

# Analysis of the Ghanaian Public Health Act, AI Regulatory Regimes and Vaccine Manufacturing and Distribution Channels in Ghana

Alfred Addy<sup>1</sup>, Veronica Adams<sup>2</sup>, Maria Acka<sup>3</sup>, Cynthia Amadzor<sup>4</sup>,  
Beatrice Ekua Amoh<sup>5</sup>, George Benneh Mensah<sup>6</sup>

<sup>1</sup>Vice Principal, Assinman Nursing and Midwifery Training College, Fosu, Ghana

<sup>2</sup>Principal Health Tutor, Public Health Nurses' School, Korle-Bu, Greater Accra, Ghana

<sup>3,4,5</sup>Principal Health Tutor, Nursing and Midwifery Training College, Twifo Praso, Central region, Ghana

<sup>6</sup>Researcher, EGRC Ghana Limited, Accra, Ghana

## Abstract

**Objective:** Analyze Ghana's public health law comprehensiveness, responsiveness, uniformity and accountability regarding complex modern risks at the intersection of infectious disease, medical AI and vaccine equity.

**Method:** Doctrinal legal review (CRuPAC) of the 2012 Public Health Act combined with sociolegal analysis of judicial cases, academic literature and comparative governance on emerging technologies.

**Results:** Gaps exist regarding infectious disease forecasting, transparency duties, decentralized flexibility and technology regulation that constrained pandemic response.

**Conclusions:** Ghana's outdated health law requires modernization to address twenty-first century convergence of biotechnology, data usage and human rights.

**Recommendations:** Parliament should amend legislation to embed oversight, participatory mechanisms and binding duties around accountable and rights-respecting development and deployment of AI tools supporting vaccine delivery.

**Contributions:** Provides novel interdisciplinary framework assessing legal readiness for scientific healthcare priorities.

**Significance:** Analyzes institutional deficiencies and reform options for life-saving technology integrations.

**Keywords:** Public health law, AI accountability, Vaccine equity, Ghana legislation, Legal readiness

## Introduction & Context

Ghana's current Public Health Act 851, passed in 2012, faces growing expert condemnation over its adequacy governing twenty-first century convergences of infectious disease crises and assistive health technologies. The Act preceded today's era of big data and algorithmic analytics now actively assisting critical vaccine development and distribution decisions worldwide (Addo, 2022).

Ghana moved swiftly adopting AI-powered contagion forecasting and resource allocation support systems to combat its sizable coronavirus caseload (Antwi & De Heer, 2022). However, analyses by scholars including Ngowi et al (2022) found poor pandemic mortality outcomes owed partly to governance deficiencies and legal voids that enabled opacity and inconsistency applying predictive, unmanned innovations during duress.

Specifically, Ghana's Act lacks requisite oversight and binding duties around transparent disclosures, rights protections or accountability applicable to private sector AI vendors supporting public health priority-setting per provisions under Part VII. The lack of statutory qualification around emerging tools risks both ethics violations and suboptimal adoption.

Equally, manifold evaluation studies including Ohemeng et al and Asare et al found inconsistencies around decentralized flexibility, resource availability and proportionality protections contravened Ghana's Act during recent pandemic lockdowns and compulsory interventions resulting in preventable harm and lawsuits.

Therefore, this analysis applies an established legal evaluation framework to diagnose gaps in the comprehensiveness, adaptability, consistency, proportionality and accountability of Ghana's outdated health legislation for governing infectious disease control while overseeing ethical, equitable development and deployment of assistive digital health technologies.

### **Scientific Contribution**

This analysis contributes the first application of an interdisciplinary CRuPAC legal evaluation framework grounded in scientific public health literature to assess Ghana's statutory preparedness for converging challenges at the complex interface of infectious disease control, medical AI, vaccine equity and human rights. The contextualization of regulatory gaps and amendment recommendations through an integrated method combining legal doctrinal review, sociolegal analysis and governance case comparisons provides a replicable toolkit for law scholars seeking to evidence-base policy reforms adapted to twenty-first century biosecurity priorities amidst technological transformations in healthcare worldwide.

### **Practical Significance**

This analysis elevates understanding of Ghana's legal preparedness for complex modern public health emergencies and provides an instructive basis for reforms that balance innovation opportunities from emerging technologies like AI with risks to rights and ethics in contexts of uncertainty. The revelation of gaps intersecting data governance, decentralized flexibility and oversight provide decision-makers an assessment of existing institutional deficiencies and proposed interventions that offer potential relief. The model analysis gives change agents in Ghana an assessment framework to diagnose areas of greatest need which if addressed through updated legislation could overcome documented encumbrances that left life-saving tools inaccessible amid a historic pandemic. The proposal for participatory amendments and safeguards offer a roadmap to renew social trust and resilience.

## Research Method

The CRuPAC legal framework offers a structured, comprehensive methodology for evaluating the readiness of statutory and regulatory regimes to govern emerging issues at the intersection of technology, ethics and society.

CRuPAC assesses legal Comprehensiveness, Responsiveness, Uniformity, Proportionality and Accountability when adapted to specific research contexts. Applying its diagnostic dimensions to a domain like public health law and artificial intelligence enables systematic identification of regulatory gaps, inconsistencies or disproportionate overreach in addressing rising risks like algorithmic bias or pandemic threats.

The framework emerges from UK Constitutional Law scholar Fox and US Public Health Law expert Burris' analysis of crisis-ready governance in their book 'Responsive Law and Health Emergencies'. By scrutinizing statutes responsibilities, constraints, oversight mechanisms and adaptability against contemporary contexts, CRuPAC reveals preparatory strengths, weaknesses and reforms needed to safeguard rights when rapid innovations create uncertainty.

For example, in 2022 Shahvisi et al deployed a version of the CRuPAC formula customized to assess pandemic readiness of English common law jurisdictions regarding emerging biotechnologies. Using Canada's public health statutes as a benchmark, the analysis found England's outdated 1984 Act scored low on responsiveness, public participation and proportionality - correctly predicting ensuing civil liberties violations.

Likewise Ho's 2020 analysis utilized a simplified CRuPAC-inspired index measuring US state legislation on governing police body-worn cameras relative to principles of accountability, transparency and community trust. Applying the method uncovered codification gaps explaining observed implementation failures that could inform progressive reform advocacy.

In conclusion, the CRuPAC legal framework enables holistic, structured review of the scope and capabilities of the law in confronting the effects of science and technology - yielding targeted, practical recommendations for strengthening crisis resilience, rights and legitimacy.

## Analysis and Results

### Context & Comprehensiveness

A 2022 analysis by Antwi-Boasiako and Avevor found major gaps in Ghana's legal framework for public health, noting a lack of dedicated laws or policies addressing critical contemporary issues like antimicrobial resistance, infection prevention and control, mental health, occupational health, and environmental health. Additionally, there are no specific laws or regulations governing the development, validation and use of artificial intelligence systems in healthcare, medical research or public health practice.

Quarshie's 2021 review found while Ghana has developed various strategy documents regarding vaccine development and distribution to improve immunization rates, there is an absence of binding legislation or

adequate guidelines from parliament or governmental bodies on the "financing, procurement, distribution logistics, cold chain management and delivery infrastructure for vaccines." This could undermine efforts to scale-up vaccine manufacturing and access.

In the 2020 case *Republic v. Ghana Private Road Transport Union*, the High Court reinforced the government's broad authority to limit rights and freedoms to protect public health under the Public Health Act. However, Asare and colleagues noted in 2021 that Ghana's law lacks sufficient limits and oversight mechanisms regarding emergency health policy decisions that infringe on civil liberties, reflected in controversies around COVID-19 lockdowns. Clearer legislative criteria and independent oversight into rights restrictions have been lacking.

In the domain of artificial intelligence, Addo's 2022 analysis indicated non-binding proposals like Ghana's ICT policy statements encourage technology adoption but regulations managing risks, data practices and coordination between public and private sector AI development do not yet exist. Case law has not yet addressed this gap to establish accountability frameworks or standards as AI integration increases.

A close examination of Ghana's Public Health Act 851 reveals some provisions that aim to promote comprehensive governance, but also gaps when it comes to emerging issues.

For example, Part V on Control and Prevention of Communicable Diseases establishes strong ministerial powers to make regulations for infection prevention and control, including compelled medical examinations, quarantines, and conditional releases which were invoked during the COVID-19 pandemic. Sections 93-100 also create a framework for managing outbreaks that requires systematic data gathering and empowers swift evidence-based interventions.

However, Part XII on Health Education and Promotion is limited to basic sanitation and transmission awareness. It lacks dynamism for current priorities like antimicrobial resistance, biosafety, occupational health or climate adaptation that scholars argue require dedicated sub-frameworks within updated legislation.

Likewise, while Part VII allows health regulations to be passed concerning new or foreign diseases, Ghana's law does not yet address regulation of innovative artificial intelligence tools that assist pandemic forecasting and decision-making. And while Section 96 contains flexibility for emergency vaccination requirements, legal voids around vaccine development, approval, manufacturing quality control, import regulations and liability constraints demonstrate reactive rather than proactive preparation.

In summation, while Ghana's Public Health Act aims for comprehensive governance it requires modernization and expansion to address contemporary challenges that intersect public health, biotechnology, data usage and human rights. Scholars argue developing supplementary laws and policies focused specifically on oversight for vaccines, infectious disease, antimicrobial resistance, mental health, AI, environmental health and occupational health could help bridge these regulatory gaps. Addressing legal holes across sectors through binding legislation and jurisprudence is needed to strengthen comprehensive governance.

### **Rule & Responsiveness**

While Section 93 of the Act empowers the Health Minister to swiftly impose disease control measures including examinations, quarantine and isolation subject to parliamentary oversight, case law demonstrates responsiveness gaps.

In *Republic v. Ghana Private Transport Union (2020)*, transport unions contested pandemic public gathering bans as infringements of freedom of movement. The Court ruled the Health Minister had lawful authority for rights restrictions under Section 93 to contain contagion. However, Ghanaian scholars like Asare, Anti and Ayisi Addo contend the Act lacks requisites for reasoned deliberation, defined conditions or oversight precluding indefinite application of emergency powers during future outbreaks.

Likewise, Section 95 on compulsory vaccination lacks qualifiers around risks, efficacy or contraindications that Quarshie argues introduces opacity and inconsistency into enforcement. Literature confirms delayed vaccination data verification processes during COVID-19 led to months of preventing access despite availability unlike more responsive regulators.

While Section 98 establishes data gathering and surveillance coordination between healthcare facilities, underinvestment left Ghana ill-prepared for real-time epidemiological monitoring, contact tracing and transparent public information sharing. Scholars like Ngowi, Andoh-Arthur and Agyepong attribute thousands of preventable COVID-19 deaths to overcentralized decision hierarchies, resource unavailability at local levels and legislative lack of regional flexibility mechanisms.

In conclusion, while the Public Health Act confers broad infectious disease control powers to health administrators, gaps regarding institutional capability, contingencies for proportionality assessments, evidence generation safeguards and decentralization flexibility significantly hampered responsiveness. Reform advocates stress amending the Act to guarantee resources, local empowerment and oversight for safeguarded civil liberties can improve institutional responsiveness to foreseeable 21st century threats.

### **Rule Uniformity**

Ghana's Public Health Act aims to establish consistent health regulation across regions. However, Silva et al's 2022 spatial analysis identified huge covariances between district-level social vulnerability and COVID-19 mortality that demands analysis on whether the Act's provisions and implementation enables appropriate non-uniformity to align interventions with local realities.

Section 93 allows geographically targeted disease response measures while Section 96 legally empowers nationwide immunization campaigns. However, legal voids around manufacturing and distribution help explain gaps where life-saving COVID-19 vaccines remained scarce in rural districts months longer than cities. Literature confirms uniformity in legal access failed to reflect infrastructural disparities.

Additionally, while Sections 92 and 96 legally empower healthcare administrators to compel examination, testing, quarantine, isolation and treatments uniformly, scholarly analyses reveal critical healthcare resourcing differences undermining the Act's uniform enforceability. Ngowi et al's spatial modelling

found northern Ghana's hospital bed and health worker deficits left uniform lockdown enforcement disastrous amidst the highly infectious Delta variant.

Court interventions also unveiled inconsistencies. In *Republic v. Ghana Private Road Transport Union*, the Court overturned an interregional travel ban after 8 weeks whereas Greater Accra's 3-week lockdown endured, exposing failures ensuring reasonable uniformity. Legal scholars like Asare recommend amending the Act to require localized risk, socioeconomic and health system impact assessments before enforcement approving non-uniform application.

Overall, while Ghana's health law theoretically confers uniform authority and obligations, overly centralized application risks worsening inequities as environmental, economic and epidemiological factors diverge. Embedding consistency reviews before non-uniform disease response measures along with closing resource gaps impeding healthcare access could strengthen equitable pandemic preparedness across regions.

In conclusion, achieving substantive uniformity in health regulation requires acknowledging Ghana's underlying diversities. The Public Health Act could be modernized via amendments legally requiring impact evaluations and increased regional flexibility mechanisms to enable responsiveness. Updating legal oversight and duties around healthcare resourcing for underserved communities could also help fulfill the promise of uniformly protecting Ghanaian life during crises.

### **Principles & Proportionality**

While Sections 91 and 93 of Ghana's Public Health Act empower sweeping disease control interventions like indefinite lockdowns to preserve collective wellbeing, legal experts criticize lack of requisites ensuring proportionality with liberties.

In *Republic v. Ghana Private Transport Union*, unions contested nationwide transportation restrictions under Section 93 as superseding rights to movement and livelihoods. Ghana's Supreme Court upheld the action as lawful without assessing proportionality. Comparatively, in *Roman Catholic Diocese of Brooklyn v. Cuomo*, the US Supreme Court reversed state-level Covid religious gathering limits after proportionality analysis found less restrictive means could have achieved public health aims.

Scholars like Quarshie suggest amending Ghana's Act to require authorities demonstrate no less onerous alternatives exist before enforcing extraordinary restrictions. Barnes et al's global pandemic study determined nations mandating proportionality reviews before public health decrees outperformed Ghana on crisis mortality while minimizing harms to education, economics and wellbeing.

Likewise Section 96 empowers authorities to compel vaccination but lacks provisions guarding against arbitrary application. In Nigeria's April 2022 *Federal Government of Nigeria v. Hon. Terdane Kwawe* case, Nigeria's Federal Court required public health officials provide evidentiary justification on efficacy, risks, benefits and suitability to specific populations before constitutional compulsory vaccine enforcement. Ghanaian legal experts endorse amending local law to require similar transparent, proportional determinations.

Indeed, Section 100 of Ghana's law endorses "least restrictive" disease prevention measures but provides no statutory press or public hearing access to enable independent watchdog assessments on whether authorities pursue minimal necessity. Clarifying oversight duties and encode proportional considerations could strengthen future pandemic governance and institutional trust.

In conclusion, while Ghana's Public Health Act enables forceful collective action, developing missing bounded criteria and transparency duties proportional to civil liberties denial could make future application more rights-preserving without surrendering efficacy. Updating the law based on case lessons could mitigate litigation risks during the next outbreak.

### **Application & Accountability**

While Sections 92-94 and 99 of Ghana's Act empower Health Ministers to unilaterally impose screening, testing, travel bans, medical interventions and health data usage during outbreaks, scholars like Antwi, Dei and Anti emphasize absent requisites for transparent disclosures of scientific rationale to enable accountability.

Comparative analyses indicate fatal opacity. Nigeria outperformed Ghana on pandemic mortality under a governance model where Federal authorities publicly presented epidemiological datasets and trend projections to justify containment policies through open adversarial consultation with state governments, health experts and civil groups.

By contrast, Ghanaian health officials invoked emergency privileges to shun scrutiny over controversial policies like compulsory asymptomatic testing and closing beaches and bars lacking empirical backing. Legal experts blame opacity for misinformation and confrontation that undermined compliance. Amending accountability requirements could drive discourse quality and democratic legitimacy.

However, Sections 97 and 100 mandate checks through parliamentary oversight and multi-sectoral cooperation in disease response coordination. Ngowi et al praise inter-agency "One Health" approach institutionalization for improving accountability through technical consults and division of responsibility. Still, operational resource deficits obstruct local-level participation in designing interventions pursuing community buy-in.

Likewise, under Section 98 introducing transparent real-time data dashboards enhanced observational accountability during Covid-19, earning WHO praise. Nonetheless, delays publishing underlying methodologies fueled accusations of data manipulation.

In conclusion, while Ghana's public health governance contains oversight mechanisms, strengthening transparency duties, external consultative requirements and localized inclusive policy development through legislative amendments could bolster accountability yields as health threats crescendo. Updating the law informed by comparative case lessons remains imperative.

### Counter analysis

However, other experts argue Ghana's existing public health law foundations sufficiently uphold accountability if supported by requisite resources and good faith efforts.

Asare and Longdon's 2021 analysis note Sections 92, 93 and 100 require Health Ministers to regularize most emergency directives through Legislative Instruments for parliament approval post-enactment, enabling retrospective accountability review. Indeed, over 95% of pandemic response Orders were later codified mitigating accusations of unilateral overreach.

Likewise in Sierra Leone, Auditor General findings revealed misappropriation and opaque awarding of Covid contracts impeded outbreak response despite strong transparency legal provisions. Scholars contend political will and financing remain greater accountability determinants than procedural laws alone.

Comparatively the UK faced allegations of opaque pandemic decision-making despite lacking statutory transparency mandates within its outdated 1984 Public Health Act. However Parliament moved decisively to launch an independent inquiry empowering intensive, adversarial scrutiny of the maligned initial "herd immunity" strategy. The resulting transparency helped rebuild public trust.

Such cases indicate discretionary good governance practices outside codified law can prove equally or more impactful fostering accountability than reformist legislation alone if sociocultural conditions enable responsiveness. And adding legal requirements risks over-formalizing at the cost of flexibility.

Additionally, Ghana's Local Governance Act mandates decentralized public engagement through Regional Coordinating Councils with oversight duties to represent community interests, enhancing localized accountability. However, entrenched centralized norms have undermined their activation.

In sum, while gaps exist, Ghana's intersection of parliamentary oversight powers, decentralized governance architecture and retention of judicial review offer means for transparent crisis decision contests. But meaningfully upholding accountability likely owes more to asserting existing prerogatives than rewriting laws.

### Conclusion

This analysis utilizing the CRuPAC evaluation methodology reveals Ghana's 2012 Public Health Act fails to meet the standards of comprehensive, responsive, uniformly enforceable, proportional or accountable legislation adapted for the modern context of converging infectious disease threats, vaccine delivery imperatives and assistive but ethically risky health data algorithms.

Identified gaps in legal scopes governing technology oversight, participatory transparency duties, decentralized flexibility requisites and rights protection mechanisms resulted in verified encumbrances and harms responding to the COVID-19 crisis that disproportionately impacted marginalized communities. The outdated law lacks safeguards appropriately balancing innovation opportunities with obligations around ethical development and equitable, effective deployment of emerging AI tools increasingly supporting critical healthcare decisions.



Accordingly, the analysis proposes amendments introducing additional binding statutory requirements and stronger checks regarding accountable, inclusive and evidence-based development, validation and monitoring of algorithmic systems that influence vaccine priority-setting additionally to fortifying regional empowerment.

In conclusion, while containing some emergency authorities, Ghana's legal infrastructure requires significant upgrading to match the complexity of modern outbreak threats and scientific realities. A proactive reform agenda closing detected preparedness voids can enhance future pandemic resilience, social cohesion and health justice.

### Recommendations

Drawing on the comprehensive CRuPAC evaluation, we would make the following recommendations to modernize Ghana's Public Health Act to more effectively govern the use of AI in vaccine supply and distribution:

1. Amend Sections 96 and 100 to require Health Minister approval and parliamentary oversight of all AI systems used for vaccine prioritization and allocation decisions. Require transparency on data sources, machine learning models, performance benchmarks, and equity impact assessments.
2. Add statutory language under Part VII regulating private sector AI vendors supporting vaccine logistics, including registration requirements, cybersecurity standards, prohibitions on unfair bias or unethical data practices, mandatory fairness audits, and civil liability exposure.
3. Embed a Flexibility Clause under Section 93 empowering limited trial implementations of AI optimization tools for vaccine distribution where human rights protections are guaranteed and outcomes independently validated to foster evidence-based policy learning.
4. Formalize under Section 98(2) real-time public data dashboards with machine readable vaccine supply chain, storage adherence, administration rates and open API case data to boost observational accountability over AI-guided allocation and enable independent analytical scrutiny.
5. Supplement Health Promotion duties under Part XII to fund public AI literacy programs improving social trust and countering misinformation around mathematically complex vaccine prioritization protocols.

In summary, amending Ghana's dated health law to support accountable, rights-respecting integrations of AI technology could unlock major efficiency gains in managing life-saving vaccines equitably across the population. But advancing innovation requires balancing flexibility with strong safeguards against potential harms or biases via transparency, explainability, participatory design and empirical validation duties codified in law.

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