Diversify your team/ideas at the earliest stages

Consider the impact of your technology for all humans

Expand your market and your impact

Bias in medical devices may have led to avoidable UK Covid deaths, says Javid

Health secretary announces review to examine why people of colour and women have worse health outcomes

Interpretation bias

◎ American Heart Association's guidelines to determine chance of death due to heart failure use factors such as age, heart rate and systolic blood pressure to calculate a risk score, which helps to determine treatment.

◎ For reasons the AHA does not explain, **the algorithm automatically adds three points to non-Black patients' scores, making it seem as if Black people are at lower risk of dying from heart problems simply by virtue of their race.** This is not true.

◎ This idea persists despite ample evidence that race—a social construct—is not a reliable proxy for genetics: Every racial group contains a lot of diversity in its genes.

Vyas et al. *NEJM,* 2020

Glomerular filtration rate (eGFR)

◎ Glomerular filtration rate (eGFR), which is calculated by measuring creatinine, a protein associated with muscle breakdown that is normally cleared by the kidneys.

◎ Black patients' scores are automatically adjusted because of a now discredited theory that greater muscle mass "inherent" to Black people produces higher levels of the protein.

◎ This practice inflates the overall eGFR value, potentially disguising real kidney problems.

Vyas et al. *NEJM,* 2020

COMMENTARY

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The new GFR equations: How will eliminating the race coefficient affect Black patients?

CLEVELAND CLINIC JOURNAL OF MEDICINE

Computational bias
(includes artificial intelligence)

◎ On whom are you training the algorithm?

◎ Diversity in gender, ethnicity, body types, age, pregnancy

◎ Stopping computational bias means making a much greater effort to recruit people from different populations to participate in the design and testing of medical devices.

"When you have a history of distrust [of medical experiments], plus you don't see anyone who looks like you that's actually doing the work, it's one more signal that it's not for you," she says.

"Instruments of Bias" in *Scientific American* 324, 6, 25 (June 2021)

The aim of MIDRC is to foster machine learning innovation through data sharing for rapid and flexible collection, analysis, and dissemination of imaging and associated clinical data by providing researchers with unparalleled resources.

https://www.midrc.org/

>150,000 imaging studies collected
> 105,000 imaging studies released to public
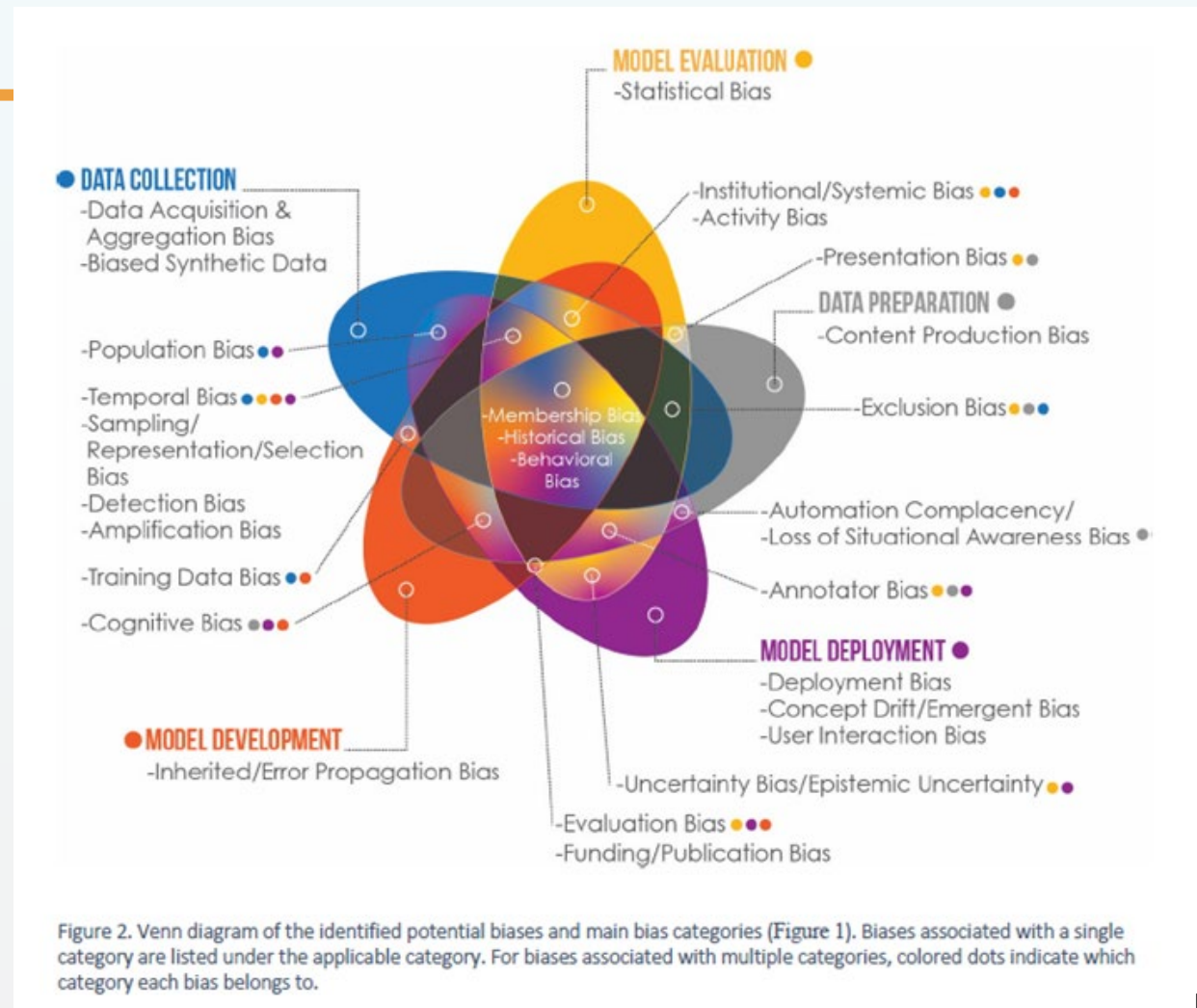24 algorithms in development
234 data users

MIDRC – Addressing Bias and Diversity in AI Datasets

Drukker, et al. (2023) "Towards **fairness** in artificial intelligence for medical image analysis; **Identification and mitigation of potential biases** in the roadmap from data collection to model deployment" JMI 2023

https://doi.org/10.1117/1.jmi.10.6.061104

Whitney, et al. (2023) "Longitudinal **assessment of demographic representativeness** in the Medical Imaging Data and Resource Center Open Data Commons" JMI 2023.
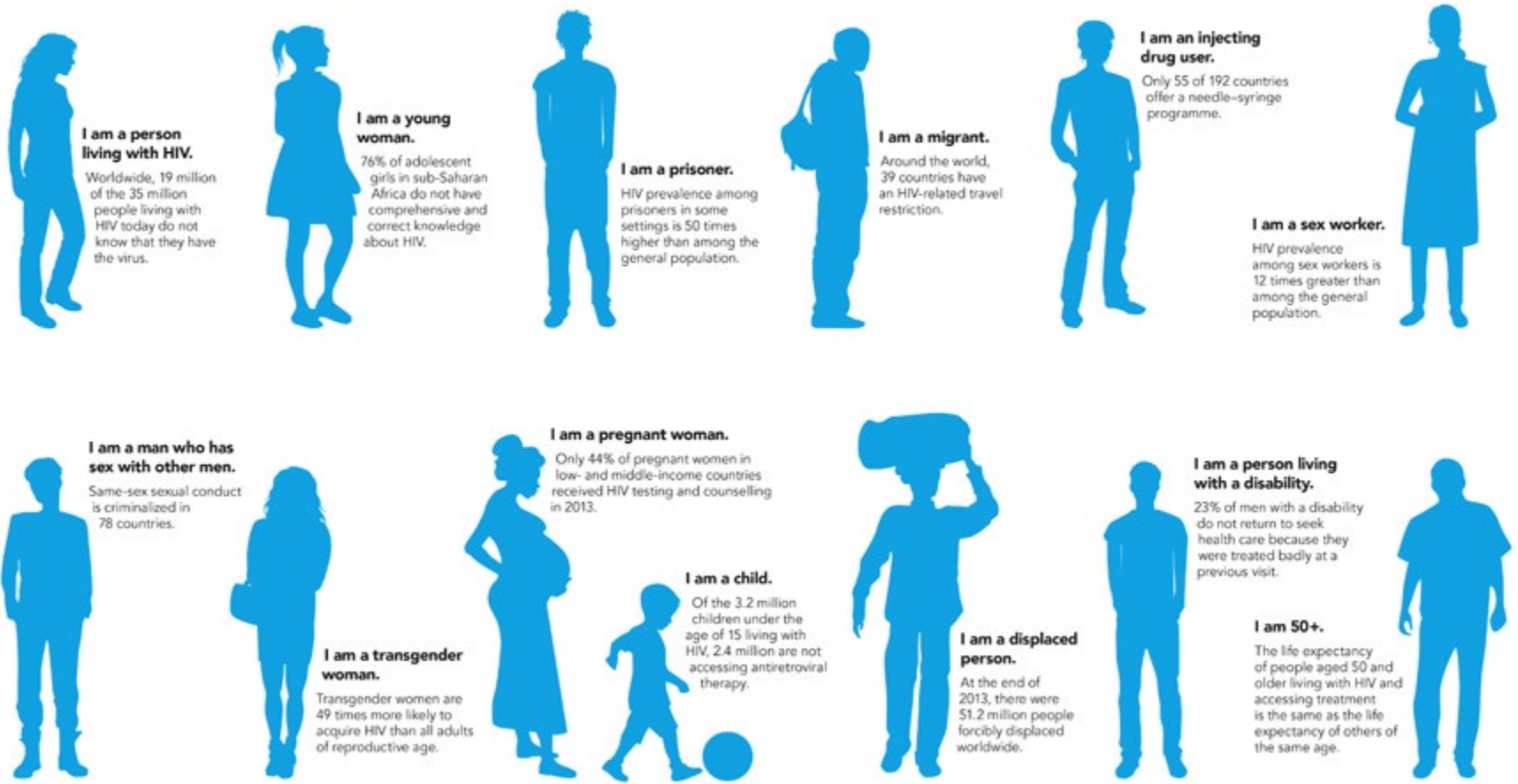
https://doi.org/10.1117/1.jmi.10.6.061105

MIDRC AI/ML Bias Awareness Tool Portal

https://www.midrc.org/bias-awareness-tool-1

DATA COLLECTION
-Data Acquisition & Aggregation Bias
-Biased Synthetic Data

MODEL EVALUATION
-Statistical Bias

-Institutional/Systemic Bias
-Activity Bias

-Presentation Bias

DATA PREPARATION
-Content Production Bias

-Population Bias

-Temporal Bias
-Sampling/ Representation/Selection Bias
-Detection Bias
-Amplification Bias

-Membership Bias
-Historical Bias
-Behavioral Bias

-Exclusion Bias

-Automation Complacency/
-Loss of Situational Awareness Bias

-Training Data Bias

-Annotator Bias

-Cognitive Bias

MODEL DEPLOYMENT
-Deployment Bias
-Concept Drift/Emergent Bias
-User Interaction Bias

MODEL DEVELOPMENT
-Inherited/Error Propagation Bias

-Uncertainty Bias/Epistemic Uncertainty

-Evaluation Bias
-Funding/Publication Bias

Figure 2. Venn diagram of the identified potential biases and main bias categories (Figure 1). Biases associated with a single category are listed under the applicable category. For biases associated with multiple categories, colored dots indicate which category each bias belongs to.

https://www.midrc.org

12 populations being left behind

UNAIDS Gap Report 2014

Can we please throw out the myths of Black people and other people of color not wanting to participate in clinical trials?

"When Offered to Participate": A Systematic Review and Meta-Analysis of Patient Agreement to Participate in Cancer Clinical Trials

Joseph M. Unger, PhD,[1,2,*] Dawn L. Hershman, MD,[3] Cathee Till, MS,[1,2] Lori M. Minasian, MD,[4] Raymond U. Osarogiagbon, MD,[5] Mark E. Fleury, PhD,[6] Riha Vaidya, PhD,[1,2]

"What is the rate of trial participation among patients who are <u>actually offered</u> an opportunity to participate?"

◎ Meta analysis of 13 studies that contained data on agreement to participate for both Black and White patients:
- Black patient participation **58.4%** [46.8% to 69.7%]
- White patient participation **55.1%** [44.3% to 65.6%]

◎ At least half of patients **offered** participation in a cancer clinical trial did participate.

◎ Importantly, Black, Hispanic, and Asian patients participated in trials at rates at least as high as White patients.

◎ The most common reason for not enrolling in a treatment trial was the desire among patients to control their treatment choice, including by avoiding protocol treatment side effects and **by avoiding participation in an experiment where treatment may be randomly assigned**.

"When Offered to Participate": A Systematic Review and Meta-Analysis of Patient Agreement to Participate in Cancer Clinical Trials

Joseph M. Unger, PhD,[1,2,*] Dawn L. Hershman, MD,[3] Cathee Till, MS,[1,2] Lori M. Minasian, MD,[4] Raymond U. Osarogiagbon, MD,[5] Mark E. Fleury, PhD,[6] Riha Vaidya, PhD,[1,2]

◎ "even if patients are eligible for an available trial, **physicians may not offer the trial to patients** out of concerns about the physician–patient relationship, preferences for a specific treatment, or practical considerations about reimbursement, time, and clinic resources"

◎ "ASCO and ACCC focused initially on one of the greatest barriers to enrollment and one that the organizations are best poised to address: **clinicians are not routinely offering clinical trials as a treatment option to all potentially eligible patients**."

The NEW ENGLAND JOURNAL of MEDICINE

MEDICINE AND SOCIETY

Debra Malina, Ph.D., *Editor*

Hidden in Plain Sight — Reconsidering the Use of Race Correction in Clinical Algorithms

Darshali A. Vyas, M.D., Leo G. Eisenstein, M.D., and David S. Jones, M.D., Ph.D.

"Equally important is the project of making medicine a more antiracist field. This involves revisiting how clinicians conceptualize race to begin with."

It would help if research teams were themselves more diverse, observes Rachel Hardeman, a public health scientist at the University of Minnesota, who studies reproductive health and racial equity.

Vyas et al. *NEJM*, 2020

Recruiting a diverse team?
How can I do that?

Looking forward to discussing that with the panel.

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