

Trust in Science in Public Health

Transforming Public Health
through Transparent AI and
Science-Based Policy



**The African
Academy of Sciences**



**UNIVERSITEIT VAN PRETORIA
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Foundation: Science as a Public Good

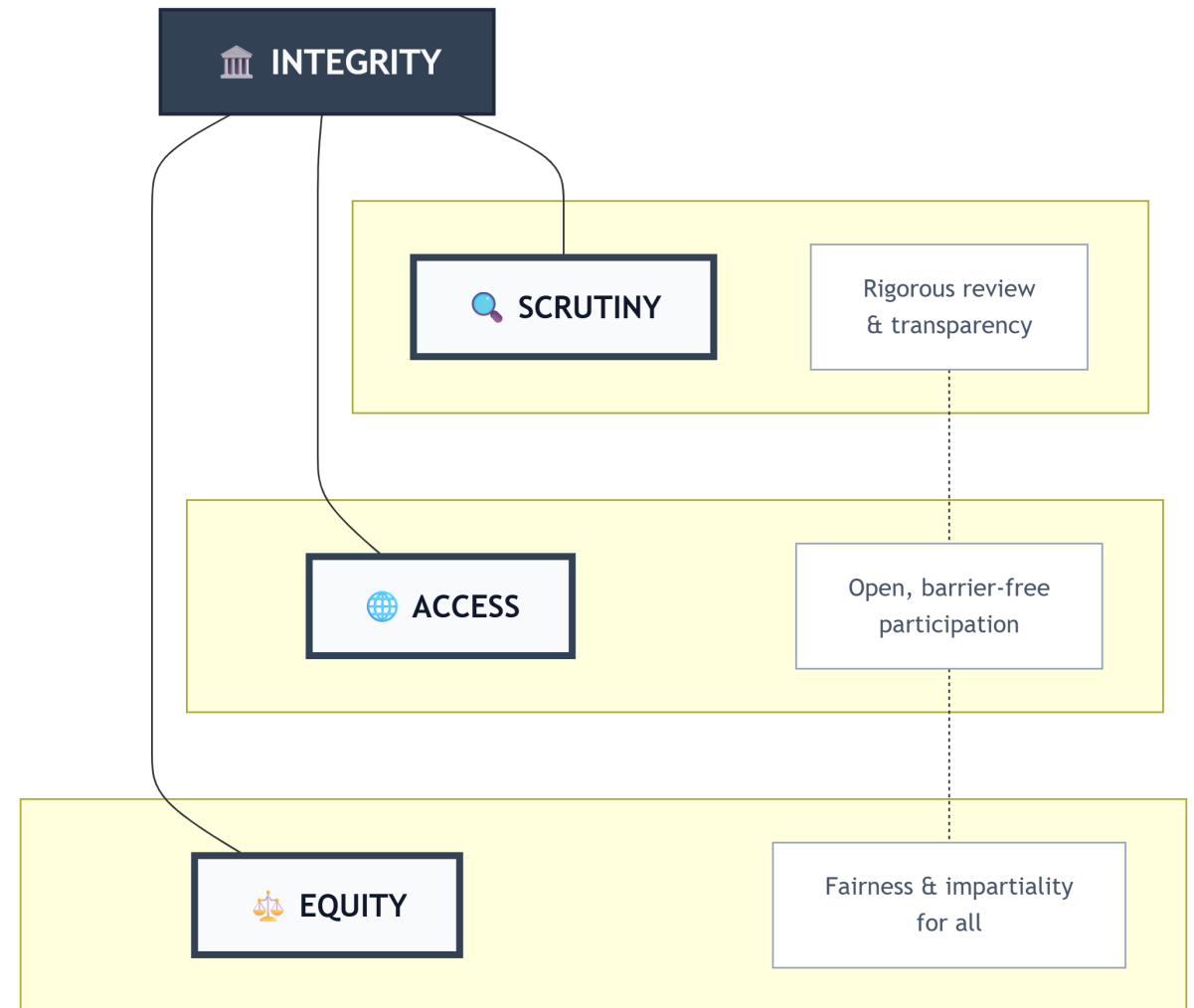
Outline

- ❖ Trust as the "social glue" of sustainability.
- ❖ Public health is the primary theater where scientific trust is won or lost.
- ❖ Moving from the ethics of AI to the mechanics of policymaking.



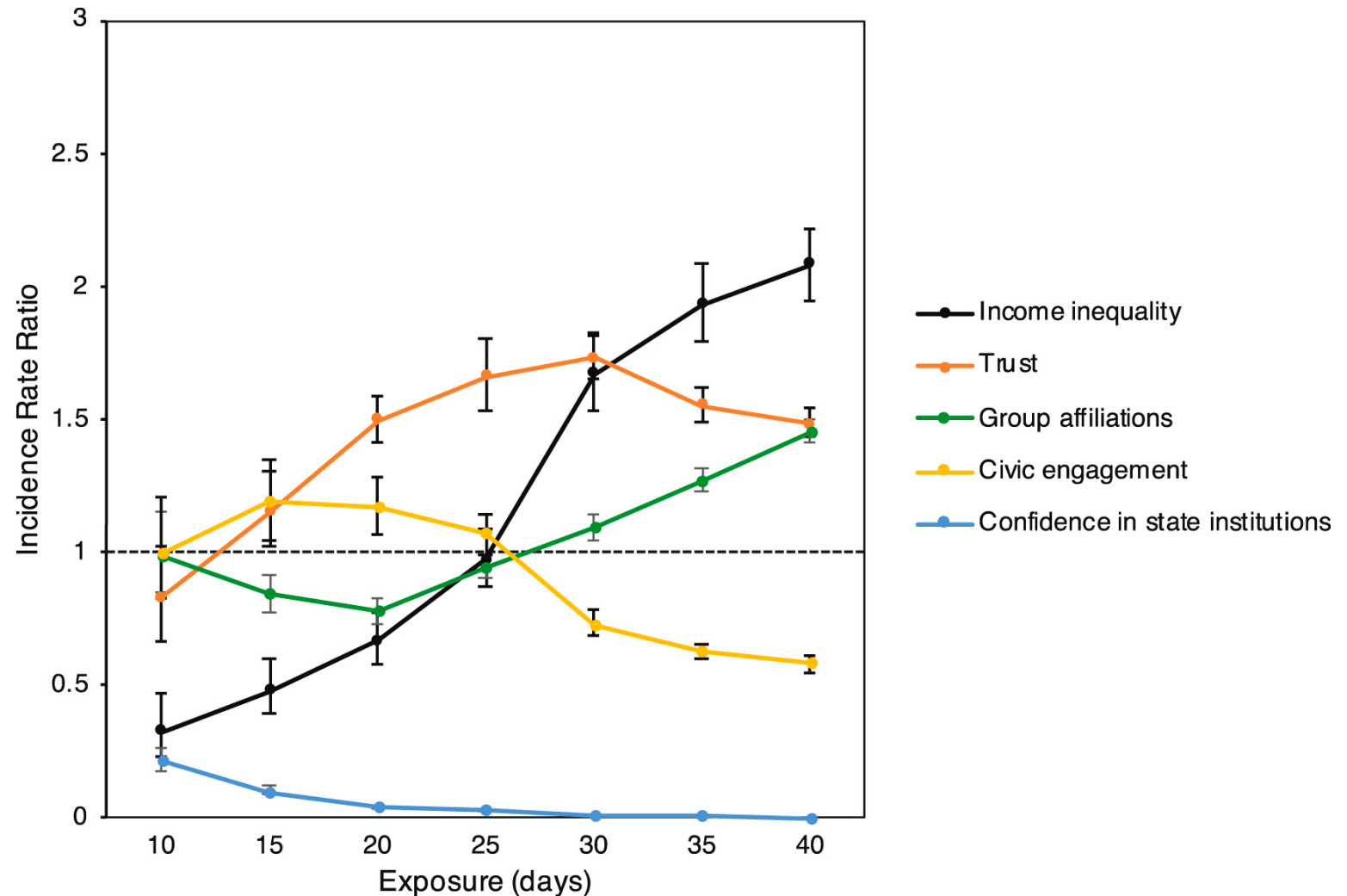
The Three Pillars of Science as a Public Good

- **Open Scrutiny:** Why public health data must be subject to external, independent validation.
- **Prompt Communication:** The ethical obligation to share health breakthroughs without paywall barriers.
- **Non-Excludability:** Ensuring that health science benefits the "global south" and marginalized communities.



Why Public Health? The Stakes of Trust

- **Behavioral Dependency:** Unlike other sciences, public health requires mass societal compliance to function.
- **The Individual vs. The Collective:** Balancing personal liberty with scientific mandates (e.g., herd immunity).
- **Direct Impact:** The immediate, life-and-death consequences of scientific "failures" or miscommunication.

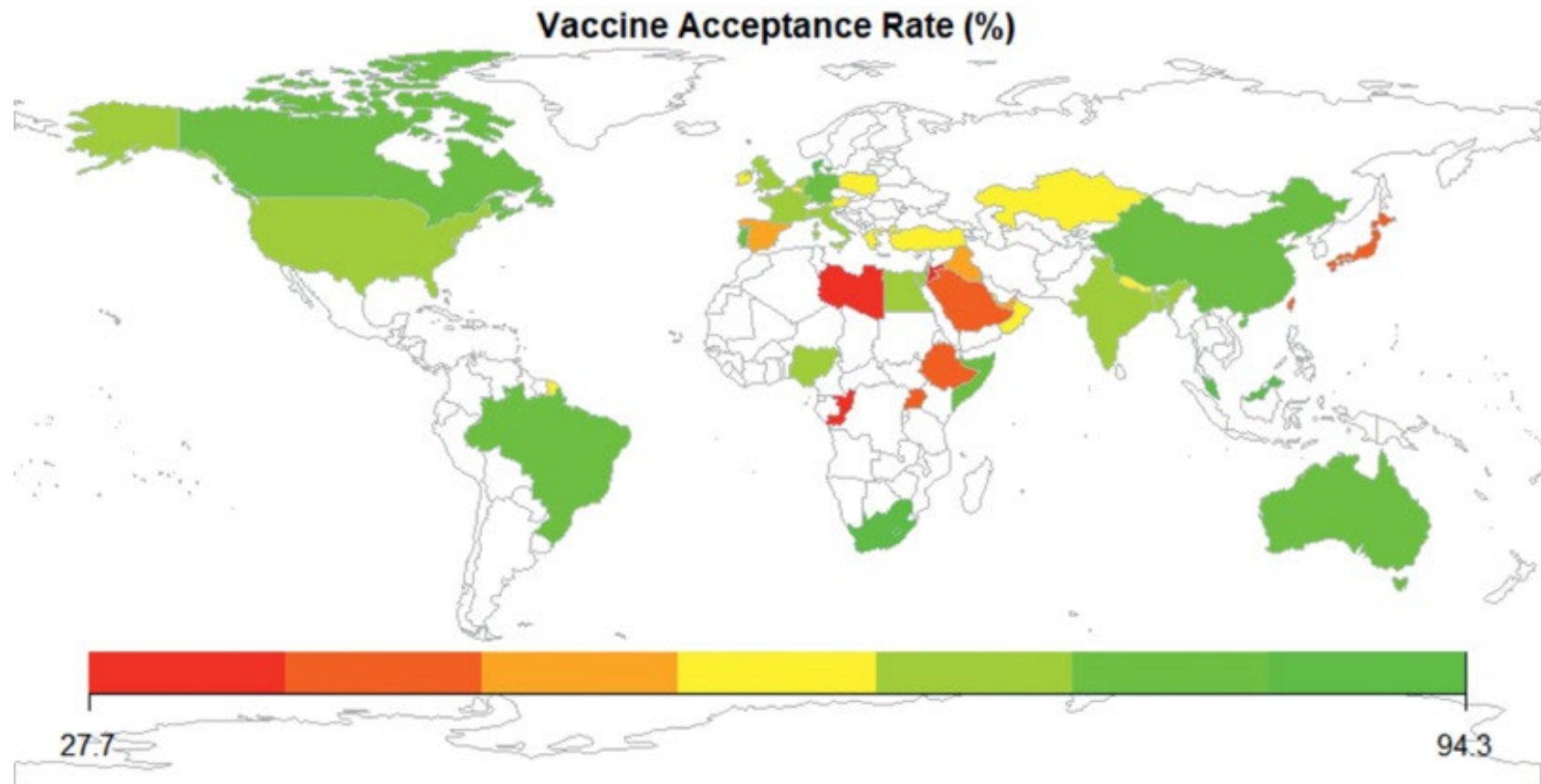


The trouble with trust: Time-series analysis of social capital, income inequality, and COVID-19 deaths in 84 countries

Elgar et al., 2020. <https://doi.org/10.1016/j.socscimed.2020.113365>

The Crisis of Confidence

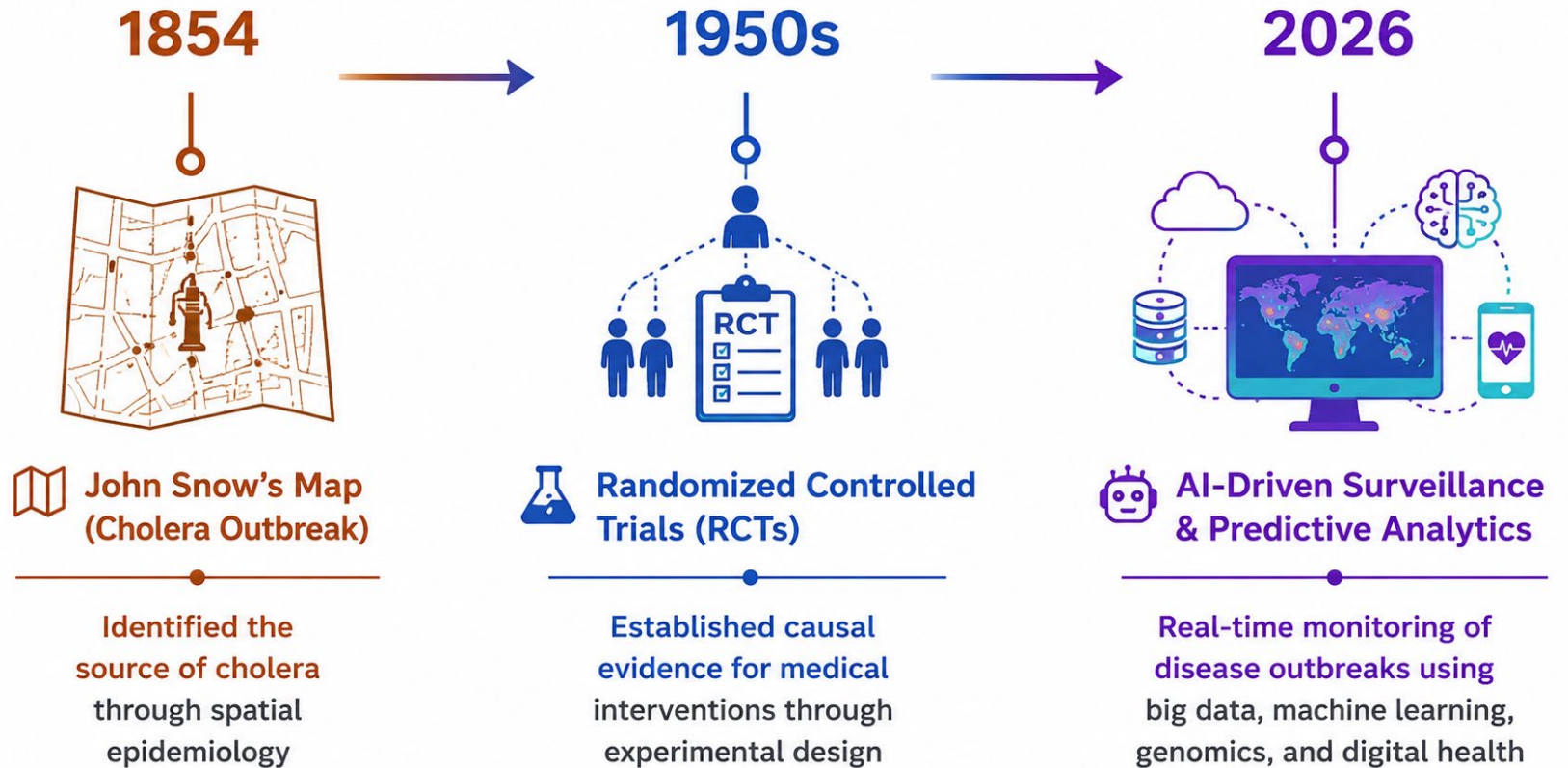
- **The "Infodemic":** How the sheer volume of health information creates a "trust vacuum" for misinformation.
- **Institutional Skepticism:** Addressing the rise of populism and the "death of expertise."
- **Historical Precedents:** How past ethical breaches (e.g., Tuskegee) still haunt modern health science trust.



A map reflecting vaccine acceptance rates worldwide Cascini et al., 2021
<https://doi.org/10.1016/j.eclinm.2021.101113>

Introduction to Issue 2: The AI Inflection Point

- **The Definition Shift:** Moving from "Evidence-Based" to "Algorithm-Informed" public health.
- **The Innovation Trap:** The pressure to deploy AI tools before ethical frameworks are established.
- **The SCJ Mandate:** Why Issue 2 (Transparent Science) is the specific solution to AI skepticism.



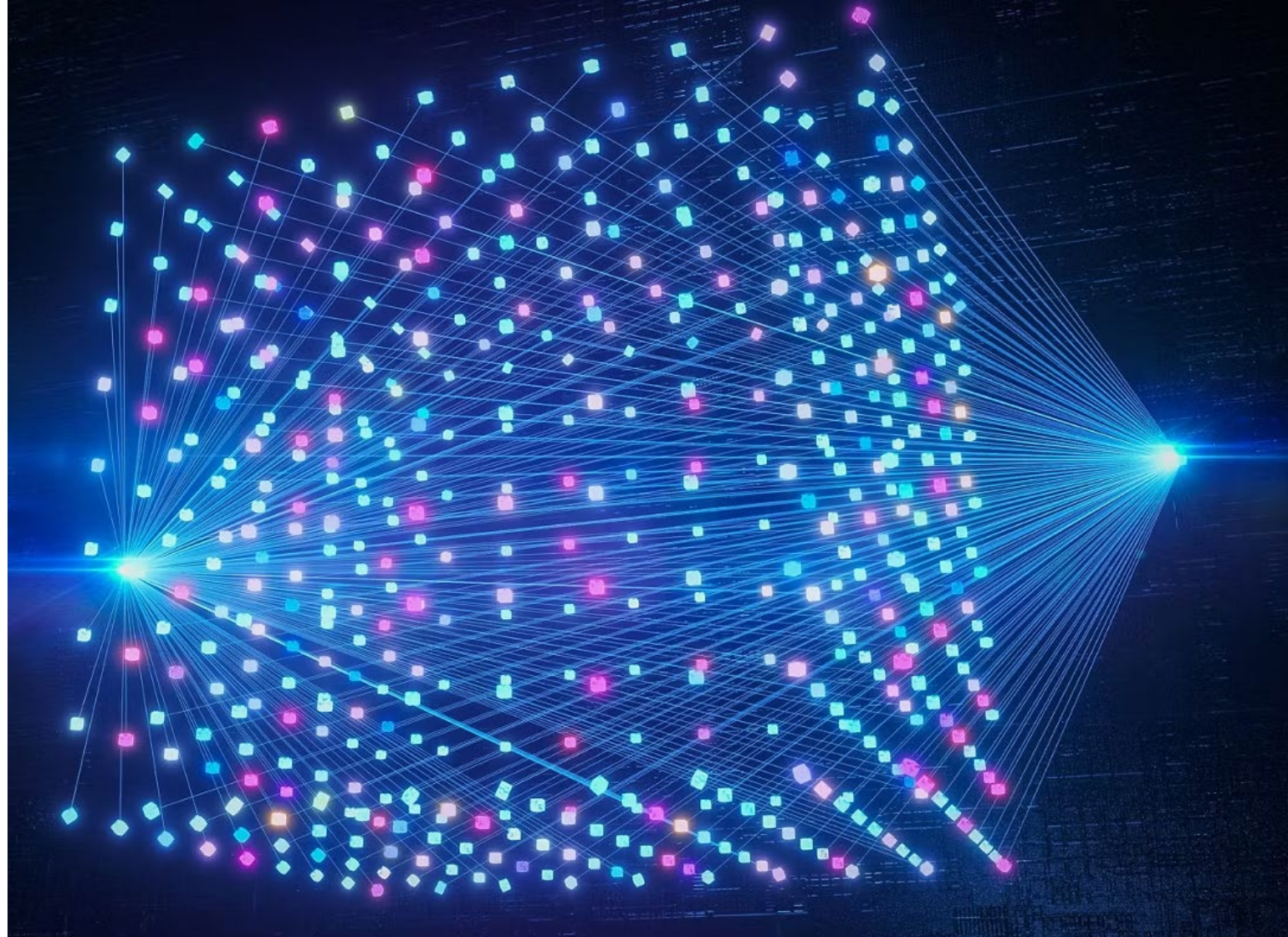
AI Applications in Public Health Today

- ❖ **Predictive Modeling:**
Forecasting outbreaks with machine learning before they reach the clinical stage.
- ❖ **Precision Public Health:**
Using AI to tailor health interventions to specific zip codes or genetic profiles.
- ❖ **Automated Diagnostics:**
AI-driven triage in resource-poor settings to alleviate doctor shortages.

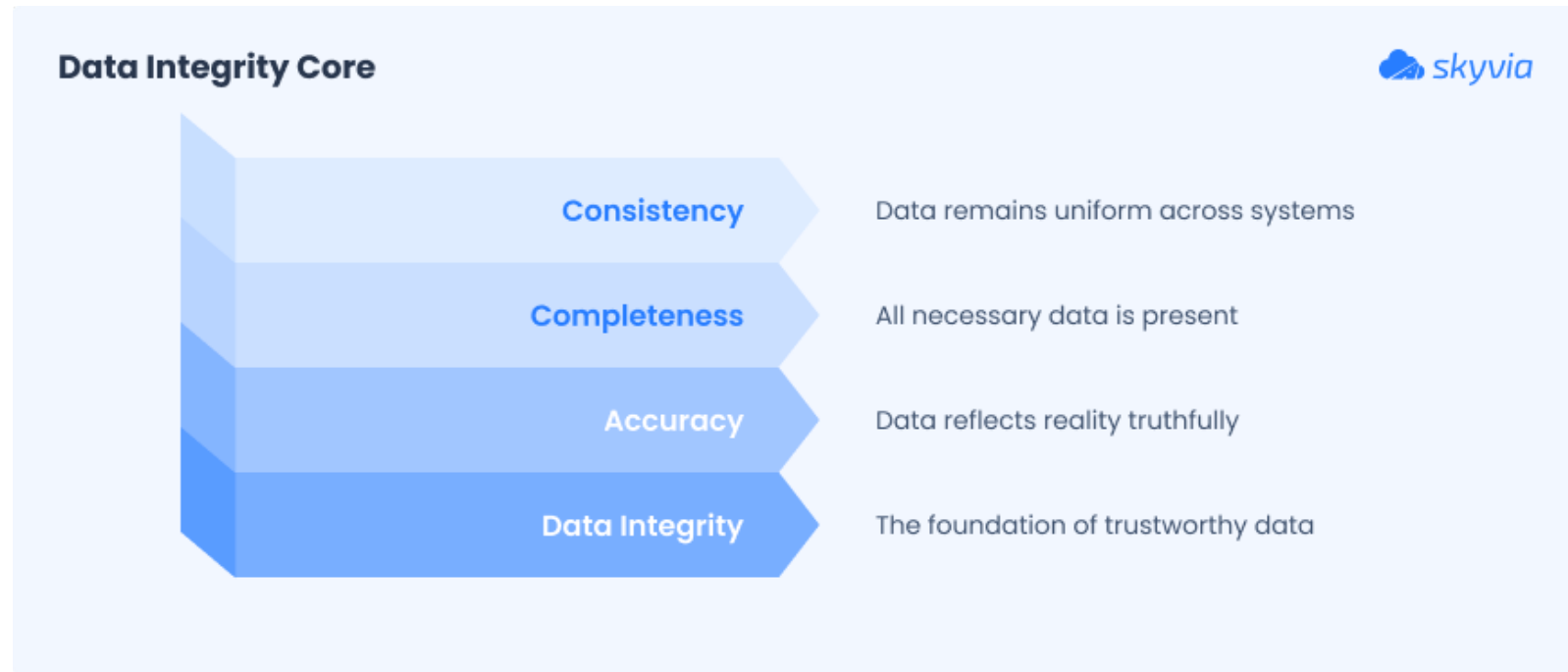


The “Black Box” Challenge

- **The Logic Gap:** If a scientist cannot explain *how* an AI reached a diagnosis, how can a patient trust it?
- **Proprietary Barriers:** The tension between “Science as a Public Good” and “AI as a Corporate Secret.”
- **The Validation Crisis:** How to peer-review deep learning models that evolve in real-time.



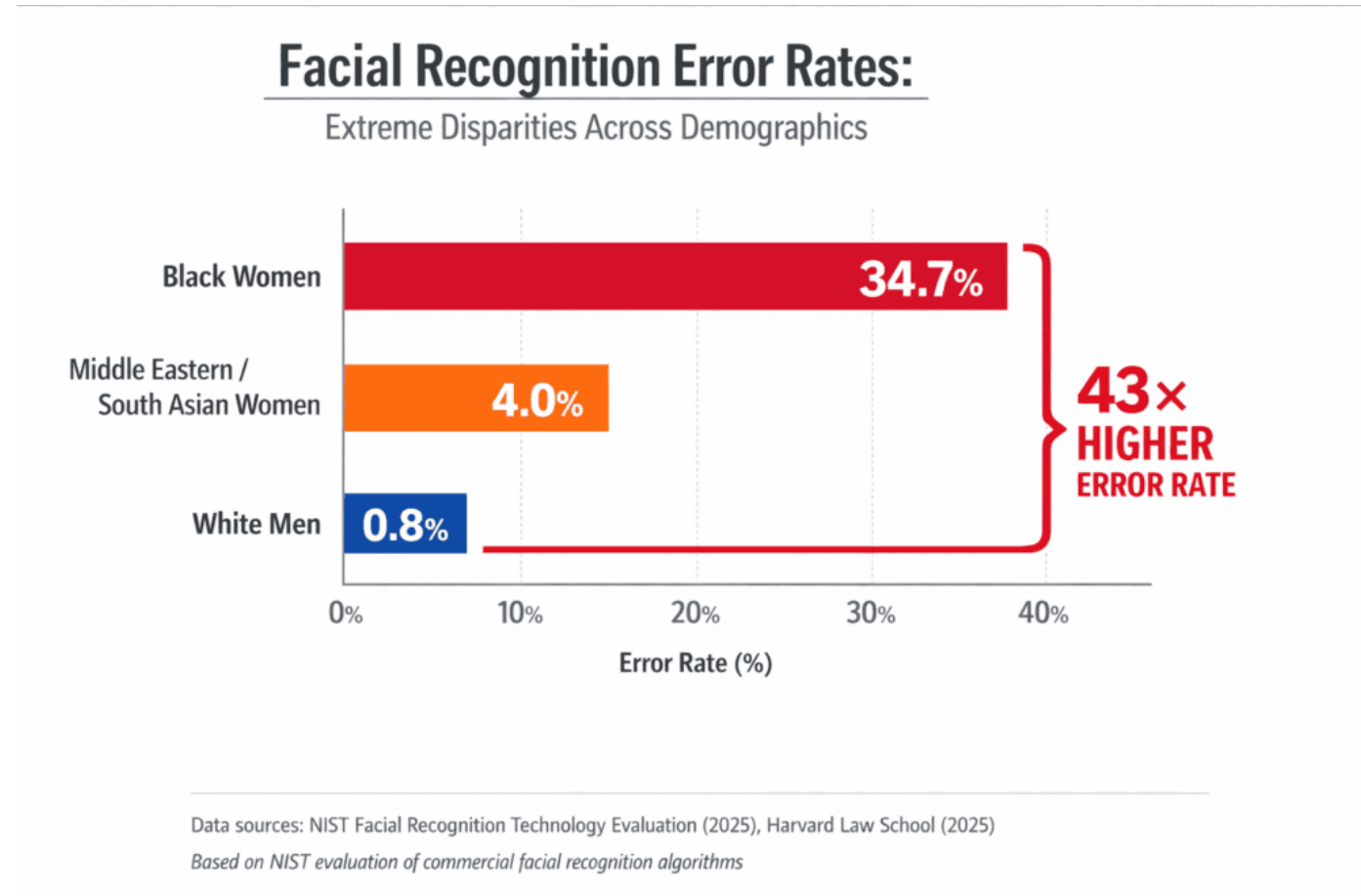
Research Integrity in AI-Driven Health



- **Autonomous Integrity:** The SCJ call for scientists to police their own algorithmic "cleanliness."
- **Data Provenance:** Ensuring the "input" data is not corrupted by socio-economic biases.
- **Replicability:** The difficulty of replicating AI findings when datasets are dynamic or restricted.

Bias and Equity in Health Algorithms

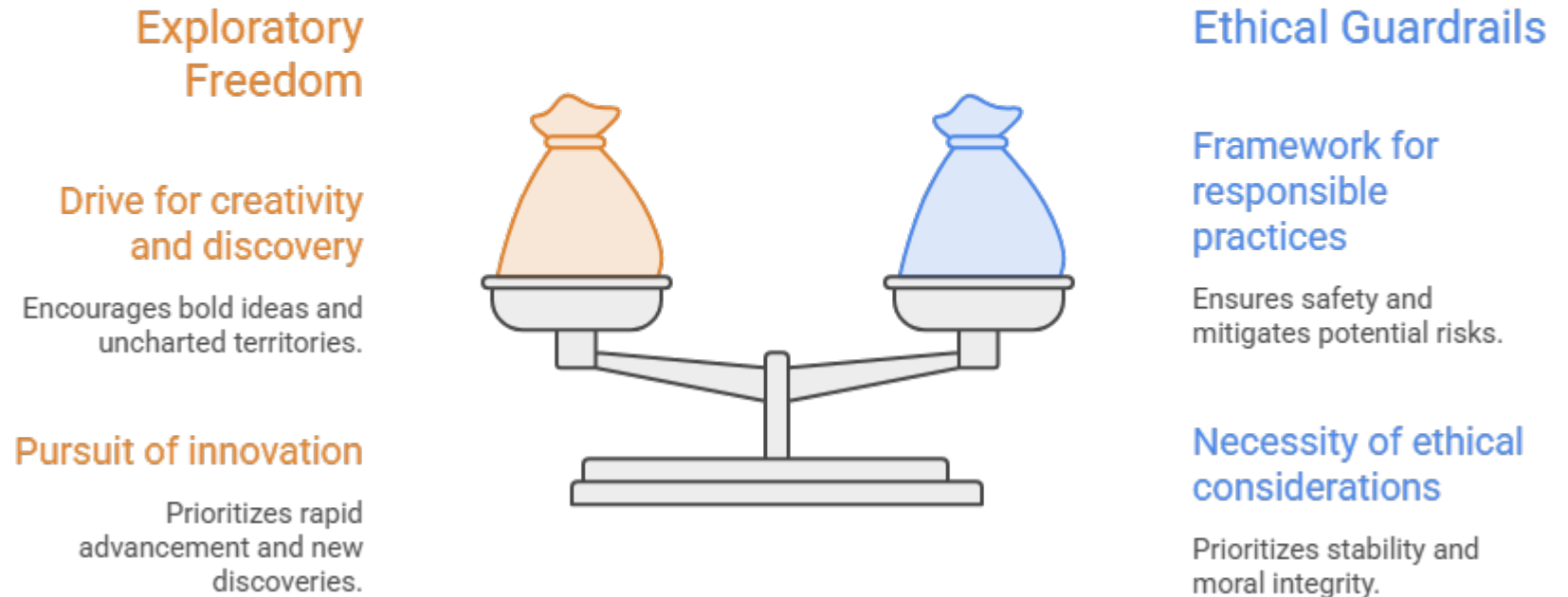
- **Algorithmic Racism:** How training AI on biased historical data perpetuates health disparities.
- **Gender Bias:** Addressing the "male-as-default" data gap in medical AI training.
- **The Digital Divide:** Ensuring AI doesn't only optimize health for those with the best wearable tech.



Academic Freedom vs. Social Responsibility

- **The Freedom to Innovate:**
Why researchers need the liberty to experiment with Generative AI in health.
- **The Responsibility to Protect:** The SCJ concept of “autonomy with accountability.”
- **Dual-Use Concerns:**
Preventing AI health tools from being repurposed for bio-surveillance or control.

Balancing Innovation and Responsibility



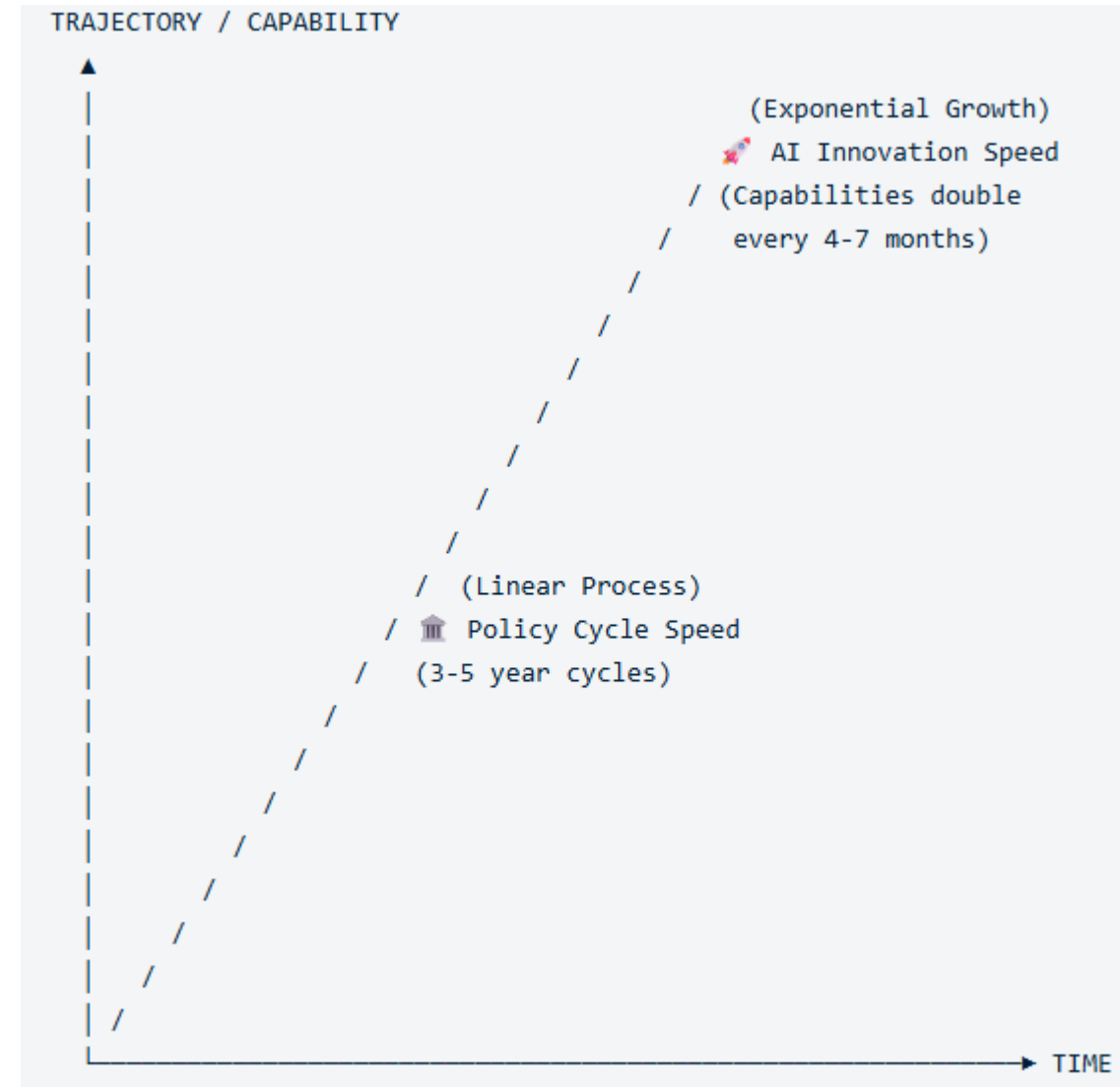
The Shift from “Expertise” to “Participation”

- **Citizen Science:** Engaging the public in data collection to build "buy-in" for AI findings.
- **Demystifying the Tech:** Creating "AI Literacy" programs for community health leaders.
- **Open Source AI:** Advocating for public health algorithms to be open-source to maximize trust.



Transition: The Need for New Governance

- **Regulatory Lag:** Why a 5-year policy cycle cannot keep up with a 6-month AI development cycle.
- **The Legitimacy Gap:** How “top-down” mandates fail in the digital age.
- **The Path Forward:** Introducing the concept of “Agile Governance” from the SCJ paper.



Governance & Transparency Models



Defining “Agile and Multi-Stakeholder Governance”

- **Beyond the State:** Including tech giants, NGOs, and civil society in the decision-making loop.
- **Iterative Policy:** Creating "Living Documents" for AI governance that update as the tech changes.
- **Soft Law vs. Hard Law:** Using ethical guidelines to bridge the gap before formal laws are passed.



Proactive vs. Reactive Governance

- **Anticipatory Ethics:** Discussing risks *before* the AI is deployed in clinics.
- **Stress Testing:** Running "Red Team" exercises on health algorithms to find potential failures.
- **The Precautionary Principle:** Knowing when to pause AI deployment in high-stakes public health.

Institutionalizing Dialogue

- **Issue 1 Linkage:** Creating “Public Deliberation Forums” specifically for health tech.
- **Transparency as a Practice:** Moving from “hiding mistakes” to “radical transparency” in health data.
- **Trust Through Vulnerability:** Admitting the limitations of scientific models to the public.

International Coordination (Issue 2 Focus)

- **Standardizing AI Ethics:** Why we need a "WHO for AI Governance" in health.
- **Global Data Sovereignty:** Ensuring developing nations aren't just "data mines" for Western AI.
- **Cross-Border Trust:** Building mechanisms so a diagnosis in Japan is trusted in Brazil.

Safeguarding Independence & Autonomy

- **The Funding Conflict:**
Ensuring health AI isn't skewed by corporate “funder influence.”
- **Political Interference:**
Shielding health scientists from “policy-driven evidence making.”
- **The “Sound Linkage”:**
Establishing a buffer between raw science and political convenience.



AI as a Tool for Public Understanding

- **Generative AI for Clarity:** Using LLMs to translate 50-page reports into 1-minute summaries.
- **Visualizing the Invisible:** Using AI to create simulations of disease spread that people can interact with.
- **Closing the Gap:** Turning AI from a "threat" into a "bridge" between the expert and the layperson.

The Future of the Public Good



The “Sound Linkage” (Issue 3)

- **Science-Policy-Society:** The three-way dialogue required for sustainable health.
- **Evidence vs. Values:** Acknowledging that science provides the *facts*, but society provides the *values*.
- **Legitimacy:** Why AI-driven policy is only legitimate if the public "sees" themselves in the data.

Sustainability & Health 2030

- **SDG 3:** How Trust in Science is the "Hidden SDG" that makes the others possible.
- **Environmental Health:** Using AI to link climate change data to public health outcomes.
- **Long-termism:** Building trust that lasts beyond the current election or pandemic cycle.

3 GOOD HEALTH AND WELL-BEING





Call to Action for Scientists

- **Be a "Science Communicator":** It is no longer enough to just publish; you must engage.
- **Advocate for Governance:** Don't leave the rules to the lawyers; scientists must lead Issue 2.
- **The Ethical Oath:** Proposing an "Oath for Health Data Scientists."

Conclusion: The Trust Dividend

- **The Summary:** Trust is the result of Transparency, Integrity, and Engagement.
- **The Future:** Public health as the ultimate model for all science-based policymaking.
- **Final Vision:** A world where "Science as a Public Good" is a lived reality, not just a conference theme.

#Thank you

Contact & Connect



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