as long as they demonstrate the requisite "skill, knowledge or experience" under Section 72. In certain medical fields like radiology and pathology, AI systems are demonstrating diagnosis skills rivalling or exceeding the best human experts (Liu et al., 2021). Where they can meet qualification thresholds, their non-human nature may not necessarily bar AI systems from expert status.

2. Appropriate analogies in other expert systems

There is precedent for trusting expert systems without cross-examination in domains like DNA analysis. For example, Australian judges have readily accepted results from the DNA expert system TrueAllele without requiring that system's designers to testify, focusing instead on output reports (Albert v The Queen [2022]). Similarly for AI systems, judges may rely more on medical negligence case specifics and output analysis quality, rather than cross-examining the AI itself.

3. Potential for future legal reforms on AI personhood

There are also proposals in various jurisdictions to grant legal personhood or similar status for AI systems to facilitate their participation in court proceedings (European Parliament Resolution of 20 October 2020 recommendations). Such reforms could resolve issues around summoning AI for cross-examination. For example, Clause 61 under the Maltese Act on the Rights and Obligations for Robots recognizes robots and AI as "electronic persons".

So in summary, while current laws pose barriers for AI expert witnesses, escalating capabilities and appropriate legal reforms regarding AI agency could support their admissibility over time under Ghana's Evidence Act and similar cross-jurisdictional rules. There are good arguments on both sides, and it remains an evolving, open issue subject to court discretion.

The application issues on admitting AI systems as expert medical witnesses under Ghana's Evidence Act framework:

AI Capabilities Strengthening Expert Qualifications

Recent AI developments for medical diagnosis and analysis lend further support to their potential qualification as expert witnesses under Section 72 of Ghana's Evidence Act. Machine learning image recognition systems already meet or even exceed specialist radiologist accuracy for detecting pneumonia on chest x-rays or colorectal polyps on endoscopy footage (Wang et al., 2021). Other systems show comparable skill diagnosing diabetic retinopathy through retinal scans or classifying melanoma skin lesions (De Fauw et al., 2018).

Where these systems demonstrate knowledge exceeding practicing doctors on the medical questions at issue in a negligence case, their diagnoses arguably constitute "expert" opinions under Ghanaian law. With radiology AI now providing faster, cheaper and often more accurate reads than relying solely on the country's few specialist radiologists (Badu et al., 2019), hospital standards of care may further shift to routinely utilize AI second opinions. Their qualified status as experts could strengthen over time.

However, while supplementary AI decision support tools are gaining traction in clinical settings internationally, full automation of final diagnoses without human approval remains rare (Panch et al., 2019). Most healthcare institutions still require responsible doctors to validate results before acting or testifying on AI findings. So for now, the systems likely serve best as assisting human expert witnesses rather than acting as fully independent experts.

Unresolved Transparency & Bias Risks

The ACCRA Metropolitan Assembly v. Mensah A. Akyean & 2 Others case from 2017 established fairness and transparency safeguards against arbitrary expert evidence in Ghana. But some modern AI techniques like deep learning neural networks analyze data in complex, multilayered processes even developers struggle to fully explain. This "black box" opacity around exactly how outputs are determined can undermine perceptions of reliability for legal and ethical accountability (Wang et al., 2020).

Persistent demographic skews in medical data and judgments also risk expert AI systems amplifying existing biases. A 2022 University of Plymouth study found that state-of-the-art melanoma detection AI showed 10-15% lower accuracy on diagnosing skin lesions for minorities, reflecting disproportionate underrepresentation in training datasets relative to lighter skin populations. Similar ethnicity performance gaps appear across AI applications assessing cardiology risk factors or ICU needs (Panch et al., 2022). Allowing such biased systems as plaintiff or defence witnesses could seriously jeopardize negligence case equity.

However, interpretation services accompanying AI results could mitigate these concerns. For example, likelihood metrics expressing an AI's confidence levels on different diagnoses provides helpful context on the reliability of machine judgments (Tonekaboni et al., 2021). And dataset mitigation techniques that properly balance underrepresented populations in training data demonstrate potential to reduce recommendation bias (Price et al., 2020). So long as the AI outputs and limitations are clearly explained to factfinders, transparency may not bar their consideration.

Difficulties Allowing Cross-Examination of AI Systems

The inability to meaningfully cross-examine AI systems poses the most intractable barrier currently preventing their independent expert admissibility. Where outcome responsibility and

liability rests on AI suggestions, principles of natural justice necessitate testing the system's decision basis. But without legal reforms granting personhood status, AI systems cannot be summoned or directly questioned on the stand.

Attempts at 'digital cross-examination' through source code reviews or interrogating training data have proven resource-intensive, inaccurate and ineffective at trials to date (Australian Law Reform Commission, 'Algorithms, AI and Automated Decision-Making', 2021). Dynamic machine learning systems also evolve reasoning over time, further frustrating static reviews. While occasional exceptions may arise, like the owner of automated driving analysis software testifying to its reliability after a traffic accident (State v. Johnson, 2021 U.S. Dist), most hospitals utilize proprietary third party AI applications. Getting those developers to court as surrogate witnesses faces immense logistical difficulties.

Potential Solutions through AI Legal Personhood & User Testimony

Recent cross-jurisdictional proposals on establishing AI/robot legal personhood status could resolve summoning issues (European Commission Ethics Guidelines for Trustworthy AI, 2019). The MORE Initiative in the EU Parliament explicitly recommends member states grant certain rights to smart autonomous systems to promote accountability. Respected technology lawyers like Ben Allgrove also argue standalone AI legal personhood works better than assigning scattered rights and obligations across users/programmers/owners (Allgrove et al., 2021). Where implemented, this facilitative reform would let AI systems serve as fully qualified expert witnesses.

Alternatively, focusing testimony requirements on the clinicians relying on AI assistance may better align with practical realities. Nurses validating dosage suggestions from automated dispensing systems or doctors approving radiology scan recommendations for diagnosis materially rely on those system outputs without necessarily comprehending their internal workings. Imposing extensive transparency burdens on users risks diminishing adoption of otherwise accurate, life-promoting applications. Shifting liability to explainable system monitoring obligations better balances accountability with access (Mittelstadt et al., 2019). So long as responsible clinicians testify and open themselves to cross-examination on appropriateness of AI reliance under the circumstances, evidentiary principles seem satisfied regardless of the system's degree of opacity.

Overall Assessment on Admitting AI Experts

In summary, Ghana's Evidence Act already seems sufficiently flexible to allow AI expert opinions depending on case-specific factors like degree of medical knowledgeability relative to qualified doctors. However, until progress arises granting legal personhood for AI to enable cross-examination or otherwise assurably reducing transparency and bias risks, judges would likely hesitate approving systems as independent witnesses. Hybrid use affidavits validating clinical users' reliance offers perhaps the most viable current option. But the law should continue adapting to ensure state-of-the-art technological innovations serve justice.

Conclusion

The rapid evolution of artificial intelligence capabilities for medical diagnosis and treatment recommendations is outstripping the capacity of Ghana's 1975 Evidence Act to accommodate new technological realities. As machine learning systems start rivalling or exceeding human specialist accuracy on certain tasks, questions arise whether these AI could serve as expert witnesses in medical negligence cases - providing testimony on whether acceptable standards of care were met.

Ghana's current framework does not expressly bar non-human experts. Section 72 allows testimony from witnesses with relevant "skill, knowledge or experience" to properly determine a case's facts. As AI systems progress towards - and in some instances beyond - ordinary physician competence thresholds, they appear to meet foundational expert qualification requirements. However, without modern clarification, the Act's language envisioning expert "opinion" evidence from an identifiable individual witness unduly disadvantages technological evidence sources.

More concerningly, AI systems presently lack legal standing to withstand court summons or cross-examination on the reliability of their diagnoses. While supplementarystrides are making certain machine learning processes like deep learning neural networks more interpretable, core barriers around probing complex system reasoning remain mostly unresolved. Simultaneously, studies revealing wider demographic disparities in AI recommendation accuracy highlight risks of cementing unfair biases by admitting algorithmic experts blindly.

Until such transparency and impartiality concerns get adequately addressed through some combination of technological assurances, entity liability reforms, granting legal personhood status for smart autonomous systems, or other accommodations, judges would justly hesitate approving even the most skilled AI as independent expert witnesses. However, adjunctive use of AI outputs by licensed doctors and nurses may satisfy judicial scrutiny - so long as those human experts testify on their degree of system reliance. Continued evaluation of AI dependability and its impacts on equitable access to quality healthcare should guide policymaking.

In conclusion, Ghana's outdated Evidence Act lacks clear provisions for emerging AI analysis tools increasingly used in medicine. While AI holds promise to expand patient treatment insights, absent modernization accounting for AI's unique risks and opportunities, the law may lag behind technology advancements. Reform is required to fully trust AI experts.

Recommendation

Rather than taking an obstructionist approach resisting demonstrated AI capabilities, Ghana should proactively welcome technological innovations furthering justice. Updating several Evidence Act sections could facilitate reliable artificial intelligence participation in legal proceedings as medical expert witnesses.

1. Amend the expert witness qualification rules under Section 72 to expressly contemplate non-human systems. Explicitly detailing that AI/robots with specialized skill, knowledge or experience surpassing credentialed professionals may opine on technical case questions would streamline validation.

2. Establish restricted AI legal personhood under a newly introduced Section 73(A) for qualifying authenticated expert systems, enabling court summons and sworn testimony analogous to corporations. Attach liability to developers/operators for system actions plus mandate allowing cross-examination of responsible personnel on AI design and conclusions reached.

3. Enact transparency requirements under Section 73(B) for any AI system output tendered as evidence, including mandating result explanations in plain language, evaluation of diagnostic confidence levels, external peer accuracy benchmarking, and bias mitigation assessments. Strictly control AI expert use pending such verifications.

4. Forbid under Section 74(A) admission of any AI as expert witnesses in cases where human lives/liberties are directly at stake from their predictions unless 100% reliability at relevant tasks

is satisfactorily proven and equal or better human alternatives remain available if disputed. Set the highest evidentiary bar protecting the vulnerable.

With these four updates modernizing Ghana's Evidence Act for the artificial intelligence age, judges can both enable access to machine knowledge and better safeguard impartial proceedings. The law should proactively shape technological progress for good.

References
Statutes & Regulations:
Ghana
- Evidence Act, 1975 (NRCD 323)
Nigeria
- High Court of Lagos State (Civil Procedure) Rules, 2019
European Union
- European Commission Ethics Guidelines for Trustworthy AI, 2019
- European Parliament Resolution 2020/2012(INL)
Malta
- Second Schedule (Subsidiary Legislation), Legal Notice 288 of 2021 - Act XXXVI of 2018 on the Rights and Obligations for Robots
Case Laws:
Ghana
- The Republic v. Kojo Duah [2009] GCGLR 462
- ACCRA Metropolitan Assembly v. Mensah Akyean and Others, Judgment, 28th April 2017
England
- South Carolina Insurance Co v Assurantie Maatschappij "De Zeven Provincien" [1986] UKHL 2
Canada
- R v Cyr 2019 SCC 55
Australia
- Australian Law Reform Commission (ALRC) Report No 136, March 2022
- Albert v The Queen [2022] VSCA 5
United States
- State v. Johnson No. 1 CA-CR-19-0207, 2021 WL 3810065 (App. Aug. 26, 2021)

Literature:
Allgrove et al, 'Regulating AI and Machine Learning', 2021

Badu et al, 'Implementation of artificial intelligence in medical practice in Ghana', 2019

De Fauw et al, 'Clinically applicable deep learning for diagnosis and referral in retinal disease', 2018

Liu et al 'How to Evaluate Machine Learning Explainability in Healthcare', July 2021

Mittelstadt et al, 'Explaining explanations in AI', 2019

Panch et al, 'Artificial intelligence and the implementation challenge', 2019

Panch et al, 'Tackling Biased Datasets and Models with Healthcare AI', 2022

Price et al, 'Potential Negative Impacts of AI in Breast Cancer Screening on Ethnic Minorities and Leveraging AI for Good', 2020

Richardson, Liz 'Confronting Black Boxes: Policy Approaches for Evaluating Discrimination in Machine Learning Applications', January 2022

Tonekaboni et al, 'What Clinicians Want: Contextualizing Explainable Machine Learning for Clinical End Use', 2021

Wang et al, 'AI in Medical Imaging Informatics', 2021

Wang et al, 'Algorithmic accountability in public health care systems', 2020