POSITION PAPER

Web3 and AI for Public Good: Transforming Global Health Systems

Introduction

Global health systems today face complex challenges – from inequitable access and fragmented data to resource shortages and transparency issues. **Emerging technologies like Web3 and artificial intelligence (AI) offer a transformative opportunity to strengthen health systems as global public goods**. Web3, the decentralized web built on blockchain technology, promises new models of trust, data ownership, and collaboration. AI, on the other hand, brings powerful capabilities in data analysis, prediction, and decision support.

This position paper outlines a high-level vision for how Web3 and AI can jointly advance public good in health, with a focus on strengthening health systems. Aimed at policymakers, international agencies, technologists, and non-profits, the discussion remains conceptual and forward-looking – setting the stage for real-world applications to follow. We explore the potential benefits in areas like patient care, public health surveillance, supply chains, and health financing, while emphasizing principles of equity, ethics, and global collaboration.

The future of healthcare is digital and decentralized; harnessing these innovations responsibly could help achieve universal health coverage and healthier societies for all.

Web3 for Health: Decentralizing Trust and Empowerment

Web3 refers to a new era of the internet characterized by decentralization, blockchain technologies, and user sovereignty. In health, Web3 offers **patient-centric and transparent solutions** that can address longstanding systemic gaps:

- **Secure Health Records & Data Sovereignty:** Blockchain's distributed ledger can enable secure sharing of medical records across providers, with patients retaining control over access to their data. In a decentralized health information system, individuals could grant caregivers permission to view their history on a need-to-know basis, leading to faster diagnoses, fewer medical errors, and improved outcomes. For example, the University Health Network in Canada launched a platform that *"leverages blockchain not simply to secure and consolidate patient data across the network, but also to obtain and record patient consent before any information is shared"*, logging every access on a tamper-proof ledger. This **ensures privacy, consent, and trust** in health data exchange.
- **Interoperability and Efficiency:** Many healthcare systems suffer from siloed databases and a *"patchwork of portals, forms, and electronic systems lacking interconnectedness"*. Blockchain-based health information exchanges and smart contracts can improve

interoperability by storing data on a common decentralized ledger accessible to authorized parties. Automated smart contracts can also streamline processes like insurance claims, referrals, or prescription management by executing transactions once predefined conditions are met. By eliminating middlemen and paperwork, these **Web3 solutions reduce administrative burdens**, potentially alleviating clinician burnout linked to bureaucracy.

- **Transparency in Health Financing and Aid:** Public health programs and aid initiatives demand accountability. Blockchain's transparent ledgers allow every transaction - from donor funding to health service delivery - to be recorded and auditable by relevant stakeholders. This visibility helps ensure that resources reach their intended recipients. In humanitarian health contexts, such transparency has cut waste significantly; for instance, *Oxfam's blockchain-based voucher program in Vanuatu reduced aid delivery time by 96% and costs by 75%* while **making every voucher traceable, reducing fraud and boosting community trust**. The World Food Programme's **Building Blocks** blockchain platform has delivered over $325 million in food assistance to more than one million refugees with full traceability, cutting transaction costs by millions and removing the need for third-party banks. These examples illustrate how Web3 can make health financing faster, more transparent, and more inclusive – critical for public trust in health interventions.

- **Supply Chain Integrity for Medicines:** Ensuring the availability of quality medicines and supplies is a core health system function. Web3 technologies can strengthen supply chains by tracking pharmaceuticals and vaccines from manufacturer to patient on an immutable ledger. This *"tamper-proof logbook"* approach means that each handoff or storage condition can be verified. In practice, blockchain-based supply chain tracking has been used to monitor food quality (as in WFP's farm-to-market projects) and can be similarly applied to medications – helping flag counterfeit drugs, forecast shortages, and ensure deliveries reach clinics even in crises. In Ukraine's conflict, over 65 aid organizations used a shared blockchain system to coordinate shipments of medical and food supplies, **avoiding duplication and saving an estimated $67 million in 2024 alone**. By **enhancing coordination and accountability**, Web3 can build more resilient health supply chains.

- **Decentralized Governance and Community Engagement:** Web3's ethos of decentralization can extend to health governance. Blockchain supports Decentralized Autonomous Organizations (DAOs) – member-run groups with transparent rules encoded in smart contracts. In health, one could envision global or local health DAOs where stakeholders (from patients and providers to donors) collectively vote on funding priorities

or interventions. This model can **shift power from central authorities to communities**, promoting equity and trust in decision-making. While experimental, such approaches could fund public goods like vaccine research or rural clinic programs through community-governed crypto pools, aligning resources with local needs.

- **Incentivizing Healthy Behavior:** Web3 also enables creative incentive models through tokenization. Health programs can issue digital tokens as rewards for positive behaviors – for example, patients who adhere to medications or engage in exercise could earn tokens redeemable for health services or discounts. This concept, often called "move-to-earn" or "health-to-earn," is already piloted by startups. One platform, STEPN, rewards users with crypto tokens for activities like walking or jogging, and collectively its users have burned billions of calories while earning rewards. Another initiative, JennyCo, plans to reward individuals for contributing health data to research, giving people tangible benefits for participating in medical studies. Such **token economies could boost public health efforts** (e.g. incentivizing preventive care) by aligning individual behavior change with broader societal gain.

In summary, **Web3 holds promise to empower patients, streamline operations, and bolster trust in health systems**. By *"bringing greater security, transparency, and access to healthcare around the world"*, blockchain-powered solutions can help **eliminate inefficiencies and decentralize control** in service of the public good. These technologies are not a magic bullet – challenges like scaling, user literacy, and governance remain (discussed later) – but early successes indicate Web3 can be a foundational tool for healthier, more equitable communities.

AI for Health: Intelligent Systems for Public Good

Artificial intelligence is already reshaping healthcare, offering powerful tools to analyze data, support clinicians, and reach underserved populations. As the **WHO Director-General** notes, *"AI is already playing a role in diagnosis and clinical care, drug development, disease surveillance, outbreak response, and health systems management… The future of healthcare is digital, and we must…prevent [AI] from becoming another driver for inequity."*. To realize AI's potential as a global public good, it must be applied in ways that enhance efficiency and equity in health systems:

- **Clinical Decision Support and Diagnosis:** AI algorithms can rapidly analyze medical images (X-rays, MRIs), lab results, and patient symptoms to assist in diagnosing diseases. This augments clinicians' abilities – for example, AI tools have achieved expert-level detection of conditions like diabetic retinopathy and are being used for early cancer screening. **Early disease detection and personalized treatment plans are among AI's most critical contributions**, especially as health systems face rising burdens of chronic illnesses. By catching diseases in nascent stages, AI enables proactive interventions that improve long-

term outcomes while reducing costs of late-stage care. In resource-poor settings, these tools can compensate for shortages of specialists. For instance, in Kenya, an AI-powered platform for remote cardiac screening allows patients in villages to get analyzed for heart conditions by AI, with only the high-risk cases referred to cardiologists – **ensuring timely care regardless of location** and optimizing use of scarce expert resources.

- **Public Health Surveillance and Epidemic Response:** AI can sift through vast datasets (including epidemiological reports, social media trends, and climate data) to identify patterns that humans might miss. This capability supports early warning systems for disease outbreaks or health risks. Machine learning models have been used to predict dengue fever surges, track COVID-19 spread, and even link climate change indicators to health outcomes. By detecting anomalies and predicting hotspots, **AI empowers health authorities to respond faster to outbreaks** – deploying resources or public health messages in time to curb spread. Indeed, leveraging AI for *"disease surveillance and outbreak response"*has become a global priority[who.int](). When combined with decentralized data inputs (for example, community-level reports shared via blockchain), AI could provide a more trusted and inclusive epidemic intelligence network.

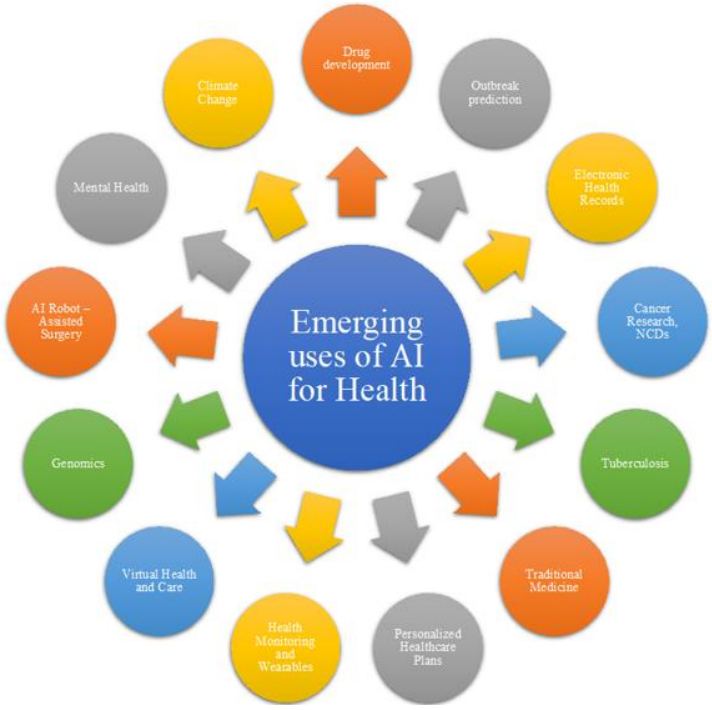
- **Health Systems Management and Resource Allocation:** Beyond direct patient care, AI can greatly enhance the management of health services. Intelligent algorithms can analyze hospital operations to predict patient influx, optimize staff scheduling, or manage supply inventories. This is especially valuable in **low- and middle-income countries (LMICs)** where resources are scarce – AI offers *"scalable and affordable solutions"* to make the most of what's available. For example, AI might forecast which clinics will run low on certain vaccines and trigger re-stocking, or identify inefficiencies in referral processes. The Africa Centres for Disease Control has recognized these benefits, investing in digital technologies (like connecting all health facilities and strengthening surveillance) to build more **resilient health systems** across the continent. By analyzing facility data, AI can help leaders allocate budgets or interventions to where they'll have the greatest impact. In short, AI-fueled analytics turn data into actionable insights for stronger health system performance.

- **Expanding Access through Virtual Care:** In many parts of the world, qualified health workers are in short supply, and rural or marginalized communities struggle to access care. AI can extend the reach of healthcare via telemedicine and digital health apps. **AI-driven chatbots and decision-support apps** on mobile phones can triage symptoms, provide health education, and remind patients to take medications. These tools operate 24/7, overcoming geographical and staffing barriers. Telemedicine platforms enhanced with AI allow a single doctor to remotely serve many more patients – the AI can assist by

translating languages, summarizing patient histories, or flagging urgent cases. As noted in a World Economic Forum analysis, *"AI transcends geographical boundaries and extends quality healthcare services to underserved populations, ensuring equitable access… regardless of location or socio-economic status."*. This democratization of expertise helps fulfill the principle that healthcare is a fundamental human right. For example, an AI-powered diagnostic app in a remote village can ensure a sick child's symptoms are evaluated against millions of cases, providing guidance to the local nurse or alerting a doctor in the city if needed. Such **digital health assistants** empower communities to get care and advice locally, rather than being left behind.

- **Medical Research and Drug Development:** AI is accelerating the discovery of new treatments by analyzing huge volumes of scientific data. Machine learning models can screen chemical libraries to identify promising drug candidates or predict how existing medicines might be repurposed. In genomics and precision medicine, AI algorithms find patterns in genetic data that can lead to targeted therapies. This has public good implications: faster and cheaper R&D could yield new cures for diseases that predominantly affect low-income populations (which are often neglected by traditional pharma R&D). AI can also help **bridge knowledge gaps** by digesting global research literature and guiding scientists to insights, effectively acting as a force-multiplier for human expertise. During the COVID-19 pandemic, for example, AI systems were employed to scan thousands of research papers for relevant findings, and to model potential molecules to inhibit the virus. The continued use of AI in drug development and health research promises to bring innovations to market sooner, benefiting patients worldwide.

AI's transformative potential is especially amplified in emerging markets, where it can leapfrog traditional infrastructure limitations. By automating tasks and providing decision support, AI helps alleviate the strain on overburdened health facilities and workforce, fostering more sustainable health outcomesweforum.org. Importantly, AI can empower local providers by equipping them with tools and real-time information – a frontline nurse with an AI app can deliver higher quality care, confident that recommendations are informed by vast medical knowledgeweforum.org. Harnessing AI for global health thus means not only improving efficiency, but also **upskilling and supporting health workers, and engaging patients in their own care**.



Emerging uses of AI for health span a wide range – from helping predict outbreaks and accelerating drug development to supporting clinical decisions in areas like cancer, tuberculosis, and mental health. AI-driven tools, including virtual health assistants and wearable health monitors, can enhance prevention and personalized care, illustrating the breadth of AI's role in future health systems.

Synergies of Web3 and AI: A Convergence for Good

While Web3 and AI each offer significant benefits on their own, **their convergence can unlock new capabilities and address each other's limitations**. By combining decentralized trust frameworks with intelligent analytics, we can create health solutions that are both *smart* and *secure*. Key synergies include:

- **Trusted Data Sharing for AI:** AI systems are hungry for data, but health data is sensitive and siloed. Web3 can provide the infrastructure for secure, consented data sharing across institutions and borders. By using blockchain to manage data access and identity, healthcare organizations can collaborate on larger, more diverse datasets without compromising privacy. For instance, hospitals in different countries could contribute anonymized patient data to a common blockchain-based pool that an AI model trains on – the blockchain would log who contributed what and ensure only authorized AI algorithms access the data. This *"securely share patient and outcome data"* approach means AI can learn from global health experiences (improving accuracy and reducing bias) while patients' personal information remains protected. The result is **better-trained AI**

models yielding greater insights and more equitable outcomes, since underrepresented populations' data can be included through a trustable system.

- **Data Integrity and Auditability:** The "black box" nature of many AI models can erode trust – it's often unclear how an algorithm arrived at a recommendation. By leveraging blockchain's immutable ledgers, we can make AI decision-making processes more transparent and auditable. Each step of an AI model's data handling, from initial input through processing and output, can be recorded on a blockchain audit trail. If an AI flags an abnormal lab result or suggests a treatment, the underlying data and model version used could be documented on-chain. This enables regulators or hospital auditors to later review *what data the AI saw and verify it wasn't tampered with*, adding a layer of accountability to AI-driven care. In essence, **blockchain can wrap AI in a "glass box"**, increasing explainability and trust in high-stakes settings like healthcare.

- **Security and Privacy by Design:** Combining blockchain with AI creates a stronger foundation for data security. Blockchain's cryptographic protections and decentralized storage safeguard data against unauthorized changes or single-point breaches. AI models then operate on this secured data, reducing risks of data poisoning or leaks. For example, patient identifiers and records can be stored as encrypted blockchain entries that only an AI with the right key (and patient permission) can read. This integration ensures **end-to-end data integrity** – from data collection and validation (guaranteeing data authenticity via blockchain) to model training and prediction. A 2023 analysis suggested that *blockchain's greatest healthcare use case may be bringing trust and verification to AI*, ensuring privacy and integrity for the data AI consumes. Thus, Web3 can function as **AI's security backbone**, tackling concerns around sensitive health information and model reliability.

- **Decentralized AI and Collaboration:** The Web3 paradigm also opens the door for decentralized AI networks. Instead of AI development being dominated by a few big tech companies, blockchain-based platforms could allow researchers and developers worldwide to collaborate and share AI models as "public goods." For instance, a decentralized network might host open-source AI algorithms for disease diagnosis that anyone (from a rural clinic to a city hospital) can access or even improve, with changes tracked on-chain. This would distribute AI expertise globally and allow local innovation. We are already seeing early efforts: from federated learning initiatives that use blockchain to coordinate AI training across multiple hospitals without centralizing data, to token-based communities that crowdfund the creation of AI models for neglected diseases. Such **community-driven AI**, underpinned by Web3 incentives and governance, could ensure that AI tools align with public needs rather than solely commercial interests. By

pooling investments and expertise (a model advocated by the WHO's AI strategy), stakeholders can collectively build AI solutions that are accessible as digital public goods.

- **Enhancing Accountability and Fairness:** AI algorithms can inadvertently perpetuate biases or make mistakes. Web3 can help address this by **crowdsourcing oversight**. Smart contracts could automatically monitor AI outputs for predefined red flags (e.g. an unusual spike in adverse events predicted by an AI) and then trigger alerts or audits. Moreover, individuals could have greater agency in an AI-driven system: for example, patients might hold a tokenized stake in an AI health service DAO, giving them a voice in how the AI should be used or when it needs review. This kind of **decentralized governance for AI** ensures that the deployment of AI in health stays aligned with ethical norms and community values. Blockchain's transparency also means any discriminatory patterns in AI decisions could be spotted by the community by examining the ledger of AI outcomes (while preserving privacy). In short, Web3 can embed **inclusive governance and fairness checks** around AI, making the overall system more accountable to the public it serves.

Together, these synergies point to a future where **AI and Web3 function as complementary pillars of digital health**. AI provides the intelligence – the ability to learn from data and assist with complex decisions – while Web3 provides the infrastructure of trust, security, and collective governance. *"The union of AI and blockchain creates a fuller and more trustworthy system"*, one that can **address critical challenges and truly transform healthcare delivery for the better**. By designing solutions that incorporate both, we maximize the strengths of each technology and mitigate their individual risks. This convergence, if guided well, could yield globally accessible AI-driven health services that are as open, transparent, and reliable as public utilities – a new kind of digital public good for health.

Conclusion and Way Forward

Web3 and AI represent complementary frontiers in the journey to strengthen global health systems. This high-level exploration shows that, **if harnessed responsibly, these technologies could help transform health care delivery and public health into more inclusive, efficient, and equitable endeavors**. From a patient owning her health data on a secure blockchain, to an AI-driven early warning preventing the next pandemic, the possibilities are truly inspiring. Importantly, these advances align with global goals: improving transparency, empowering individuals, and accelerating progress toward targets like the Sustainable Development Goals (SDG 3 on health and well-being).

Realizing this vision will require leadership and cooperation across sectors. **Policymakers** should craft visionary yet practical digital health strategies – integrating Web3 and AI into national health plans, funding innovation hubs, and updating regulations to support new models of care. **International agencies and donors** have a role in convening stakeholders and ensuring that solutions are shared as global public goods, especially benefiting low-income settings. Initiatives like the WHO's global AI for health efforts and the Digital Public Goods Alliance can provide guidance, resources, and platforms for collaboration. **Technologists and developers** should continue to innovate open-source, interoperable tools – for example, creating blockchain frameworks tailored for health data, or AI models that are explainable and trained on diverse populations. Partnering with healthcare experts and communities will ensure these tools solve real-world problems and are user-friendly.

Crucially, **ethics and equity must remain at the center**. We should adopt a mantra of *"progress with purpose"*: any deployment of Web3 or AI in health should be evaluated by how well it enhances human well-being and fairness. Ongoing monitoring, evaluation, and knowledge sharing will help course-correct as needed, since this is a learning process for all. Capacity-building – training health workers to use AI tools, educating administrators about blockchain – will determine success on the ground. We must also invest in the "analog" complements to digital innovation: community health programs, strengthening primary care, and engaging citizens in health decisions. Technology amplifies what we put into the system; if we embed the right values and support structures, it can amplify the good.

In conclusion, **Web3 and AI offer a hopeful vision for the future of global health** – one where a secure, decentralized web underpins cross-border cooperation, and intelligent systems help caregivers save lives and improve quality of care. Imagine rural clinics with instant access to world-class diagnostic AI, backed by globally pooled data via blockchain. Imagine health budgets and donor funds tracked in real-time, reaching the clinics and patients who need them most. Imagine health research where anyone can contribute and benefit, with discoveries accelerated by AI and shared on open networks. This is the kind of paradigm shift within reach. By taking bold yet thoughtful steps today, the international community can ensure that these cutting-edge tools become **engines of public good**. The path forward should be one of *collective innovation*: technologists, health workers, policymakers, and communities co-creating solutions that make health systems more transparent, resilient, and people-centered than ever before. With leadership, investment, and collaboration, Web3 and AI can indeed help **pave the way to a healthier world for all** – a world in which digital innovation and human well-being advance hand in hand.