

Advancing Shared Priorities for Eliminating Health Inequities and Improving Women's Health

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NHLBI Mission: *Discovery Science That Enhances Human Health*

NHLBI Enduring Principles

- Value investigator-initiated fundamental discovery science.
- Maintain a balanced, cross-disciplinary portfolio (basic, translational, clinical, population science).
- Train a diverse new generation of leaders in science.
- Support implementation science that empowers patients and enables partners to improve the health of the nation.
- Innovate an evidence-based elimination of health inequities in the U.S. and around the world.



Focusing on Women's Health Research to Advance Health Equity

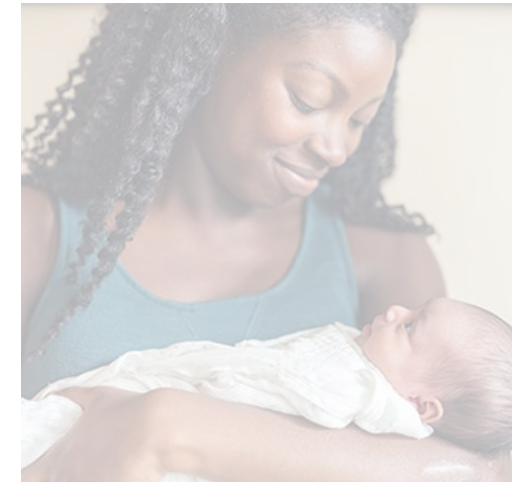
Commitment
to Inclusive
Excellence



The Impact
of COVID
on Women

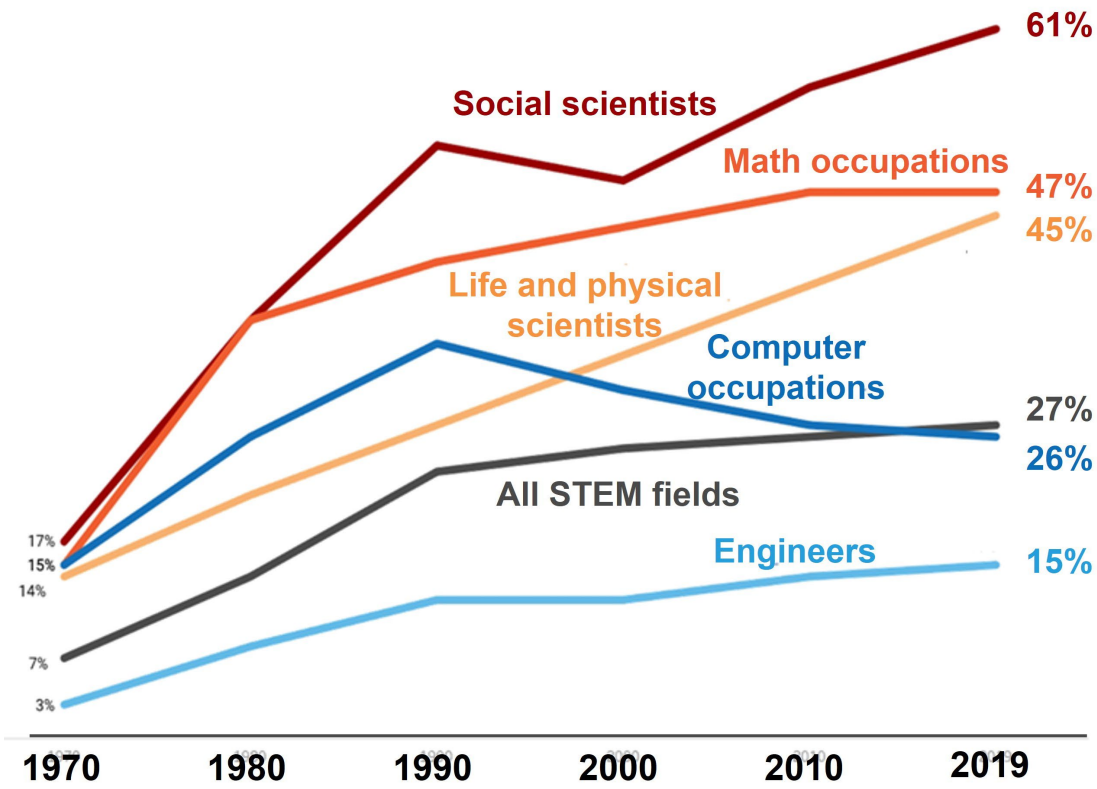


Advancing
Maternal
Health

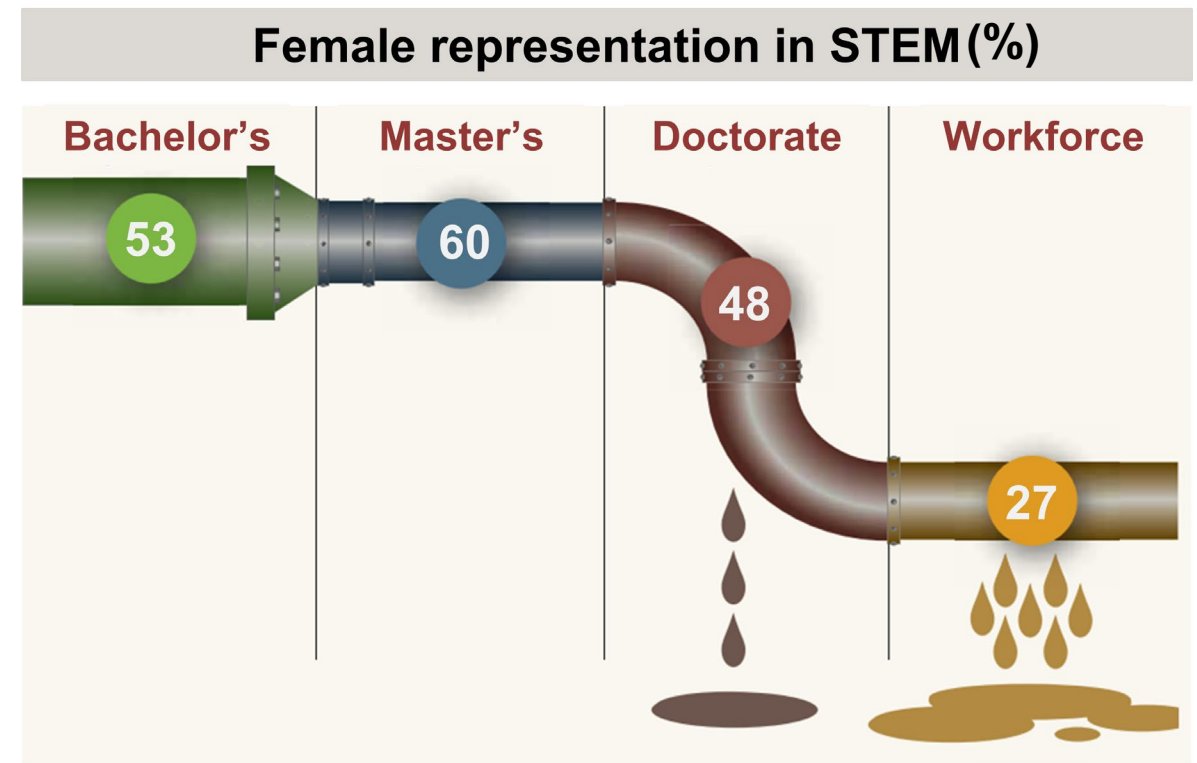


Inclusive Excellence in the Biomedical Workforce: Successes and Persistent Challenges

Despite strides made over the last half-century,
women comprise only 27% of the STEM workforce



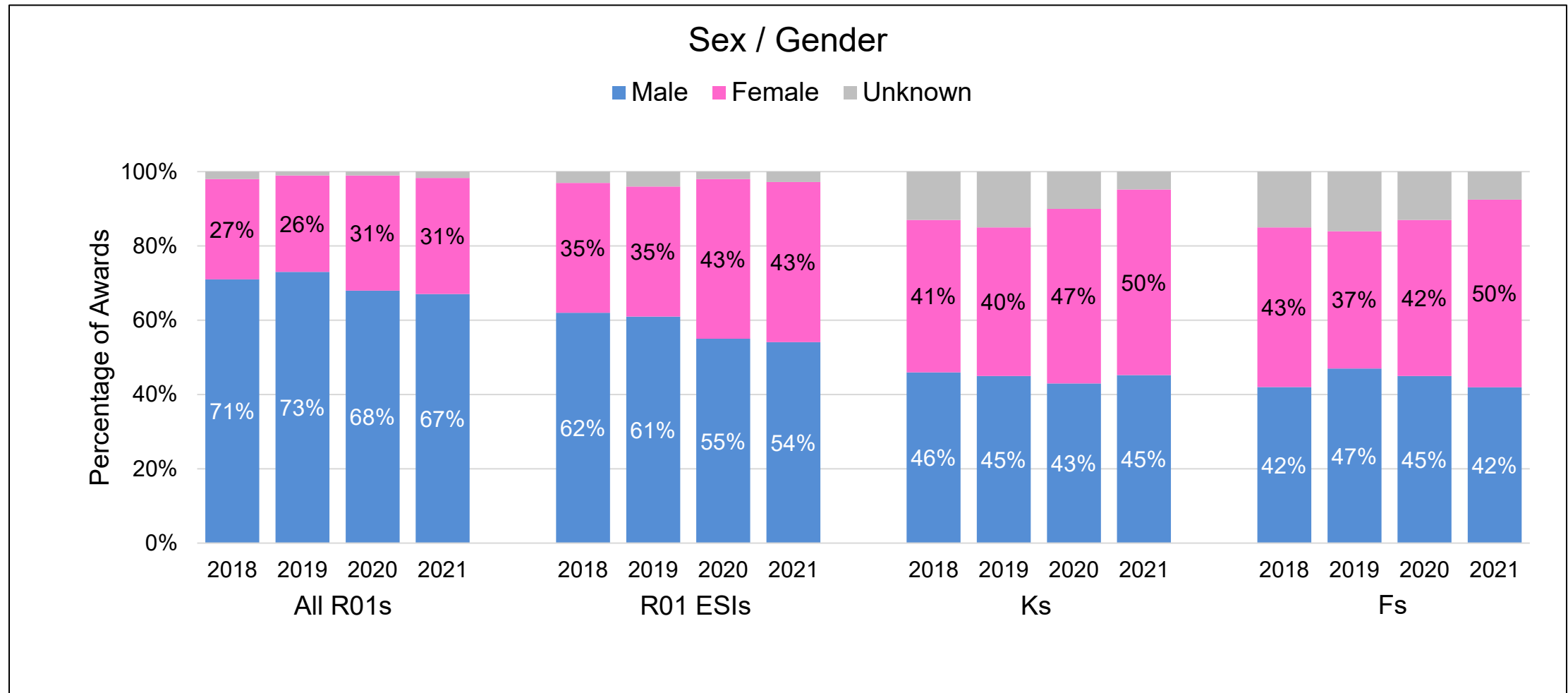
A Leaky Pipeline: equality in STEM education has not translated into gender occupational parity



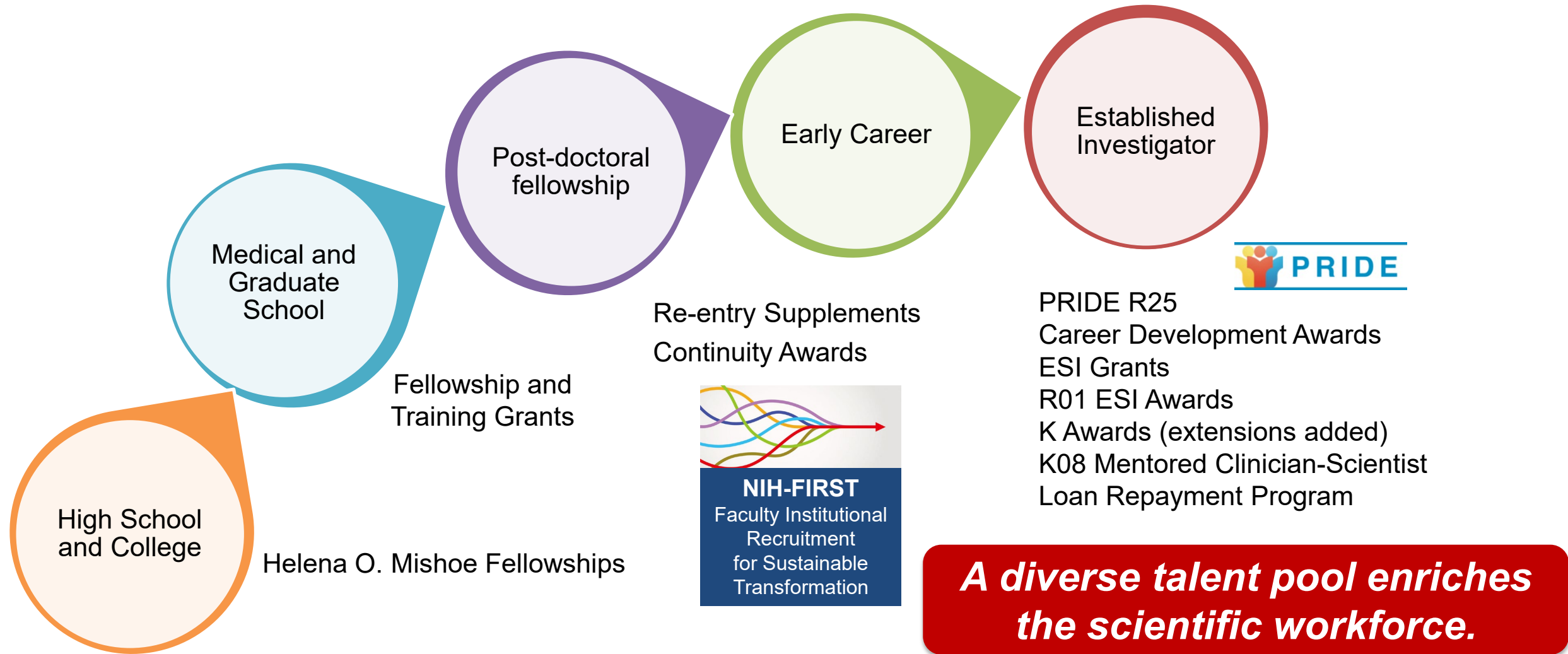
Adapted from Huyer, 2015. UNESCO science report: towards 2030

Promoting Diversity and Inclusive Excellence in Biomedicine: Demographic Profile of NHLBI Awards — The Next Generation

NHLBI FY2018 - FY2021 Awards



Stepping Stones to Success: Promoting Diversity and Inclusive Excellence in Biomedicine Pipeline



ORWH and NHLBI: A Shared Legacy of Commitment to Women's Health and Inclusive Participation in Research

1948

1990



Framingham Heart Study

A Project of the National Heart, Lung, and Blood Institute and Boston University



- Each of 6 cohorts enrolled majority women.
- **55% of original cohort** participants (1948) were **female**.



OFFICE OF RESEARCH
ON WOMEN'S HEALTH

*Advancing the Health of
Women Through Science*



Celebrating 30+ years of commitment
to advancing women's health:

Establishment of ORWH and
Women's Health Initiative.

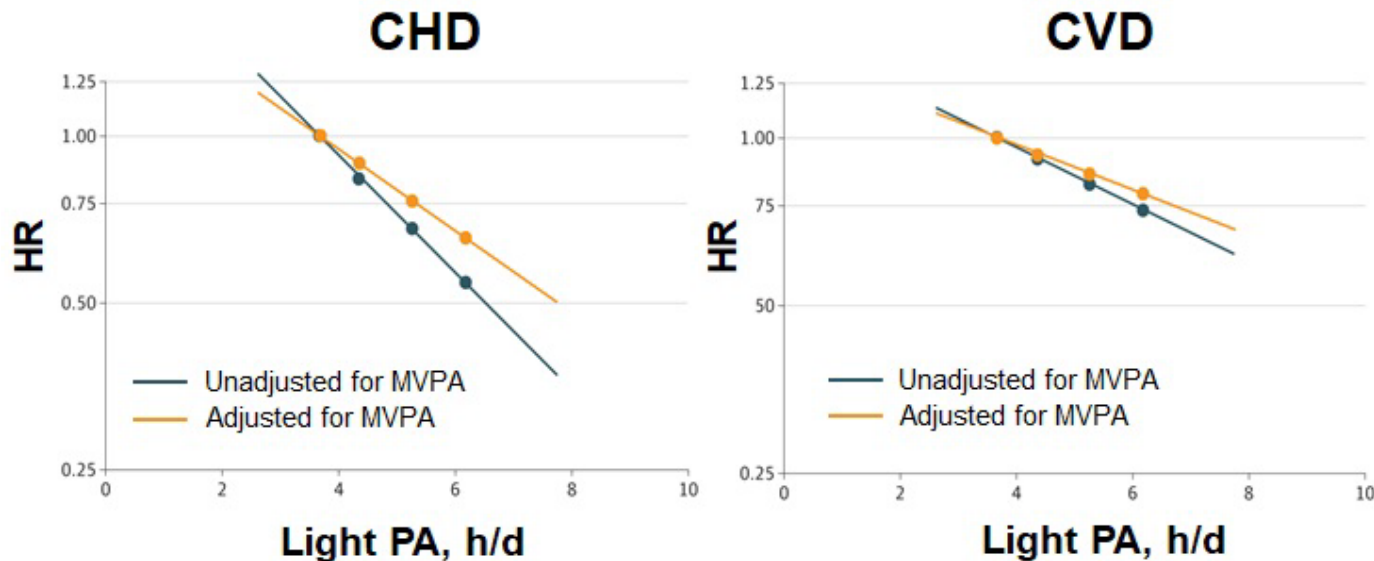
Guided from Observation to Intervention: Helping Define Links Between Activity, Intensity, and Health for Older Women



Observational

The WHI Objective PA and Cardiovascular Health Study (OPACH)

Associations of accelerometer-assessed physical activity and sedentary behavior with cardiovascular events



Light PA associated with reduced risk of CHD or CVD

Interventional

WHI Strong and Healthy Study (WHISH)

Ongoing PA Intervention trial for CVD prevention in ~50,000 older women



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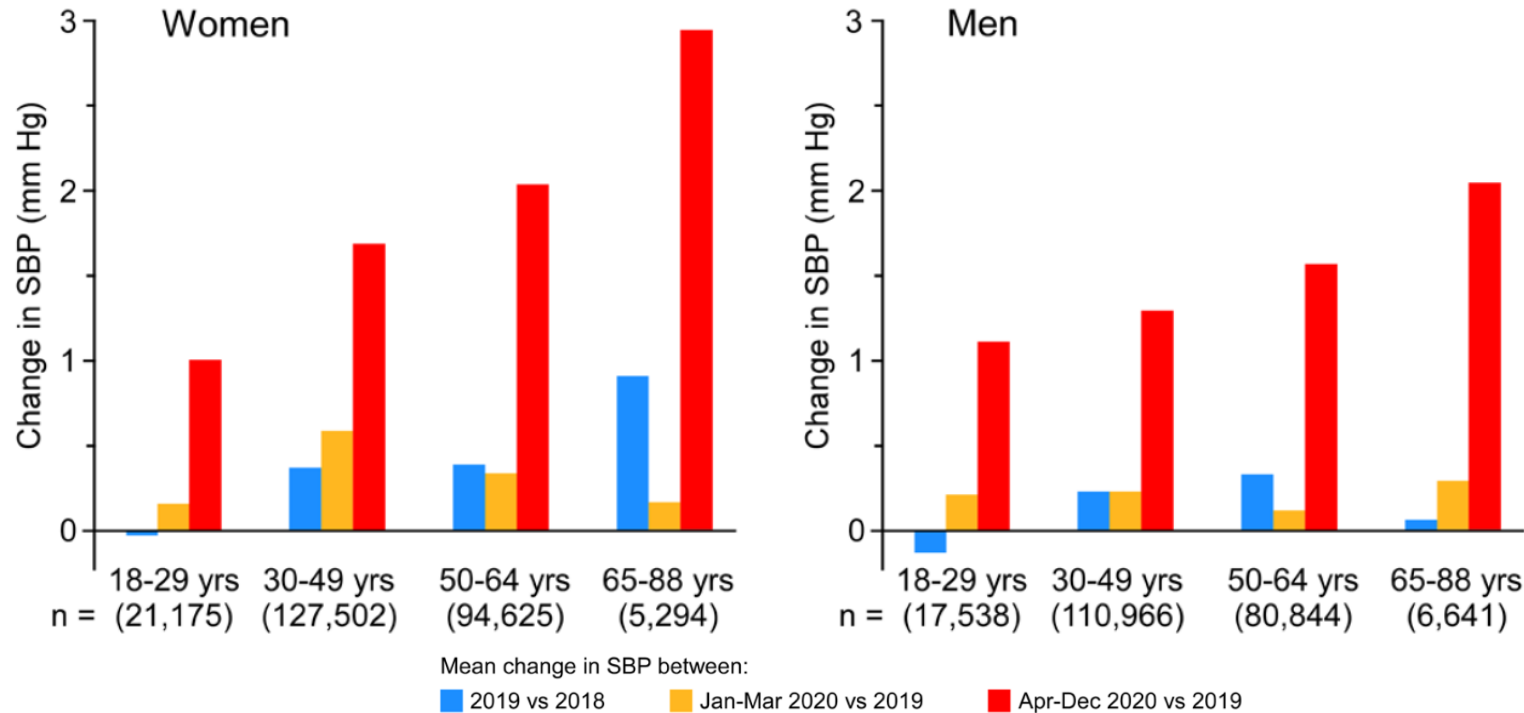


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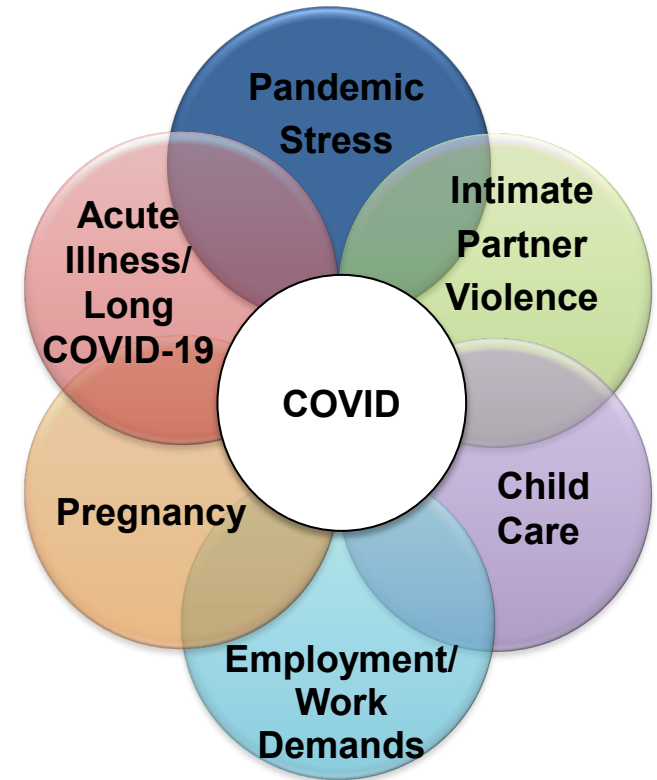


Understanding the Impact of the COVID-19 Pandemic on Women's Health

Blood Pressure Changes During the COVID-19 Pandemic

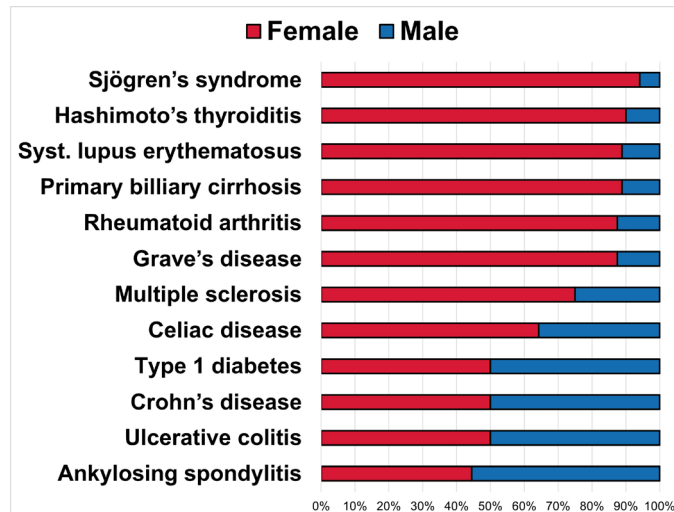


Women generally have experienced higher increases in blood pressure during the pandemic, compared with 2019 (red), than men.



Collecting Evidence of Sex Differences: ME/CFS, MIS-C & PASC

Women comprise 80% of all cases of autoimmune disease



Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS)

Immune symptoms more frequent in **women**

Renaud's phenomenon

(19.3% vs **27.9%**)

Generalized morning stiffness

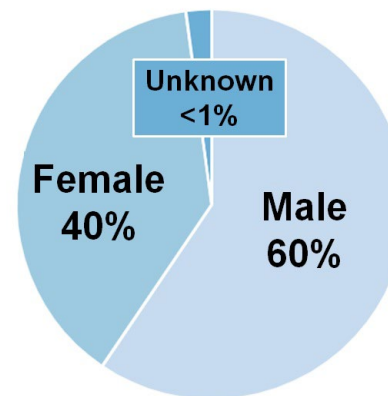
(76.5% vs **83.7%**)

Migratory arthralgia

(70% vs **86.4%**)

Multi-System Inflammatory Syndrome in Children (MIS-C)

MIS-C Patients By Sex



Affects ~1 in 3,000 children and requires hospitalization

Post-Acute Sequelae of SARS-COV-2 infection (PASC)

REsearching COVID to Enhance Recovery (**RECOVER**)

Characterizing PASC, including **sex differences** in:

- Incidence
- Severity
- Underlying mechanisms
- Clinical features

RECOVER: Research to Delve Into Sex Differences in PASC

Goal

Rapidly improve **understanding** of and ability to **predict, treat, and prevent** PASC



Key Scientific Aims

- 1 Understand clinical spectrum/biology underlying recovery
- 2 Define risk factors, incidence/prevalence, and sub-phenotypes
- 3 Study pathogenesis over time and relation to other organ dysfunction/disorders
- 4 Identify interventions

Guiding Principles



Patient-centered,
participants as partners



Inclusive, diverse
participation & community
engagement



Adaptive approaches
based on emerging
science



**Leverage big data and
digital platforms** to expand
program reach

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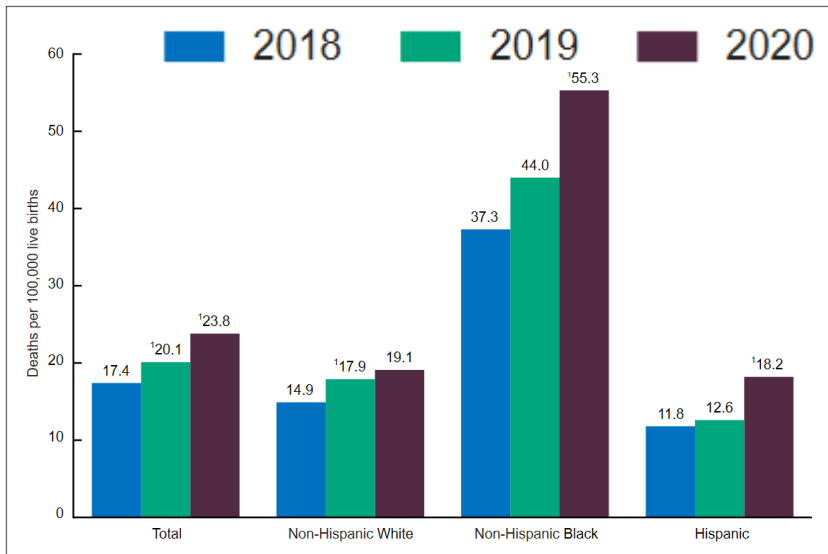
Advancing
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Health



Advancing Health Equity

With a Multifaceted Approach to Maternal Health

Rise in Maternal Mortality During the Pandemic Exacerbated Disparities



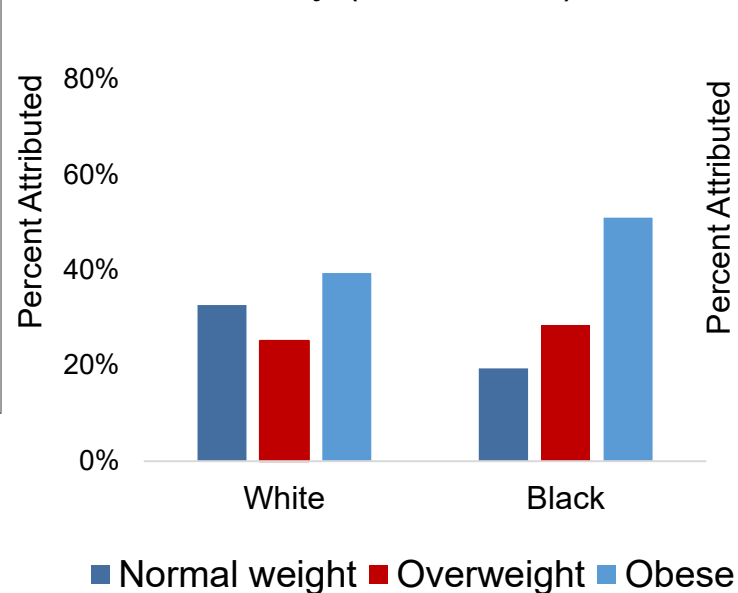
U.S. Maternal Mortality Rates by Race (2020)

White: 19
Black: 55
Hispanic: 18

The challenge: Reducing disease burden in communities facing health disparities & risk factors driven by SDOH

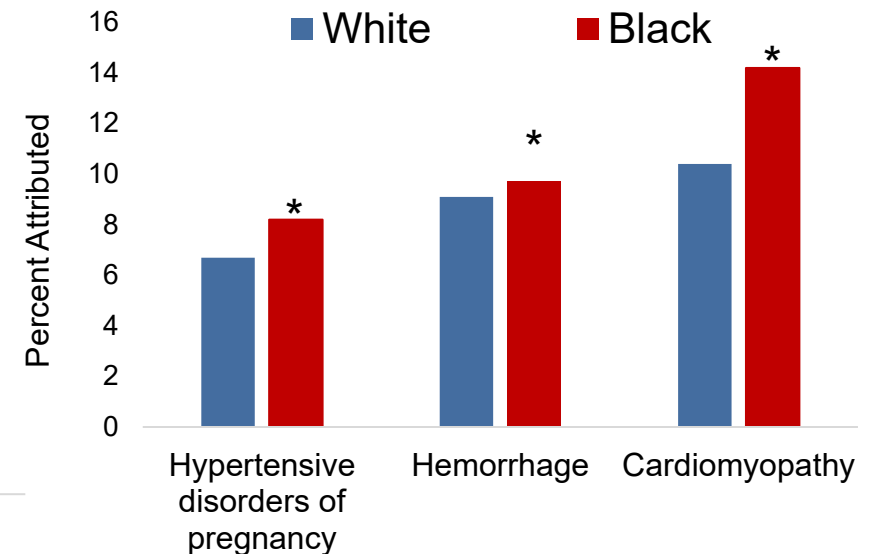
Gestational Diabetes Mellitus Cases

% attributed to overweight and obesity (2004-2007)



Cause-specific MM Proportionate Cause of Death

% attributed to each cause (2007-2016)



Pregnancy Is a “Stress Test” That Identifies Women With Long-Term Risk Trajectory for CVD

The changing **health profile** of pregnant women **increases future risk** of heart disease.

Common Risk Factors for Adverse Pregnancy Outcomes and Heart Disease

High Blood Pressure

Obstructive Sleep Apnea

Diabetes

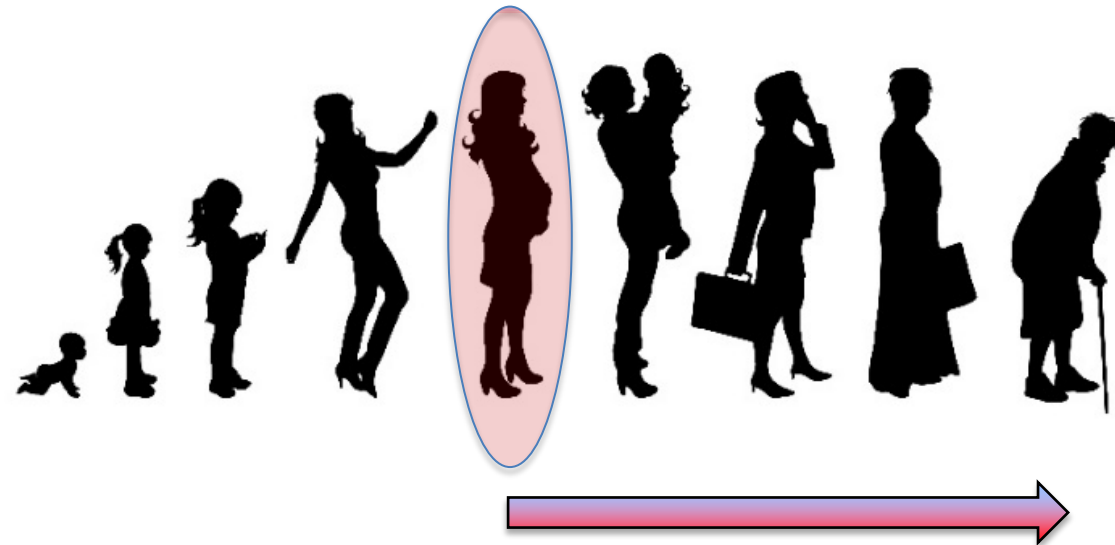
Diet/Eating Habits

Obesity/Weight Management

Smoking and Alcohol

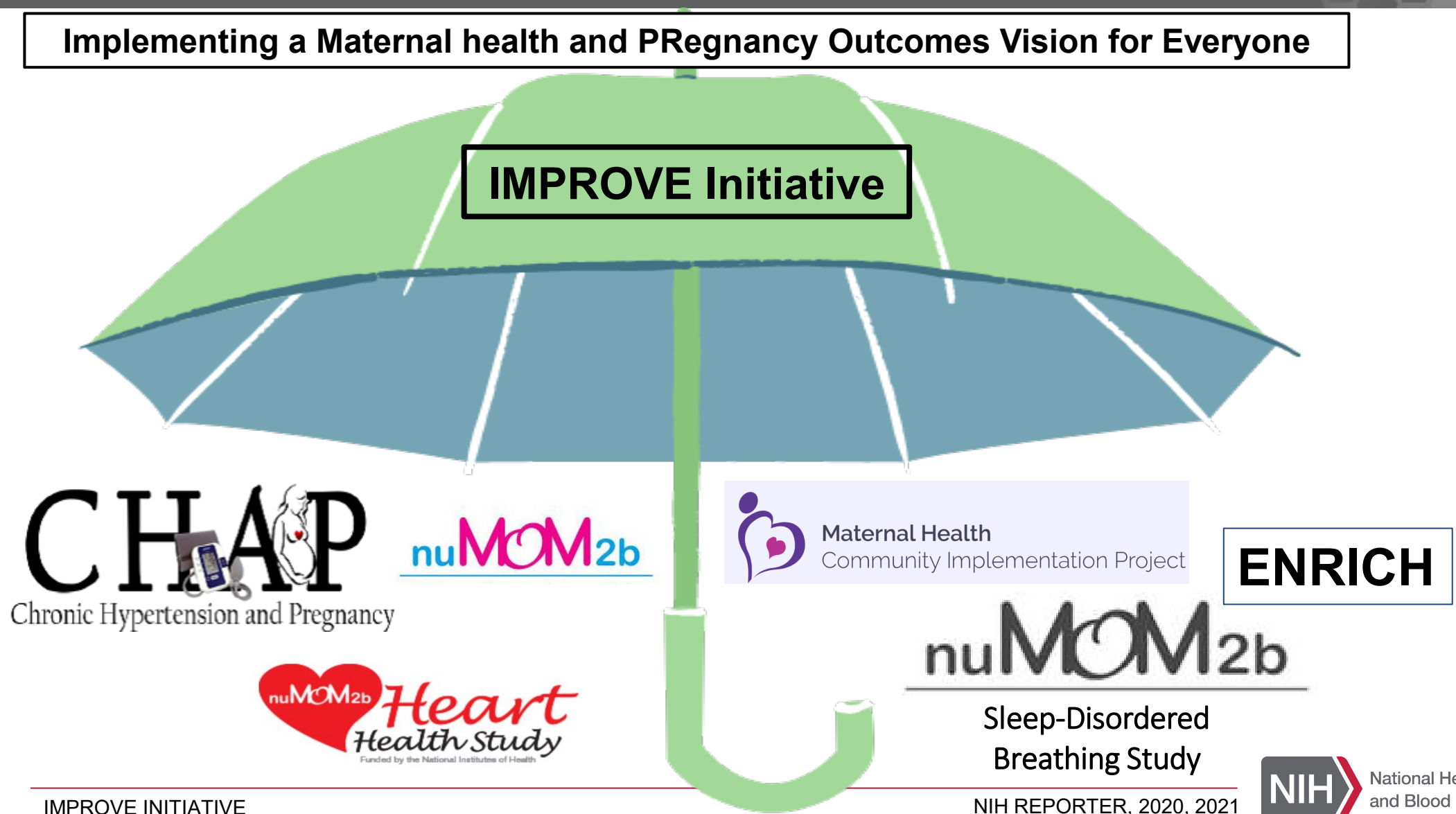
Genetics

- Older maternal age (women age ≥ 30)
- Increasing prevalence of comorbid conditions in women of reproductive age: hypertension, obesity, diabetes
- Up to 10% of pregnancies are complicated by hypertensive disorders of pregnancy.



Optimizing Health of All Women Before, During, and After Pregnancy

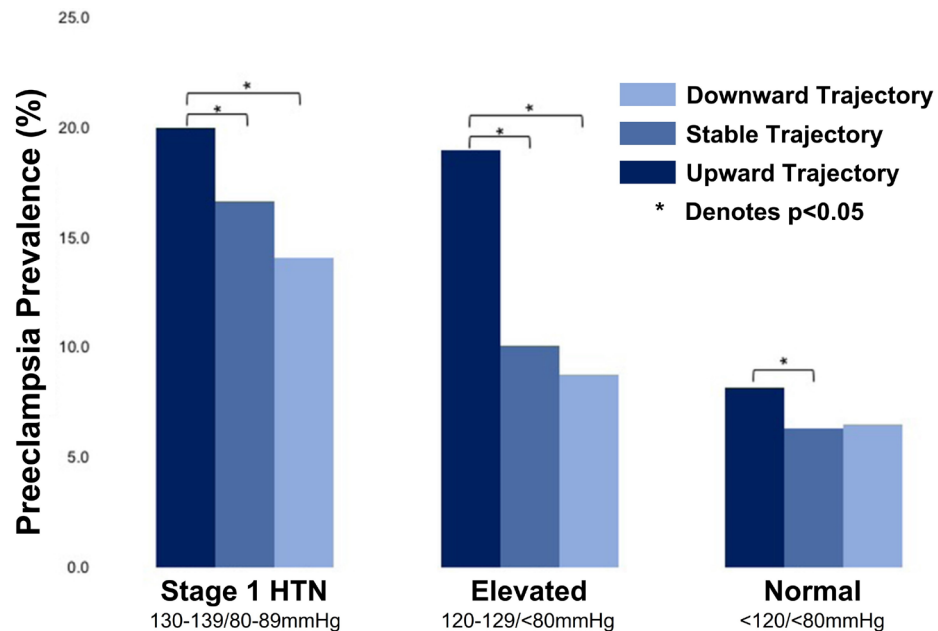
Implementing a Maternal health and PRegnancy Outcomes Vision for Everyone



Evaluating the Underlying, Interrelated Mechanisms of Adverse Pregnancy Outcomes in First-time Mothers

Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (nuMoM2b)

Blood pressure category and trajectory in early pregnancy independently associated with risk of preeclampsia and gestational hypertension.



Pregnancy Outcomes by Blood Pressure Category

	Normal BP	Elevated BP	Stage 1 HTN	p-value
	N = 7,034 n(%)	N = 975 n(%)	N = 890 n(%)	
Gestational Diabetes	248 (3.5%)	53 (5.4%)	55 (6.2%)	<0.001
Gestational age at delivery (weeks)	38.9 ± 2.1	38.7 ± 2.5	38.6 ± 2.5	0.02
Indicated preterm birth	148 (2.1%)	36 (3.7%)	47 (5.3%)	<0.001
Mode of delivery				
Spontaneous vaginal	4,611 (65.6%)	608 (62.4%)	519 (58.3%)	<0.001
Operative vaginal	635 (9.0%)	72 (7.4%)	62 (7.0%)	
Cesarean section	1,784 (25.4%)	295 (30.3%)	309 (34.7%)	
Birthweight (grams)	3279 ± 548	3269 ± 598	3258 ± 611	<0.001

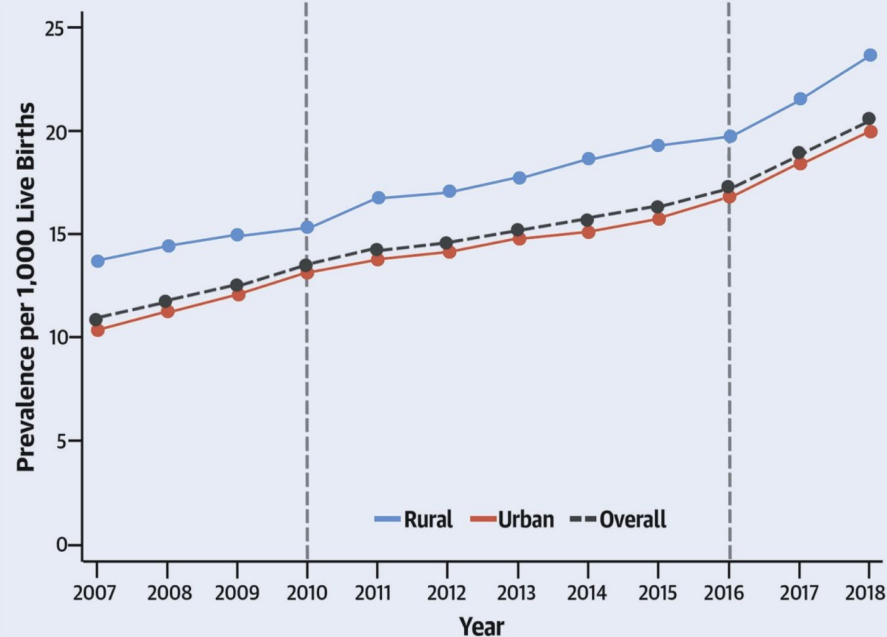
*mean ± standard deviation

Stage 1 HTN associated with poorer outcomes for mother and child.

Thinking Beyond the Severe Maternal Mortality Paradigm: Preventive Intervention Before Clinical Catastrophe

Chronic Hypertension (CHTN) in Pregnancy

Disturbing trend in pre-pregnancy hypertension,
with significant urban-rural disparities



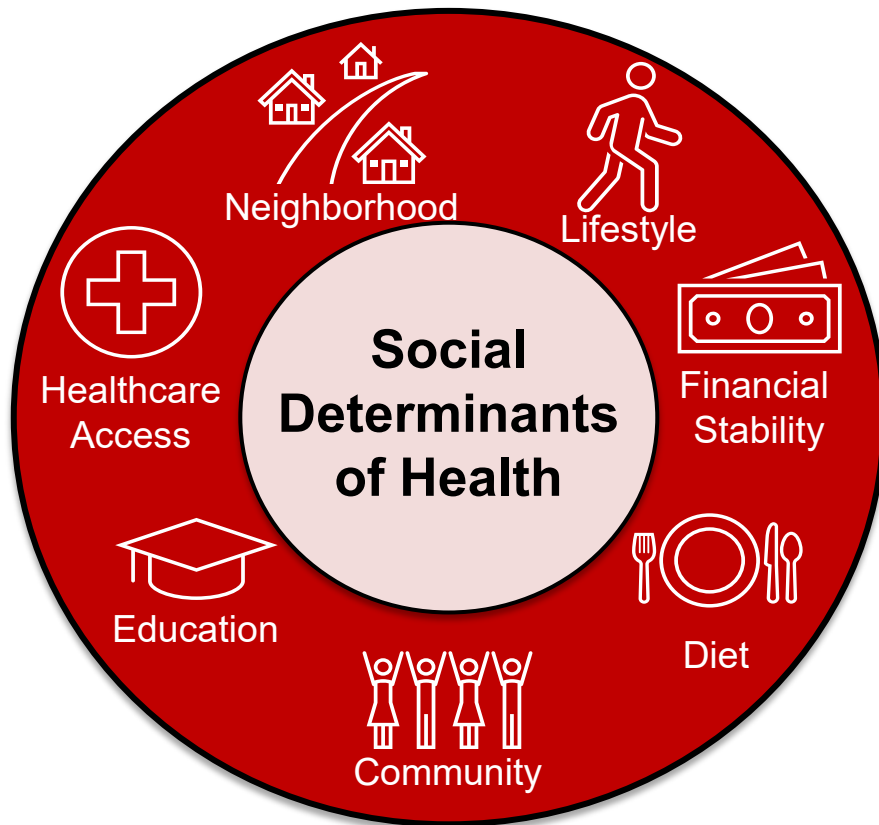
Randomized trial to evaluate **benefits and risks of pharmacologic treatment of mild CHTN during pregnancy**

Antihypertensive Therapy during Pregnancy for Mild Chronic Hypertension
Tita et al. NEJM. 2022.

Treatment of mild CHTN during pregnancy to achieve BP <140/90 **reduced adverse pregnancy outcomes without compromising fetal growth**

Targeting Community-Embedded, Evidence-Based Interventions Addressing Maternal Health Disparities

ENRICH: Early Intervention to Promote Cardiovascular Health of Mothers and Children



Home visiting evidence-based interventions focused on:

- Lifestyle (diet, **sleep**, stress management) and Simple 7
- **SDoH indicators**, home environment, responsive parenting
- Access to health care, counseling, support groups, **treatment delivery**

Partners:

HRSA

Administration
for Children and
Families (ACF)

NIDDK

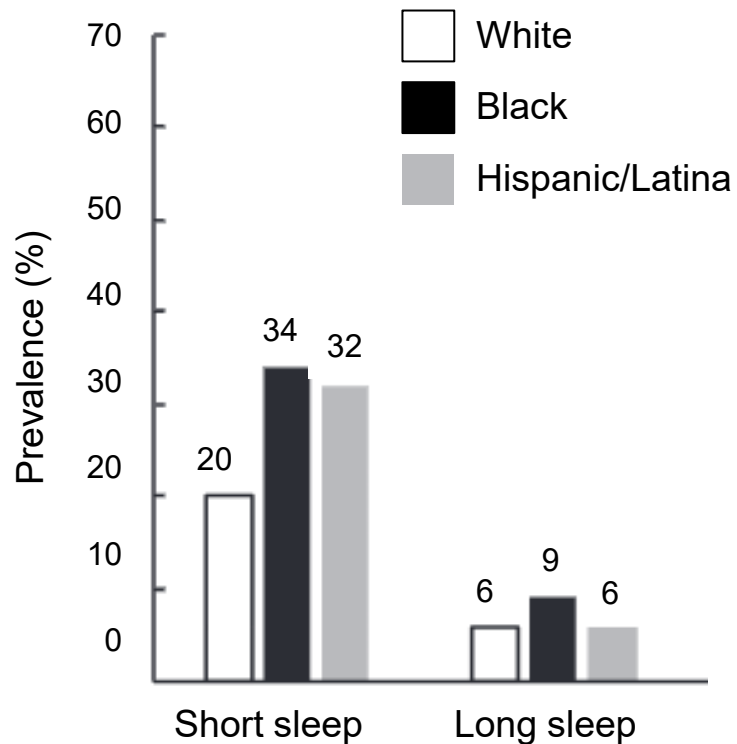
NIMHD

ODP

ORWH

Racial/Ethnic Sleep Disparities Among Pregnant Women: The Potential Impact on Health Outcomes

Age-Standardized Prevalence of Sleep Disturbances
During Pregnancy by Race/Ethnicity



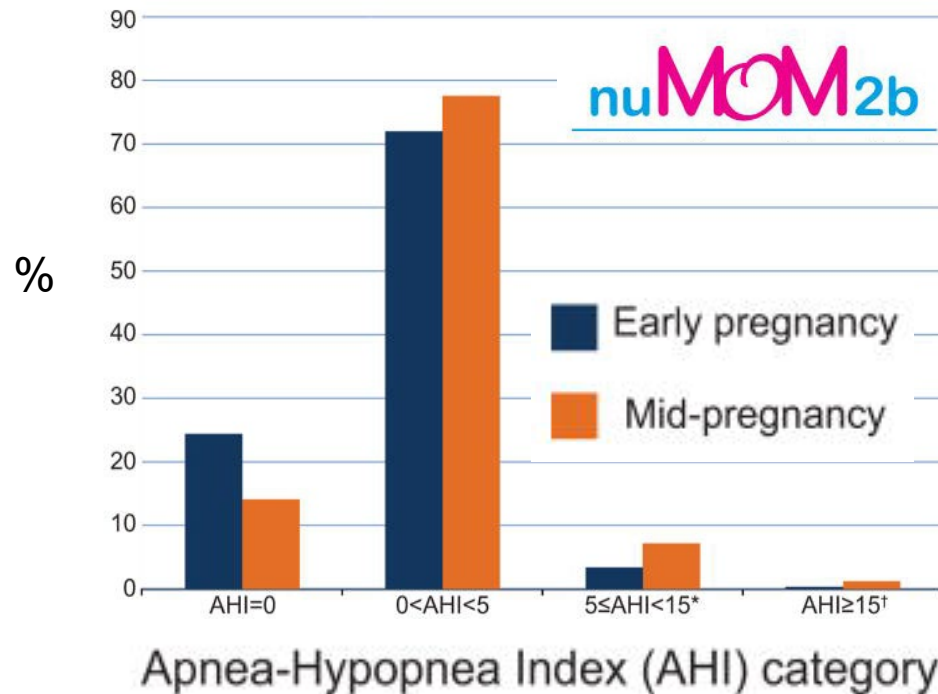
Elevation in measures of **sleep-disordered breathing** in pregnancy and **2–7 years after** delivery associated with:

- **>3x increased** risk for incident **high blood pressure**
- **>2x increased** risk for **metabolic syndrome**

Challenge/Opportunity: Understanding the root causes of sleep health disparities and developing appropriate interventions to improve outcomes

Women's Health Research Agenda: Impact of Sleep-Disordered Breathing on Adverse Pregnancy Outcomes and CVD Risk

Sleep Disordered Breathing and Obstructive Sleep Apnea (OSA) in Pregnancy



CPAP for Sleep Apnea in Pregnancy (SLEEP)

Randomized trial of 2,700 women:

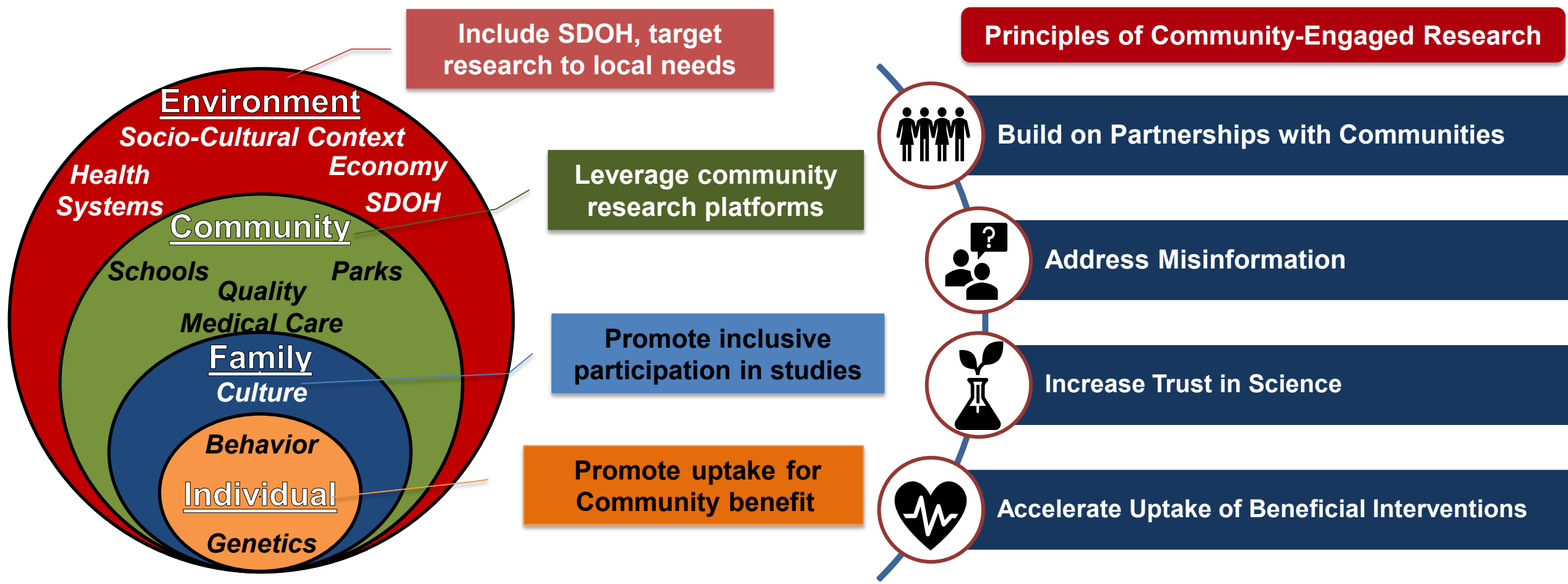
- Sleep advice counseling + CPAP
- Sleep advice counseling alone

Question: Does CPAP for OSA reduce pregnancy-related high blood pressure?

Opportunity: Test novel interventions in high-risk pregnant women to reduce adverse pregnancy outcomes and potentially influence the long-term trajectory of CVD risk

Currently recruiting

Building a Repeatable Resource With Communities to Address Social Determinants of Health (SDOH) and Advance Health Equity



Building a Community-Engaged Platform to Improve Maternal Health and Narrow the Health Equity Gap



Maternal Health Community Implementation Project (CIP)



Lifestyle



Diet



Education

Intervention Strategies to Implement:

- **Pre-pregnancy counseling** for women and/or partner/father
- **Diabetes prevention** programs
- Prenatal **nutrition counseling**
- Bridging maternal **lifestyle education** and **counseling** with CHWs



WHAT IF: Transformative Research Addresses Health Disparities Through a Life Course Approach—Kamilah's Story



Lifestyle



Diet



Education



Healthcare
Access

- Kamilah lives in rural Louisiana in a predominantly African American community with limited access to health care and healthy food.
- She experiences high blood pressure and pre-eclampsia in her first pregnancy, requiring prolonged hospitalization.
- Kamilah works with a community health worker to get access to WIC and SNAP benefits through a local clinic and use more fruits and vegetables in meals for her family.
- Based on the clinic's advice, Kamilah figures out a schedule for feedings with her partner so she can get some sleep at night.
- Kamilah measures her blood pressure with a monitor from the clinic.



How can community-based research partnerships improve the cardiovascular health trajectory of Kamilah and her baby and prepare Kamilah for a healthy future pregnancy?

Circle of Collaborative Partners: A Diverse Ecosystem Enabling Innovation for Public Health Impact





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