



Women's Health and the Health of Women

***NASEM—The Intersection of
Regenerative Medicine and
Women's Health: A Workshop***

September 26, 2024

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Office of Research on Women's Health
National Institutes of Health
Department of Health and Human Services



The presenter has no actual or potential conflicts of interest in relation to this program or presentation

*The following views expressed are those of the presenter. No official endorsement of the **Office of Research on Women's Health**, the **National Institutes of Health**, or the **U.S. Dept. of Health and Human Services** is intended or should be inferred*

The Health of Women



Sex as a Biological Variable



Women and Careers



**White House Women's
Health Research Initiative**



Implications and Next Steps



Gender Influences How Women Receive Care

THE REPORT

Dying to be Heard

Maya Dusenbery discusses why women can have such a hard time getting the medical care they need.

By Gabrielle Levy Political Reporter April 20, 2018, at 6:00 a.m.

"They don't really take my bleeds seriously": Barriers to care for women with inherited bleeding disorders

Sumedha Arya, Pamela Wilton, David Page, Laurence Boma-Fischer, Georgina Floros, Rochelle Winikoff, Jerome Teitel, Katie Dainty, Michelle Sholzberg

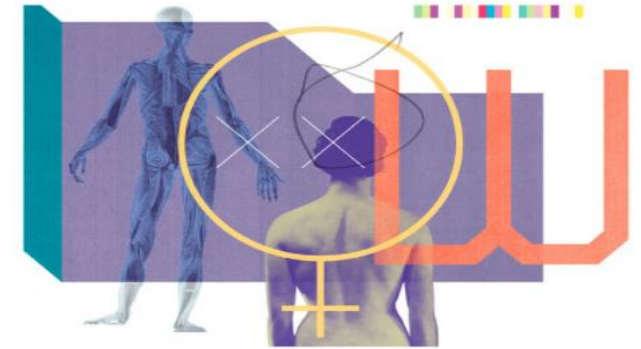
HARVARD HEALTH BLOG

Women and pain: Disparities in experience and treatment



When Doctors Downplay Women's Health Concerns

f w t e g b 396



Stuart Bradford

By Camille Noe Pagán

May 3, 2018

By Maya Dusenbery 29th May 2018

Women are more likely to wait longer for a health diagnosis and to be told it's 'all in their heads'. That can be lethal: diagnostic errors cause 40,000-80,000 deaths in the US alone.

The Health Gap

Dismissed

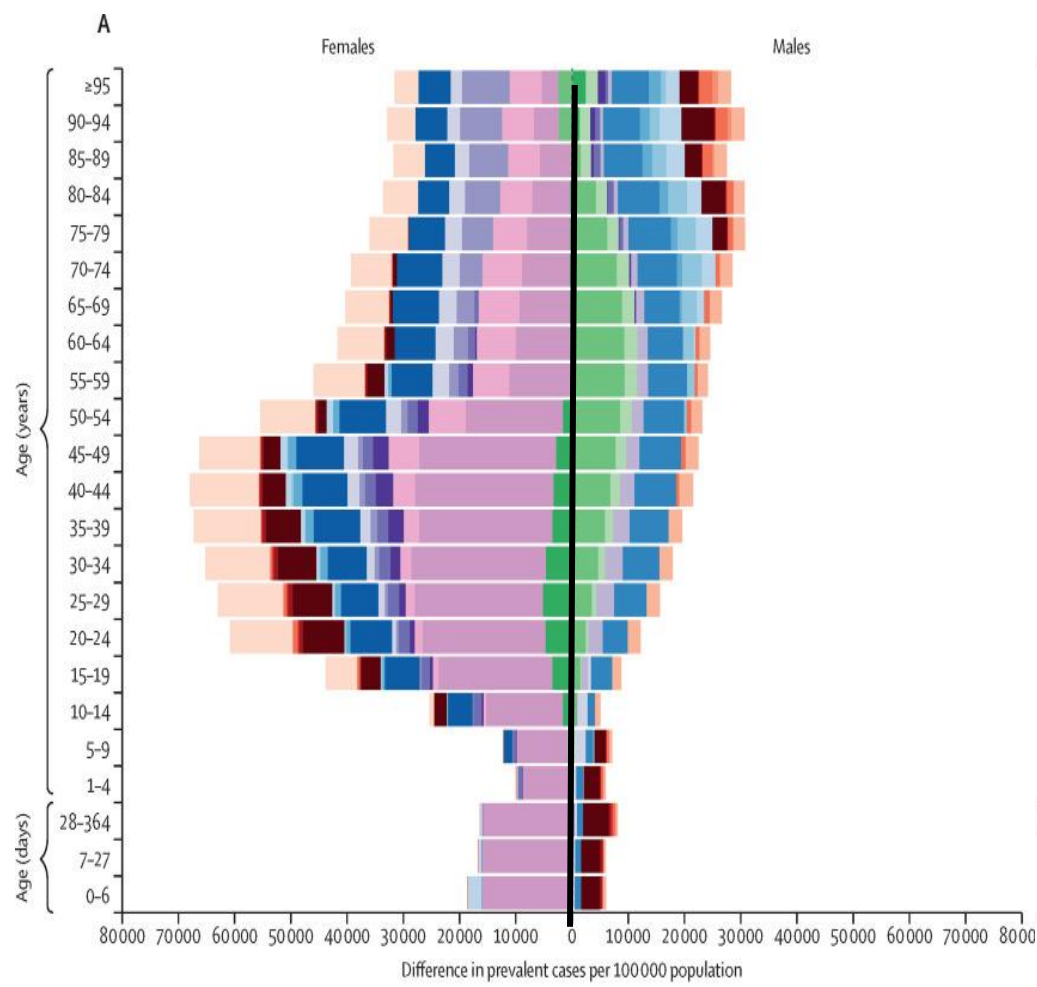
There's a gender gap at the doctor's office every woman needs to know about. Meet the doctors fighting for change.

By A. Pawlowski

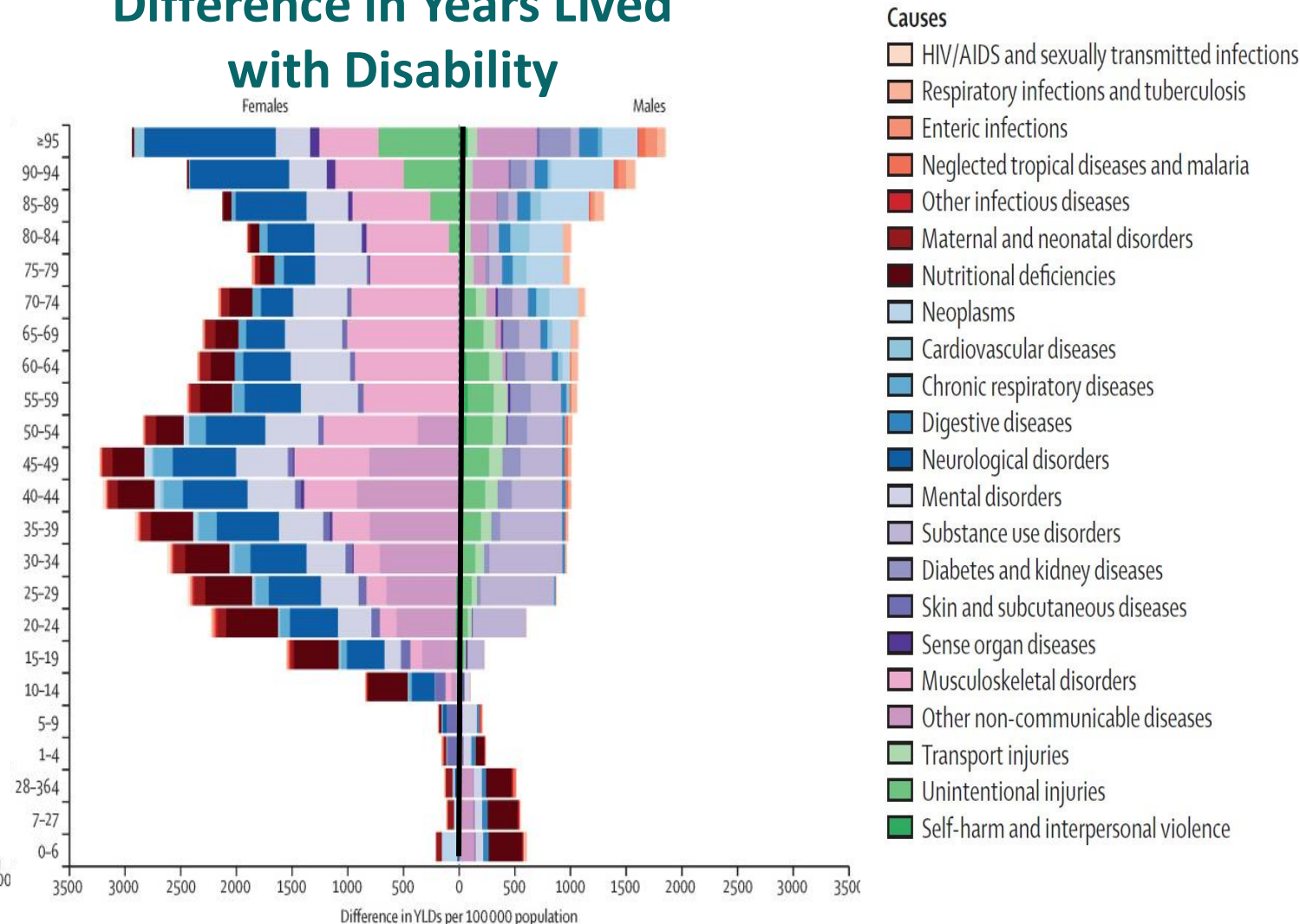


How Women Experience Health and Disease Differently

Difference in Disease Prevalence



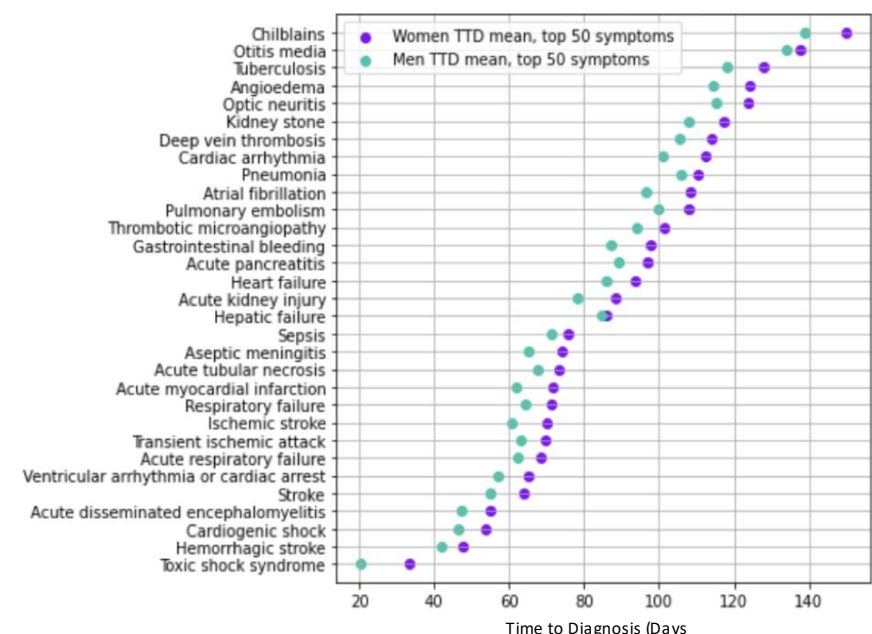
Difference in Years Lived with Disability



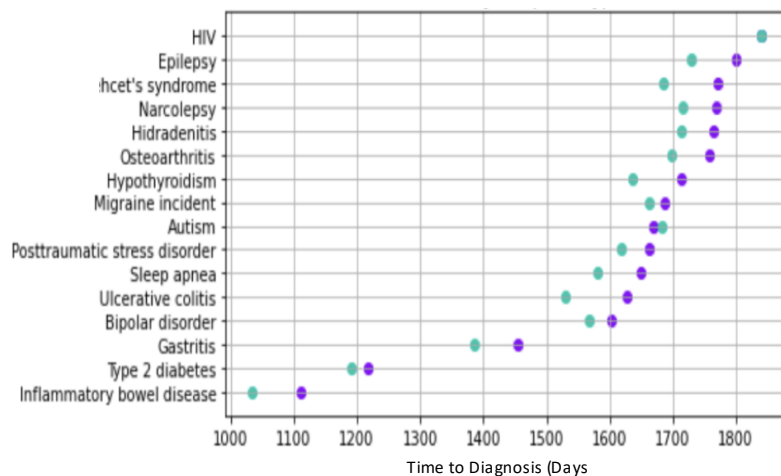


How Women Experience Health and Disease Differently

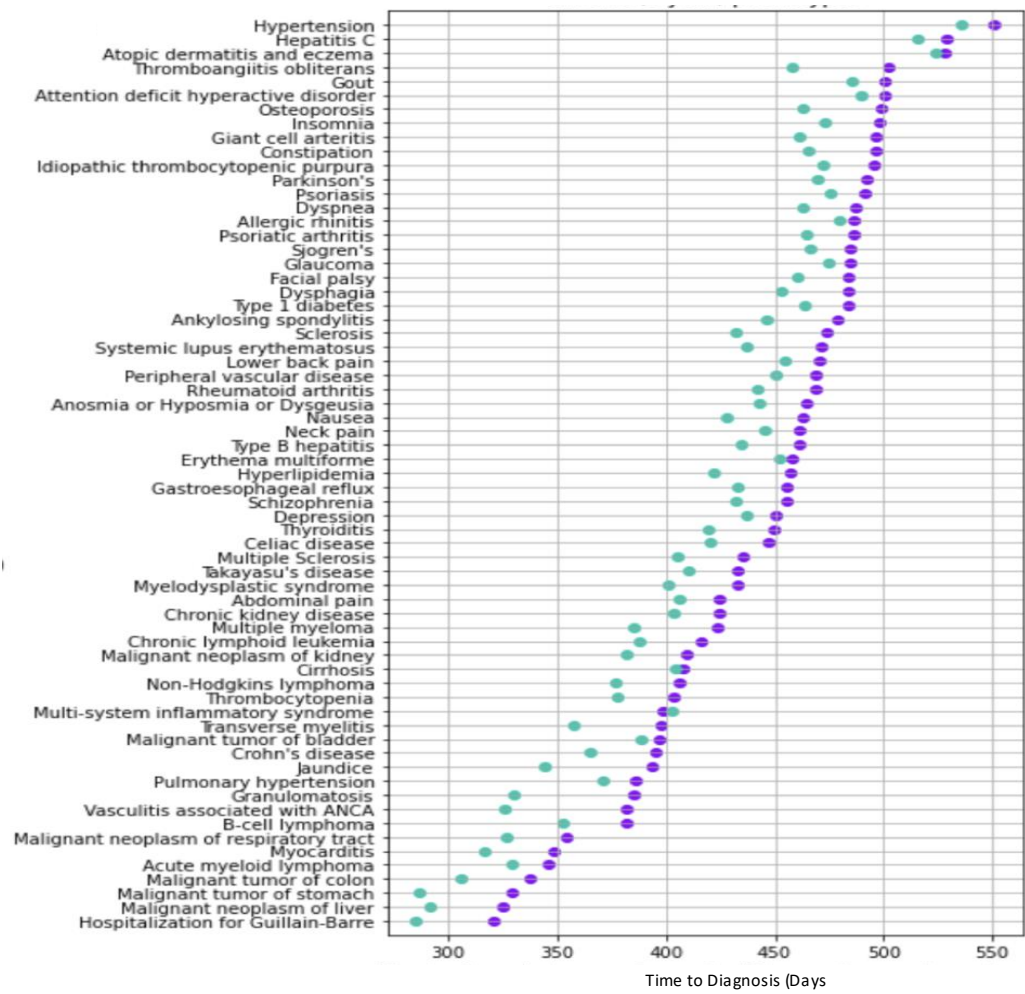
Time to Diagnosis



Acute (1 Year)



Chronic (10 Years)

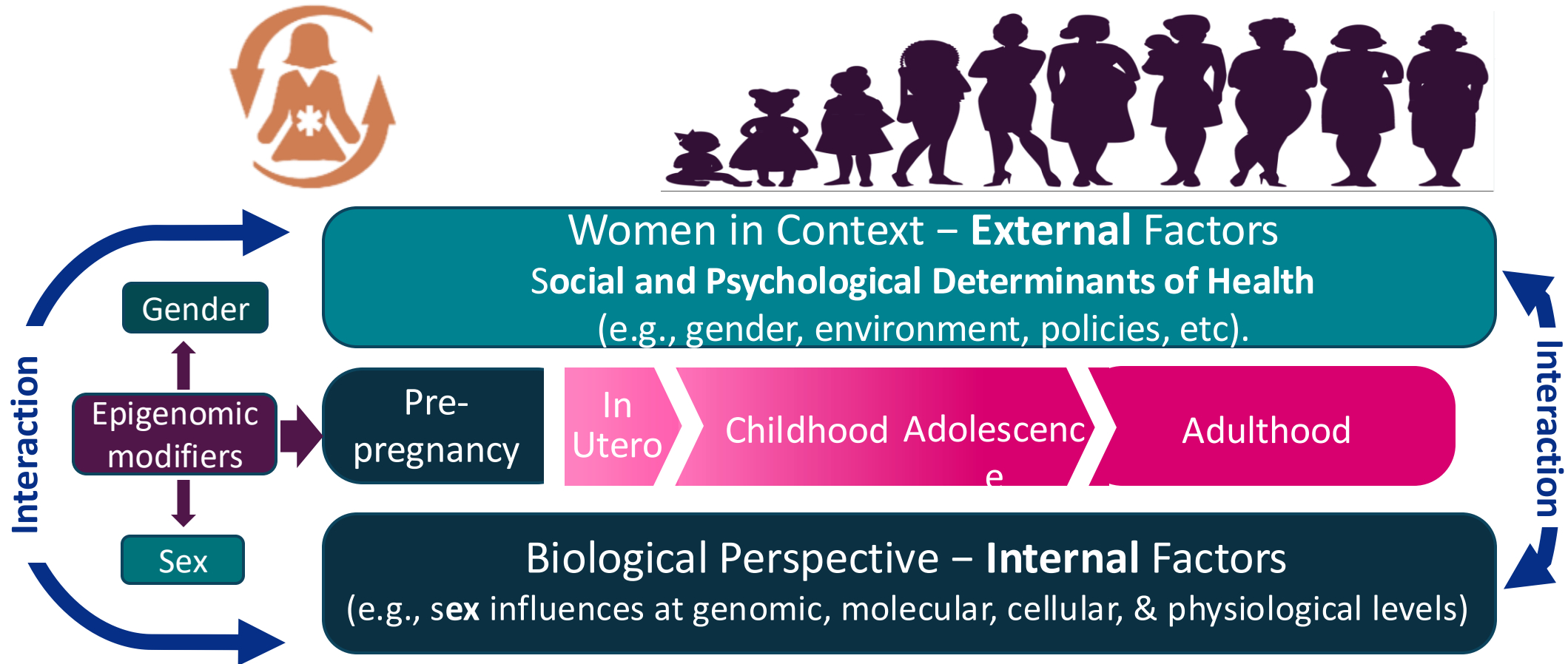


Chronic (3 Years)

Women and Men May Follow Different Paths to Disease and Health

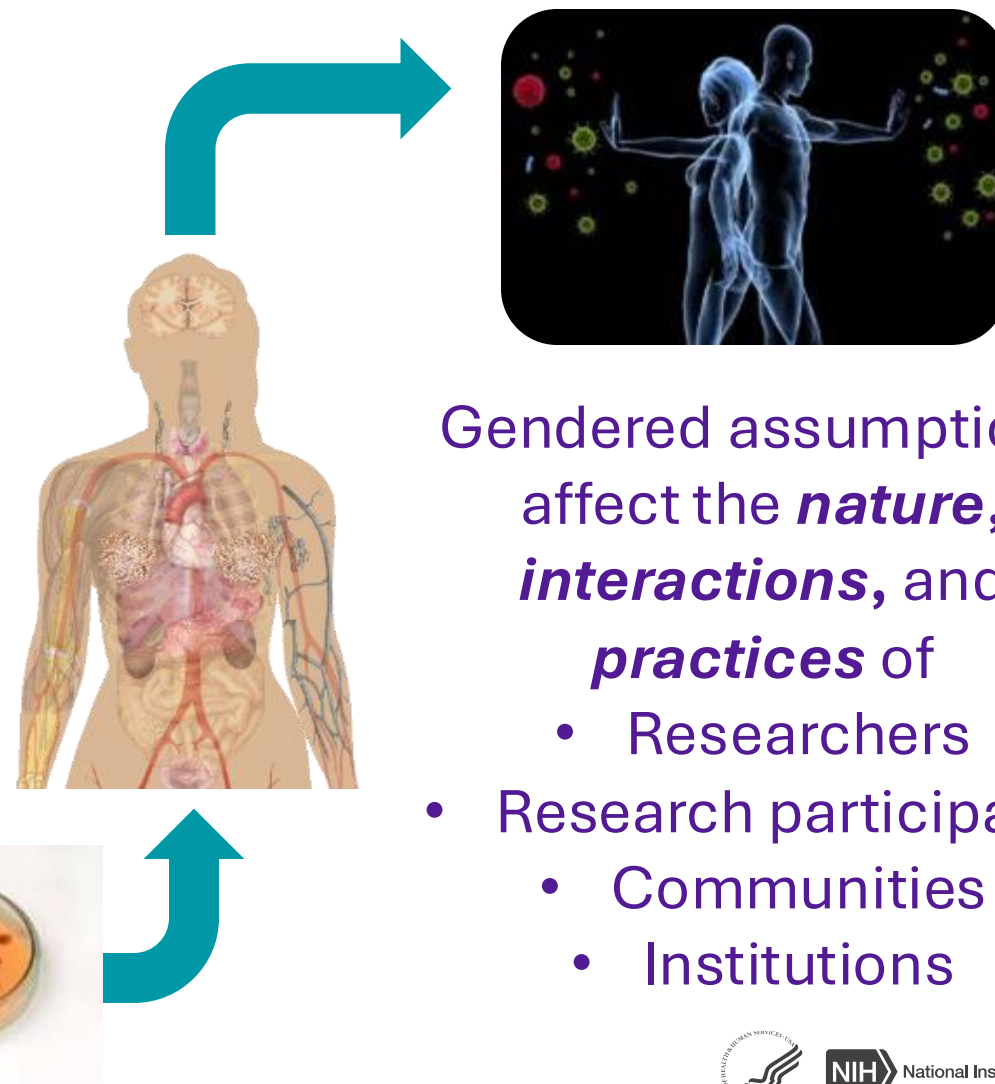
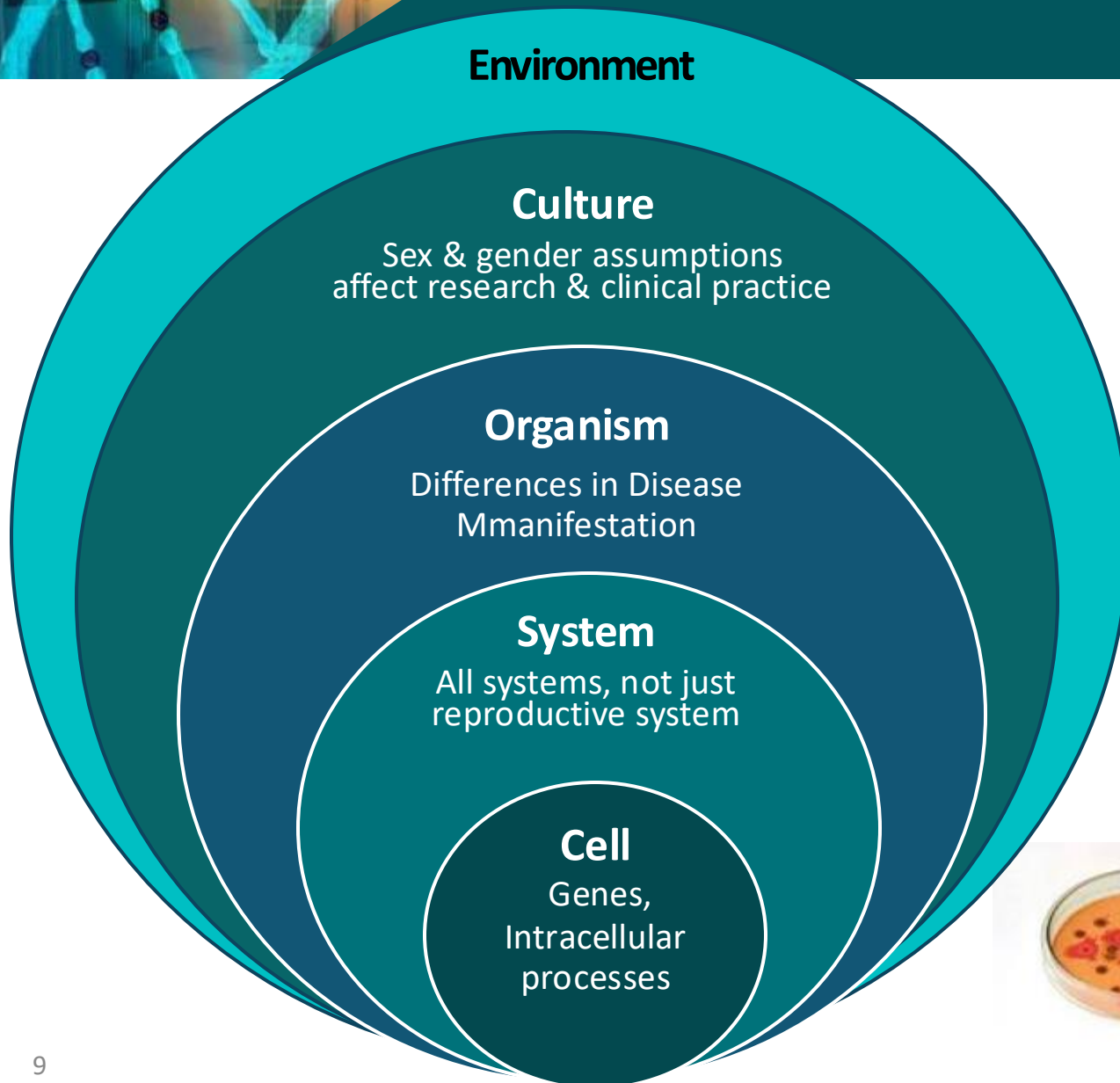


Health of Women Across the Life Course





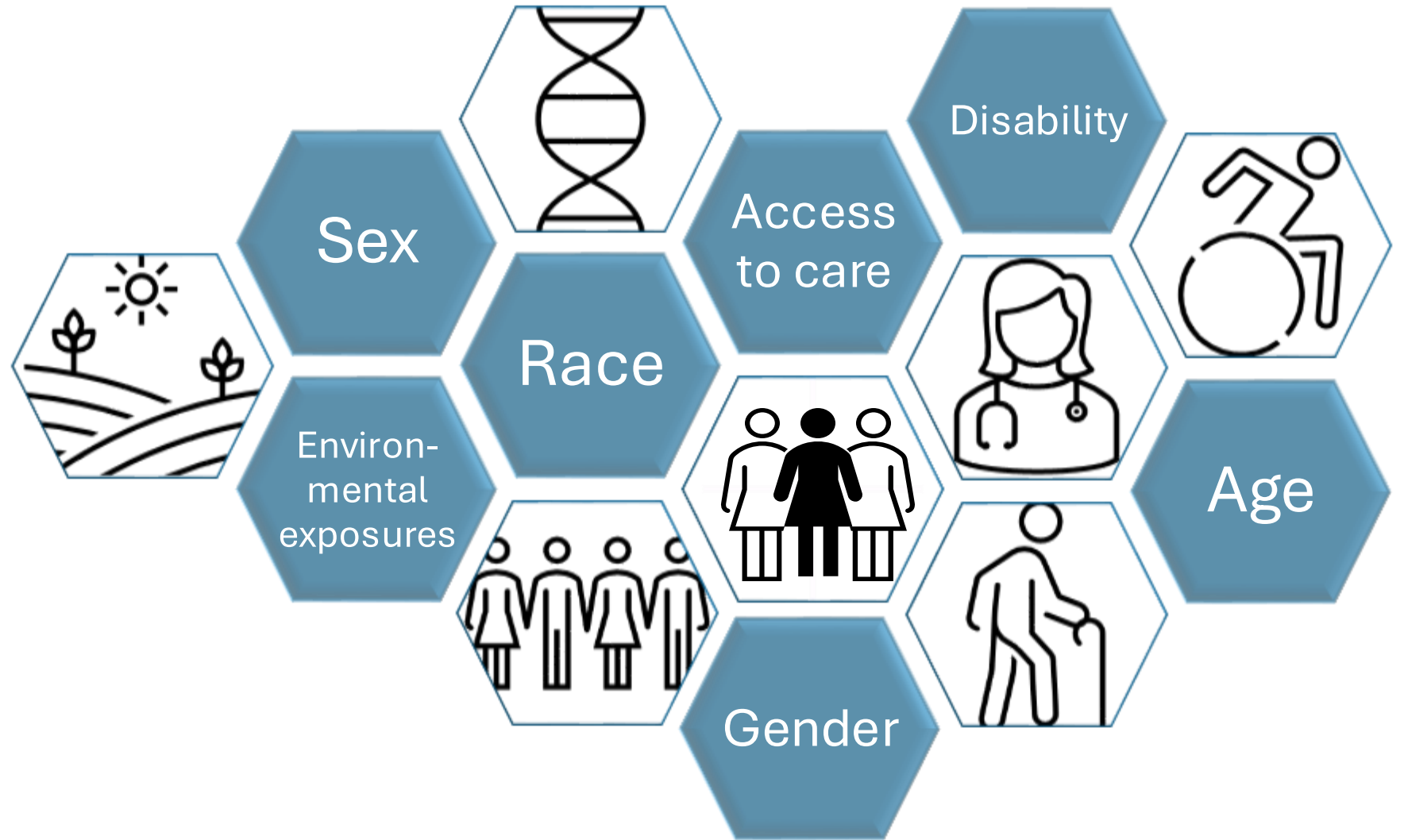
Biopsychosocial Interactions of Biology and Culture



Gendered assumptions
affect the ***nature***,
interactions, and
practices of

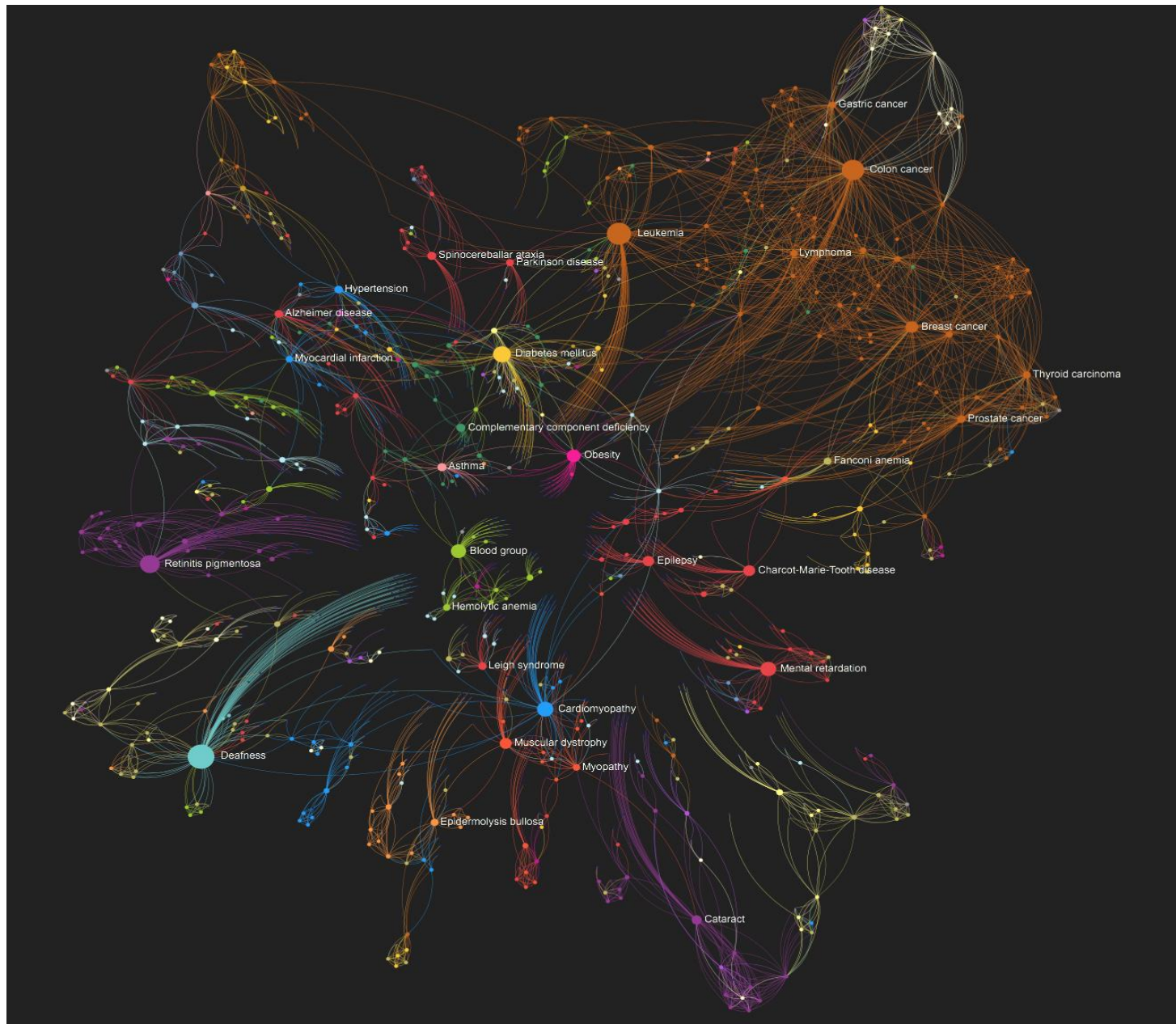
- Researchers
- Research participants
- Communities
- Institutions

***Society,
Policy,
and
Biology
Influence
Human
Health***



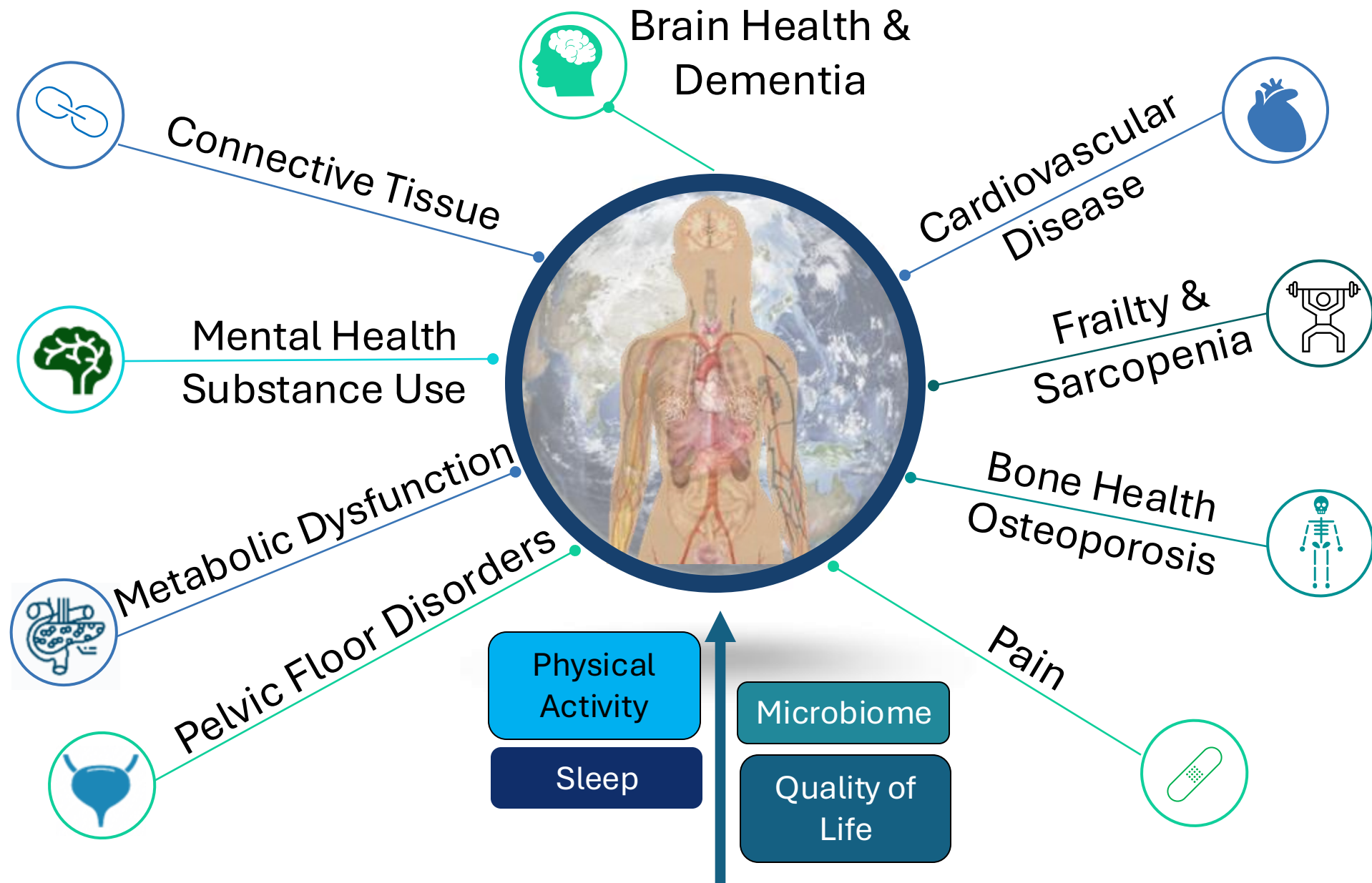


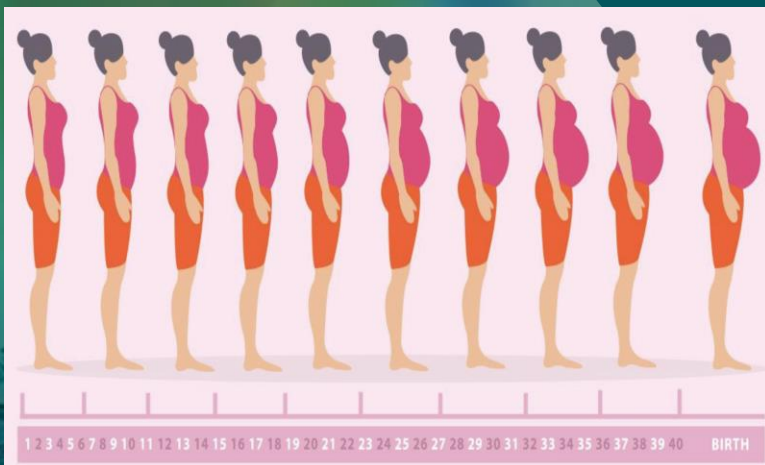
Society, Policy, and Biology Influence Human Health



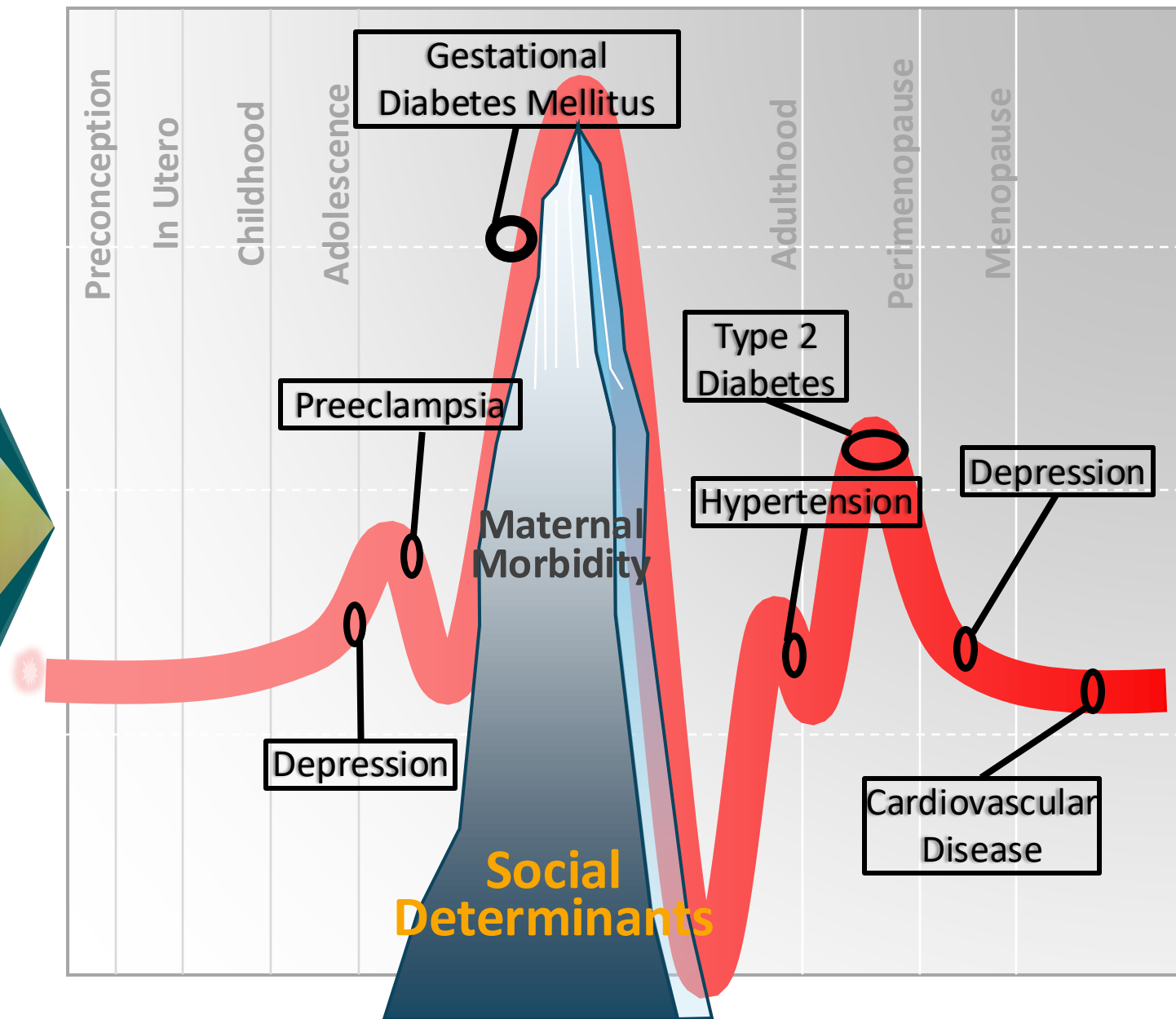
Greene, CS, et al, (2015) *Nature Genetics*, 47, 569-576. <https://doi.org/10.1038/ng.3259>
<https://visual.ly/community/interactive-graphic/health/network-graph-human-diseases>

Whole Person Health

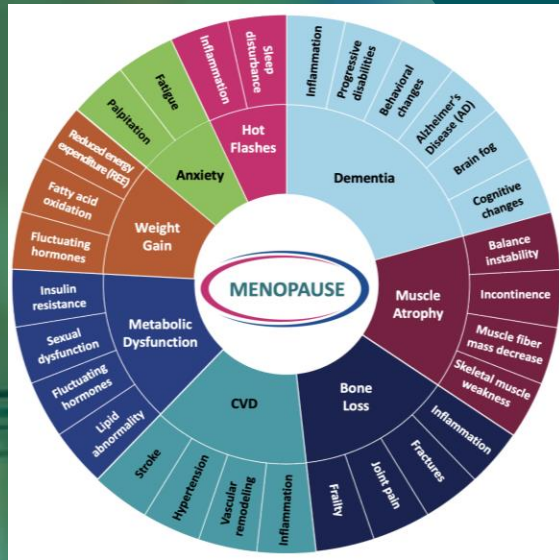




Pregnancy: Can be a Stress Test

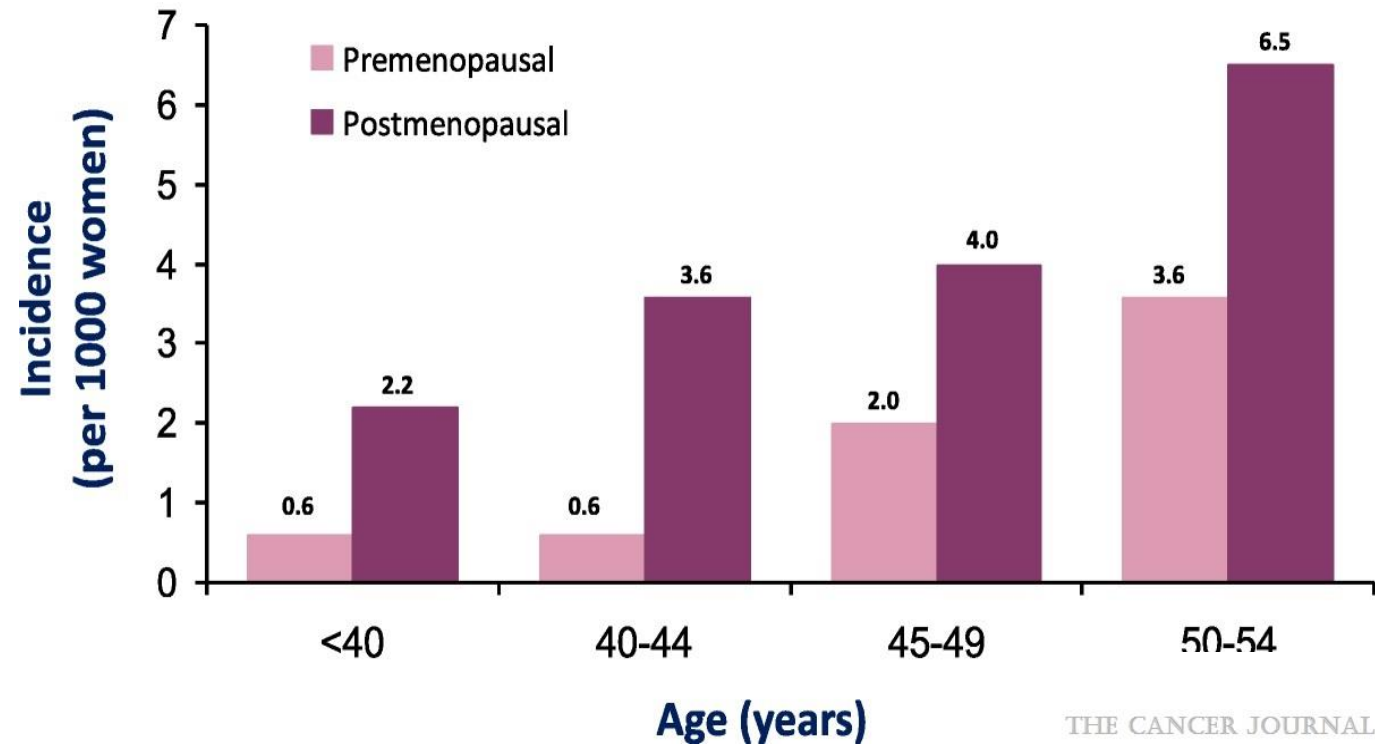


Postmenopausal Women: At *Higher* Cardiovascular Disease Risk Than Premenopausal Women



Midlife:
Pivotal Time for
Onset of Chronic
Diseases Among
Women

14

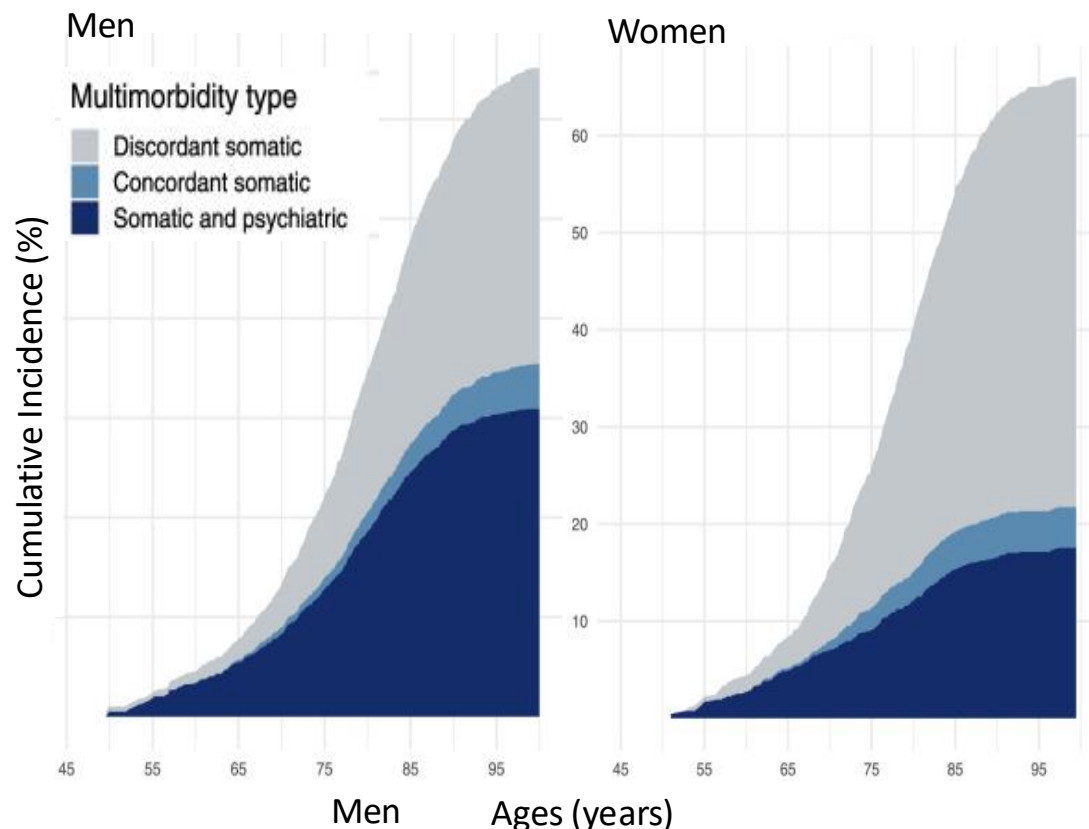


*Critical to address the role of menopause in
the health of midlife women for preventing,
diagnosing, and treating chronic disease*

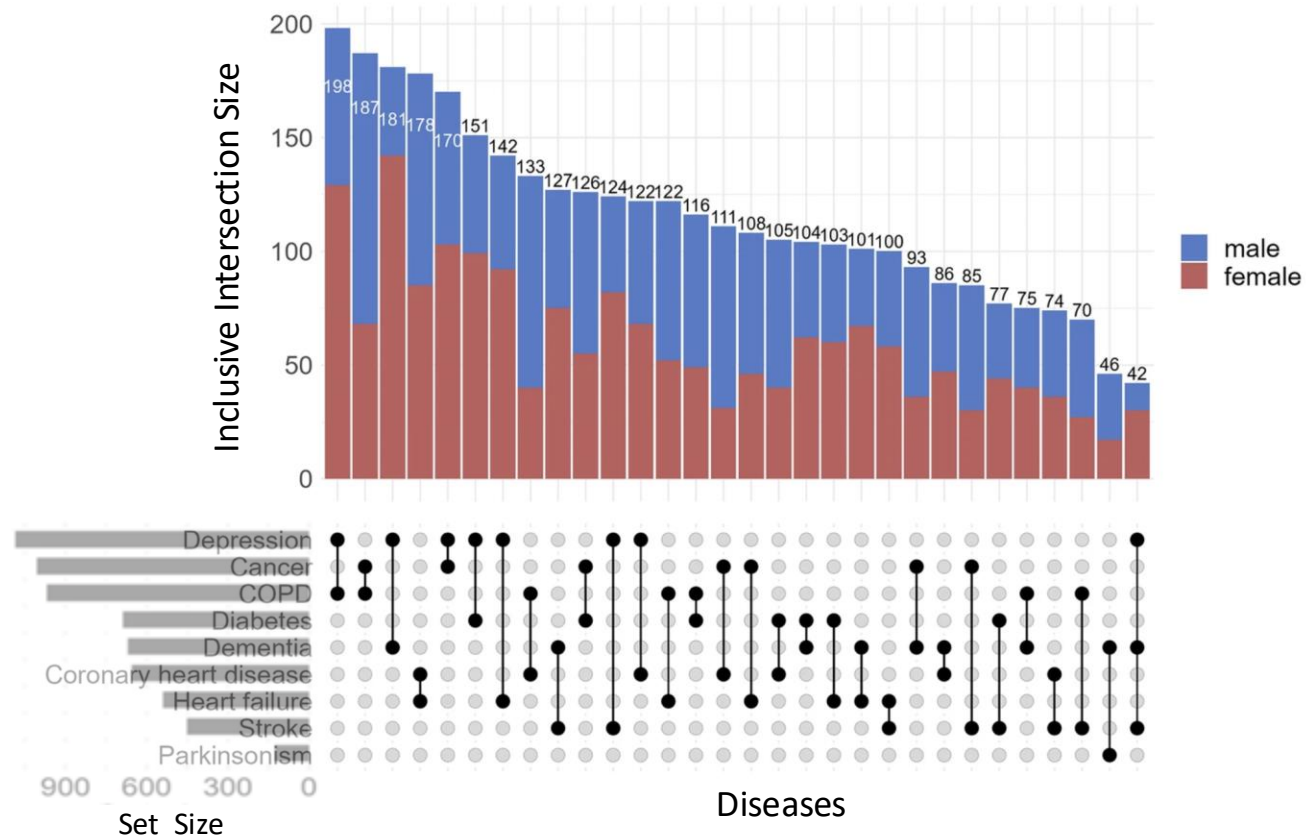


Midlife: Pivotal Time for Onset of Chronic Diseases Among Women

Multimorbidity Type



Patterns of Disease Co-morbidity



DOES SEX MATTER?

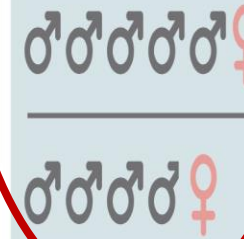
SEX MATTERS

“[Sex]...is an important basic human variable that should be considered when *designing and analyzing the results of studies in all areas* and at *all levels of biomedical and health related research*”

Before 1993,
most testing done in clinical trials
and diagnostic and device
development was conducted on men.



Male animals
outnumber females
5 to 1 in pharmacology
studies—and 3.7 to 1 in
physiology studies.



Lung cancer is the #1 cause
of cancer death in women.
More women die of lung
cancer each year than from
breast, ovarian and uterine
cancers combined.
Non-smoking women are
three times more likely than
non-smoking men to get it.



Twice
as many women as
men suffer from
depression in the U.S.
It is the leading cause
of disability in women.



Women are
3/4 of the
5.4 MILLION
people suffering from
Alzheimer's disease
Yet
66%
of the animals used in
neuroscience research are male
or of unreported gender.

Cardiovascular disease is
the #1 killer of **WOMEN** in
the US, yet only 1/3 of the
participants in clinical
trials are female.



78% of
Americans with
autoimmune
disease are
women—it is
estimated that
50 million
people
are afflicted.

Not until 2016
were female mice mandated to
be included in research by NIH.



38% of animal studies
researching strokes
used females—
although these
conditions occur
more often
in women.



Fewer than 45% of animal studies of
anxiety and depression use female lab
animals, although these disorders are
twice as common in women.



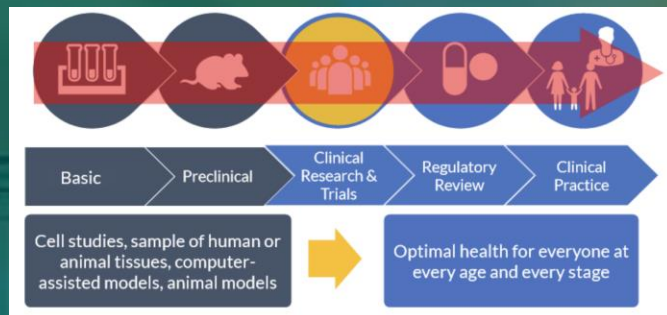
MALE STUDIES
FEMALE STUDIES

While many brain
disorders show substantial
differences across
gender, animal studies
using only males
outnumber studies
that include females
5.5 to 1.

A woman's
risk of developing
Alzheimer's
disease is almost
2X
(TWO TIMES)
that of a man,
and not just
because women
live longer.

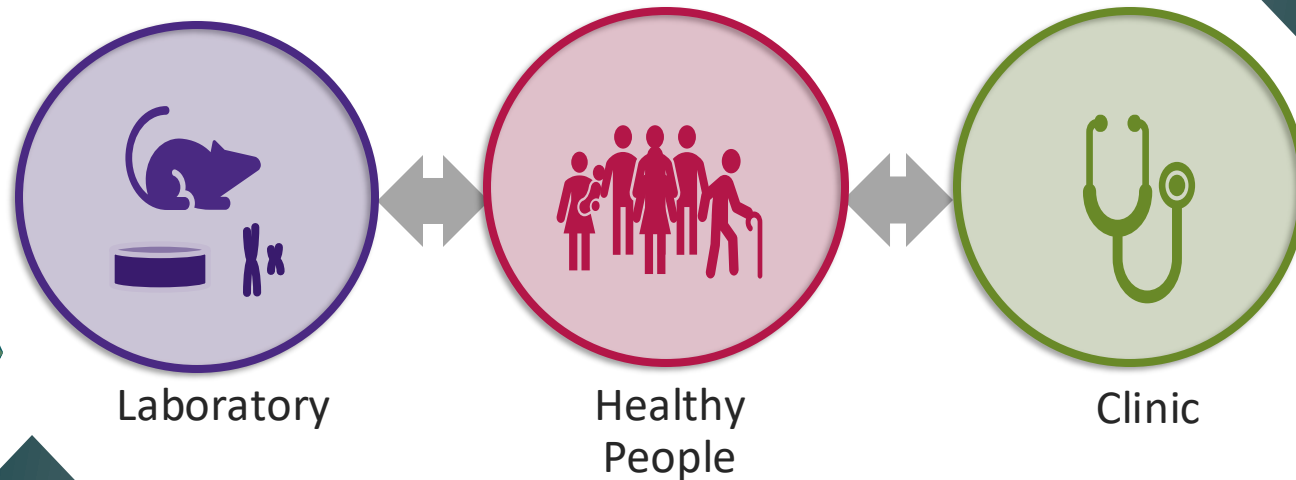


NIH SEX AS A BIOLOGICAL VARIABLE POLICY



Incorporating
Sex & Gender in the
Research Continuum
Advances Rigor,
Discovery,
Innovation, and
Equity

Preclinical Studies | Translational | Phase I, II, III, IV Clinical Trials



Cell, Animal Studies | Sex-specific Results Reporting | Sex Analyses

Health & Science Policy | Health Care | Careers & Education



NIH National Institutes of Health
Office of Research on Women's Health



Sex

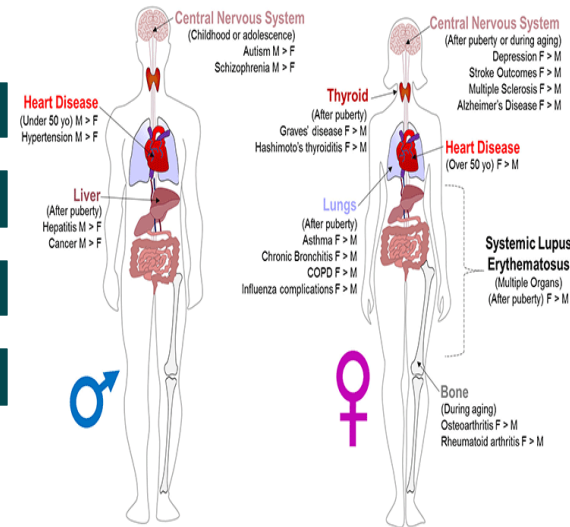
Biological Factors

Anatomy

Physiology

Genetics

Hormones



Social, Psychological, & Cultural Factors

Gender

Identity

Roles & Norms

Relations

Power

Social Determinants of Health



Exposure

Sex & Gender

Health Impact

<https://orwh.od.nih.gov/sex-gender>

NIH Sex & Gender Website

¹Exploring the Biological Contributions to Human Health: Does Sex Matter, IOM Report, 2001

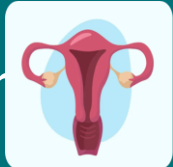



²The Integration of Sex and Gender Considerations into Biomedical Research: Lessons from International Funding Agencies, JCEM, 2021

Women's Health Burden



(Closing the Women's Health gap: A \$1 Trillion Opportunity to Improve Lives and Economies | McKinsey and Company, January 2024)

(* Based on current evidence)

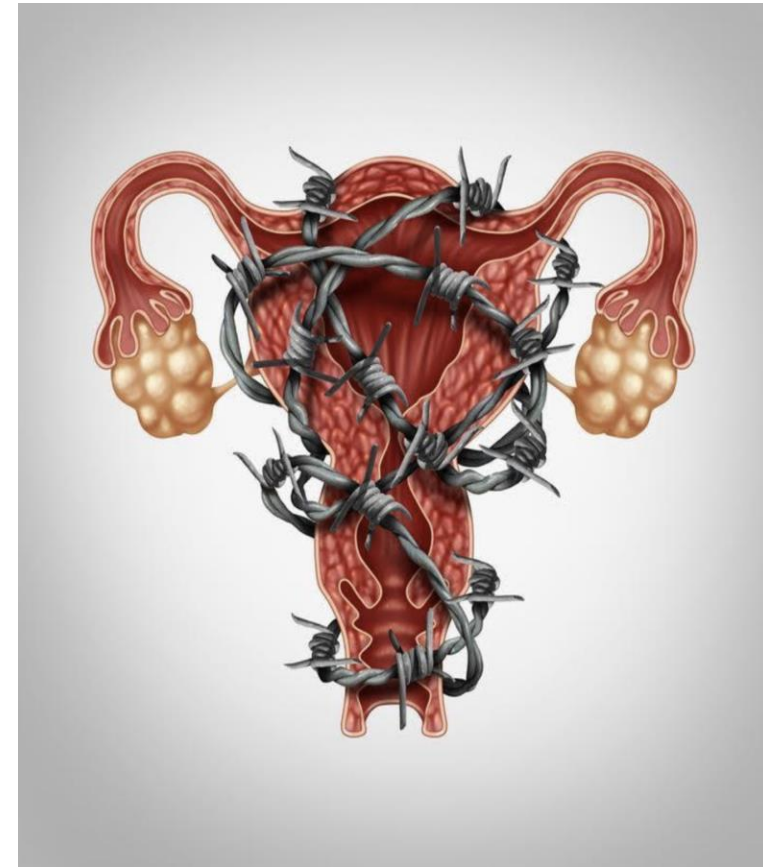
| Condition Type | Examples |
|---|---|
| Distinctly Female Specific | <ul style="list-style-type: none">• Endometriosis• Cervical Cancer• Menopause  |
| Disproportionately Affect Women | <ul style="list-style-type: none">• Autoimmune Disease• Osteoarthritis• Chronic Pain  |
| Present and Progress Differently in Women | <ul style="list-style-type: none">• Cardiovascular Disease• Stroke• Metabolic Disorders  |
| Doesn't Disproportionately or Differently Affect Women |  |

Endometriosis

Chronic disease of endometrial-type tissue that lines the uterus growing outside the uterus

Distinctly
Female

- Inflammation and scar tissue forming mainly in the pelvic region
 - *Affects ~10% (190 million) of reproductive age women and girls*
 - *Can start at first menstrual period and last until menopause*
 - *Excessive menstrual cramps, abnormal or heavy menstrual flow and pain during intercourse*
- *Sever, life-impacting pain--bowel movements, urination, and/or sexual intercourse*
- *Chronic pelvic pain, abdominal bloating, nausea, and fatigue*
- Infertility and difficulties getting pregnant
- Can decrease quality of life due to *debilitating pain, depression, and anxiety*
- Currently *no known cure*; treatment aimed at symptom control
- Significant social, public health and economic implications



Autoimmune Diseases

**Disproportionately
Impacts Women**

Brain & Nervous System

Multiple Sclerosis

Eye and Mouth

Sjogren's Syndrome
Uveitis (eye)

Lungs

Autoimmune
Pulmonary Fibrosis

Thyroid

Grave's Disease/Hashimoto's
Thyroiditis

Kidneys

Lupus
Juvenile Diabetes
Glomerulonephritis

Heart

Cardiomyopathy
Autoimmune Myocarditis

Gastrointestinal

Crohn's Disease
Celiac Sprue

Skin

Pemphigus
Scleroderma

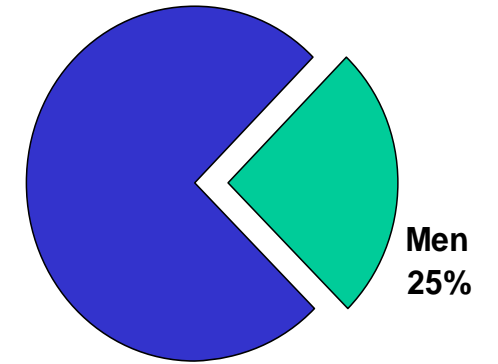
Joints

Rheumatoid Arthritis

Blood

Hemolytic Anemia
Neutropenia
Autoimmune Thrombocytopenic Purpura
Pernicious anemia

Women
75%



Men
25%

- Autoimmune diseases affect 7-8% of U.S. population (*23.5 million Americans*)
- 4X more women than men affected by autoimmune diseases

Cardiovascular Disease

Present and
Progress
Differently in
Women

- Women with **myocardial infarction** receive *less guideline-based diagnosis* and less-invasive treatment than men¹
- Women with **atrial fibrillation** receive *less anticoagulation treatment with warfarin*. Even so, they have a *greater risk for stroke than men*²
- Women are *less likely to receive Cardiopulmonary Resuscitation (CPRP from EMTs at an emergency*³



⁽¹⁾ Regitz-Zagrosek V. Therapeutic implications of the gender-specific aspects of cardiovascular disease. Nat Rev Drug Discov 2006; 5: 425–438.

⁽²⁾ Humphries KH et al. New-onset atrial fibrillation: sex differences in presentation, treatment, and outcome. Circulation 2001; 103: 2365–2370.

⁽³⁾ Rubenson Wahlin R, et al. Do male and female trauma patients receive the same prehospital care?: an observational follow-up study. BMC Emerg Med. 2016; 16: 6

Regitz-Zagrosek V. Sex and gender differences in health. EMBO Rep. 2012 Jul; 13(7): 596–603

Gaps and Incomplete Knowledge



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention














About 20% of women
report mistreatment while
receiving maternity care

THE LANCET

Globally, cancer
ranks in Top 3
Causes of
Premature
mortality
among women

80%

People living
with
autoimmune
diseases are
women

| Risk factors  | Diagnosis  | Treatment  | Outcomes  |
|--|---|--|---|
|  Differences in prevalence of risk factors  Differences in strength of the risk factors  Sex specific risk factors (APO, early menopause, hormonal factors) |  Less complete evaluations  More likely diagnosed with stroke mimic |  Less likely given IV rtPA; more likely given endovascular thrombectomy  Under-representation of women in trials |  Larger number of deaths per year  Higher disability after stroke |

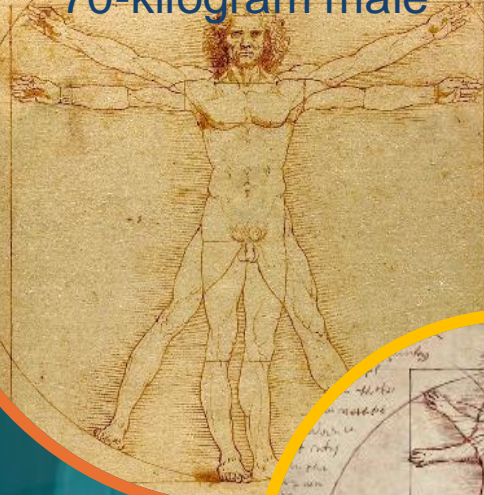
Strokes in Women¹

¹Rexrode, et al. 2022. *Circ Res*. DOI: 10.1161/CIRCRESAHA.121.319915

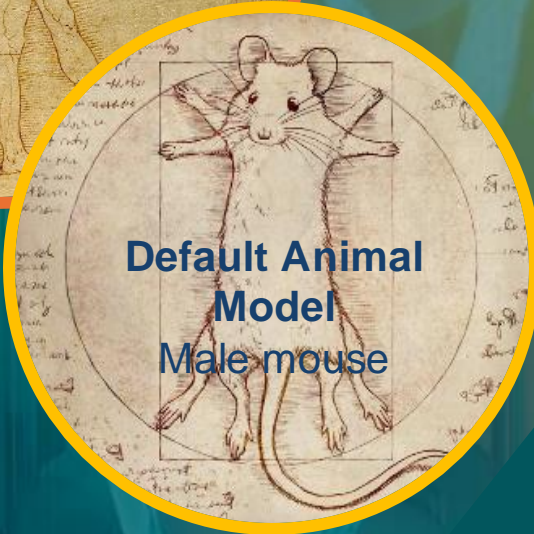
²Presto, et al. 2022. *Neuropharmacology*. DOI: 10.1016/j.neuropharm.2022.109030

Default Human (and Mouse) Models: The 70-kg male

Default Human
70-kilogram male



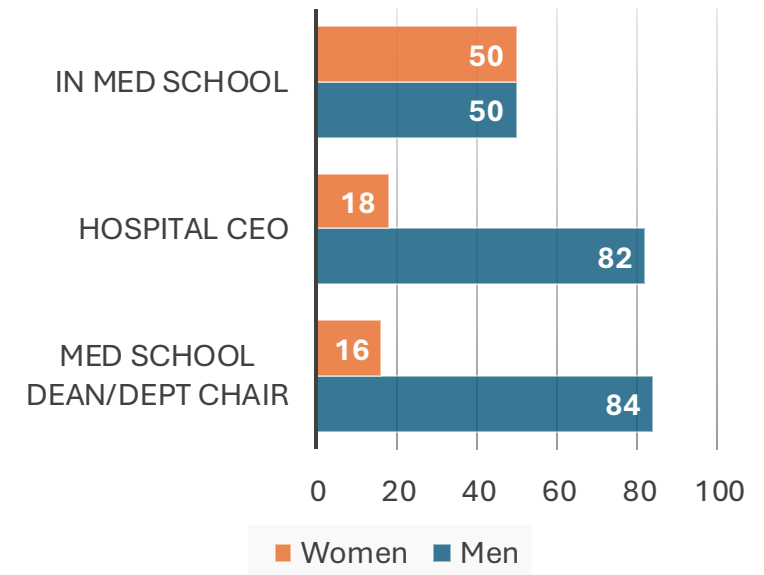
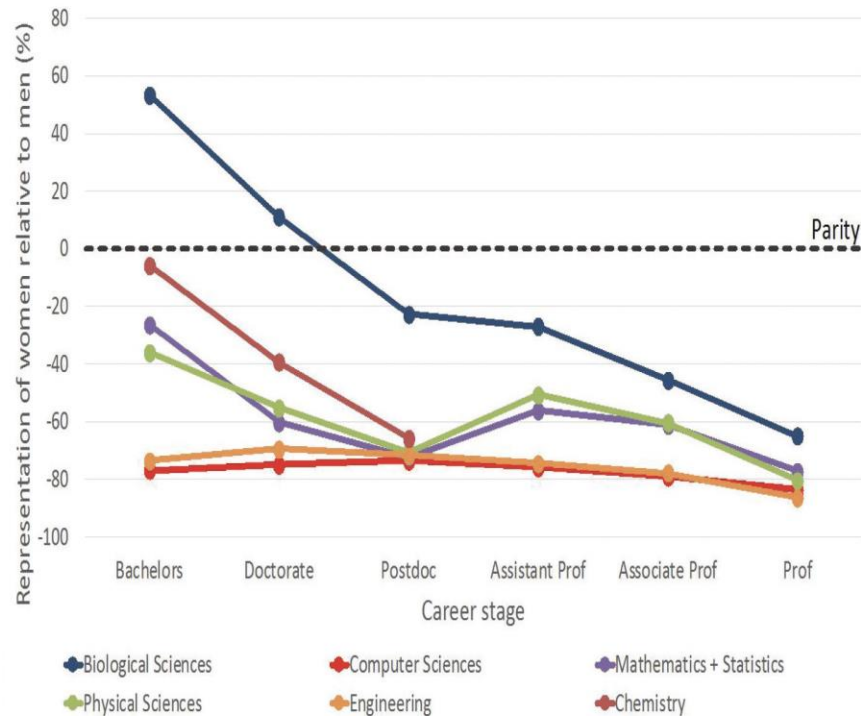
Default Animal
Model
Male mouse



- Assumed *fundamental* biology with **shared** molecular, biochemical and physiologic characteristics
 - Other factors include protectionism, paternalism, women's menstrual cycle
- **Preponderant Use of Males** in preclinical research
- **Unidimensional Research**
 - Knowledge generated applied to women (e.g., medications prescribed to women)
- Too little research on diseases & conditions of women that have led to evidence gaps

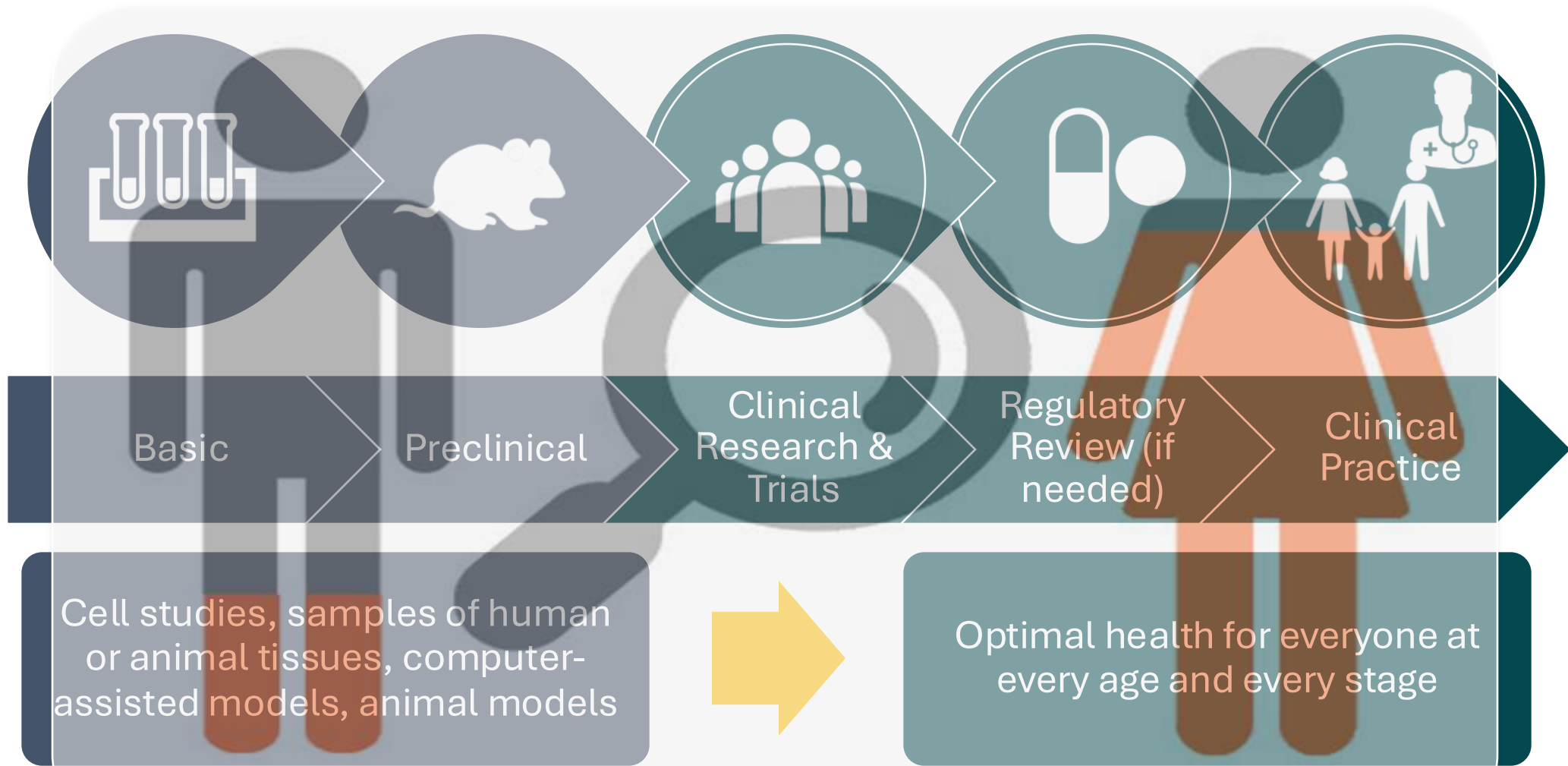
It's Not Only the Science: Careers and A Braided River

SYSTEM ISSUE: *Many women who begin scientific and medical careers do not attain equal status or leadership. This disparity is not because women are less capable or qualified*



National Academy of Sciences. 2020. Promising Practices for Addressing Underrepresentation of Women in Science, Engineering, and Medicine: Opening Doors. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25585>.

Researcher and Research Continuum



White House Women's Health Research Initiative

NOVEMBER 17, 2023

Launch of White House Initiative on Women's Health Research



▶ [GPC](#)

▶ [BRIEFING ROOM](#)

▶ [BLOG](#)

On November 13, President Biden announced the first-ever White House Initiative on Women's Health Research, an effort led by First Lady Jill Biden and the White House Gender Policy Council.



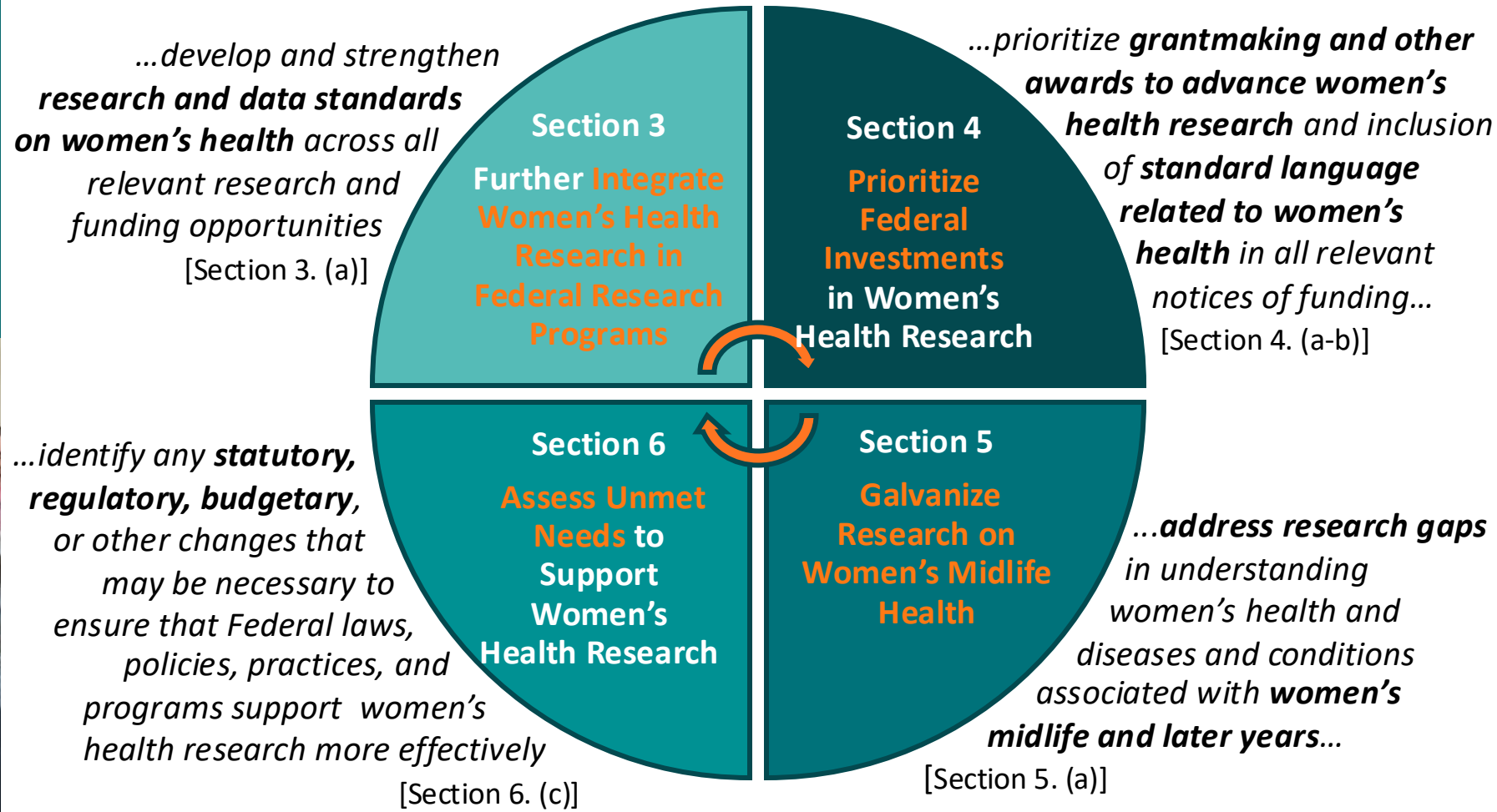


Executive Order 14120

Advancing Women's Health Research and Innovation



Comprehensive set of Executive Actions to expand and improve research on women's health



MARCH 18, 2024

Executive Order 14120

U.S. Government Partners



Department of
Veterans Affairs



Office of
Management and
Budget



Department of
Defense



Center for Medicare
& Medicaid Services



National Institutes
of Health



Department of
Health and
Human Services



National Science
Foundation



U.S. Food and Drug
Administration



U.S. Department of
Agriculture



U.S. Environmental
Protection Agency

- Collaborative, Multi-agency, Cross-cut Program
- 11 Federal Departments/Agencies
- Advance *new, interdisciplinary, transformative* research and development in women's health

NEW

The NIH Women's Health Central Resource

**INFORMATION ABOUT ADVANCEMENTS
OF NIH WOMEN'S HEALTH RESEARCH**

- **SINGLE PLACE TO FIND**
 - Research Projects
 - Health Issue Information
 - Research Funding Opportunities, and
 - Medical Literature
- **FOR**
 - Patients, caregivers, researchers, medical professionals, and the public
- **FUTURE FEATURES**
 - Additional Health Issues
 - Additional Search capabilities

NIH Discover Women's Health Research Resource

For health conditions that uniquely, disproportionately, and/or differently affect women across their lifespan.



<https://discoverwhr.nih.gov/>



Autoimmune diseases

- Lupus
- Rheumatoid Arthritis
- Scleroderma



Polycystic Ovary
Syndrome (PCOS)



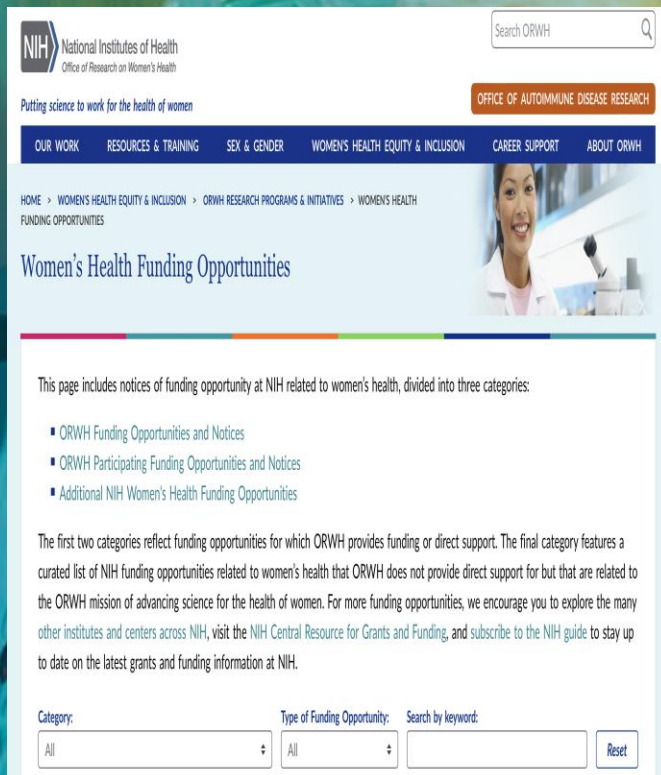
Menopause

NEW

The NIH Women's Health Funding FRONT DOOR

The Front Door: *NIH Women's Health Funding Opportunities*

- *ORWH Opportunities and Notices*
- *ORWH Participating* Funding Opportunities and Notices
- **Additional NIH Women's Health Funding Opportunities**
 - Highlights +45 NIH Notices of Funding Opportunities (NOFOs)
 - Features ~200 NOFOs
(Regularly Updated)



<https://orwh.od.nih.gov/mmm-portal/funding-opportunities>

NEW

Notice of Special Interest: Women's Health Research

First Available Due Date: May 6, 2024
Expiration Date: November 5, 2027

- Aligned with *White House Initiative on Women's Health Research*
- **Highlights NIH interest** in receiving research applications focused on diseases and health conditions that:
 - **PREDOMINANTLY AFFECT WOMEN** (e.g., autoimmune diseases; depressive disorders, Alzheimer's disease and Alzheimer's disease-related dementias, gender-based-violence)
 - **PRESENT AND PROGRESS DIFFERENTLY IN WOMEN** (e.g., cardiovascular disease; HIV; reproductive aging and its implications), or
 - **ARE FEMALE-SPECIFIC** (e.g., uterine fibroids; endometriosis; menopause)

<https://grants.nih.gov/grants/guide/notice-files/NOT-OD-24-079.html>

NIH-Wide Expansion of Funding Pathways for Women's Health Research

Women's Health Research Funding

41 Distinct Opportunities for Women's Health Funding

466 Unique Pathways



NOT-OD-24-079

Research Grants

7 Announcements for Unsolicited or Investigator-Initiated Research Projects

15 Announcements for Solicited Research Projects

Career Development Grants

10 Announcements for Career Development Awards

Fellowship Grants

5 Announcements for Fellowships

Small Business Grants

Omnibus Solicitation Small Business Innovation Research Applications

Omnibus Solicitation for Small Business Technology Transfer Applications



175+ priority topics identified in the Notice

Word cloud containing terms: reproductive, menopause, understanding, addressing, mechanisms, impact, funding, influence, conditions, disparities, prevention, office, identify, projects, including, disease, develop, advance, women, specific, understand, related, research, diseases, care, well, girls, differences, factors, health, sex, use, treatment, disorders, gender, social, among, maternal, address, efficacy, outcomes, nih, pregnancy, studies, include, models, based, postpartum, chronic, populations, autoimmune, impacts, strategies, relevant, behavioral, interest, underrepresented, disproportionately, minority.

30 participating NIH Institutes, Centers, and Offices

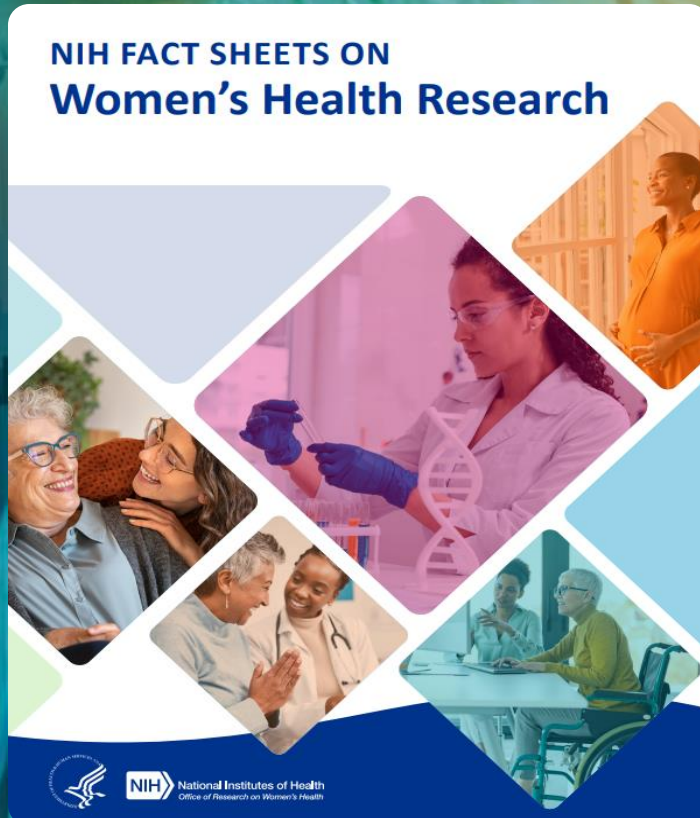


NEW



NIH FACT SHEETS on Women's Health Research

Highlights Department of Health and Human Services *Priority Topics* and *Federally Supported Research*



The Fact Sheets: *State-of-the-Science for Women's Health*

- Autoimmune Diseases
- Cancer
- Cardiovascular Disease
- Dementia
- HIV
- Maternal Morbidity and Mortality
- Menopause
- Mental Health
- Substance Use
- Violence Against Women

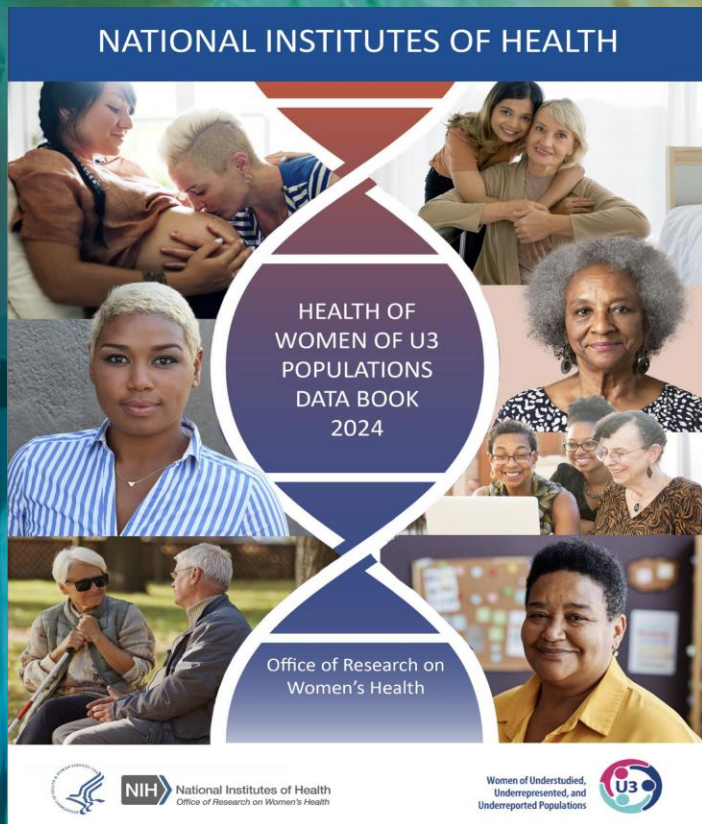
<https://orwh.od.nih.gov/in-the-spotlight/all-articles/new-resource-nih-fact-sheets-on-womens-health-research-highlights-key-womens-health-issues>

NEW

Health of Women of U3 Populations Data Book 2024

Health of Women of U3 Populations Data Book

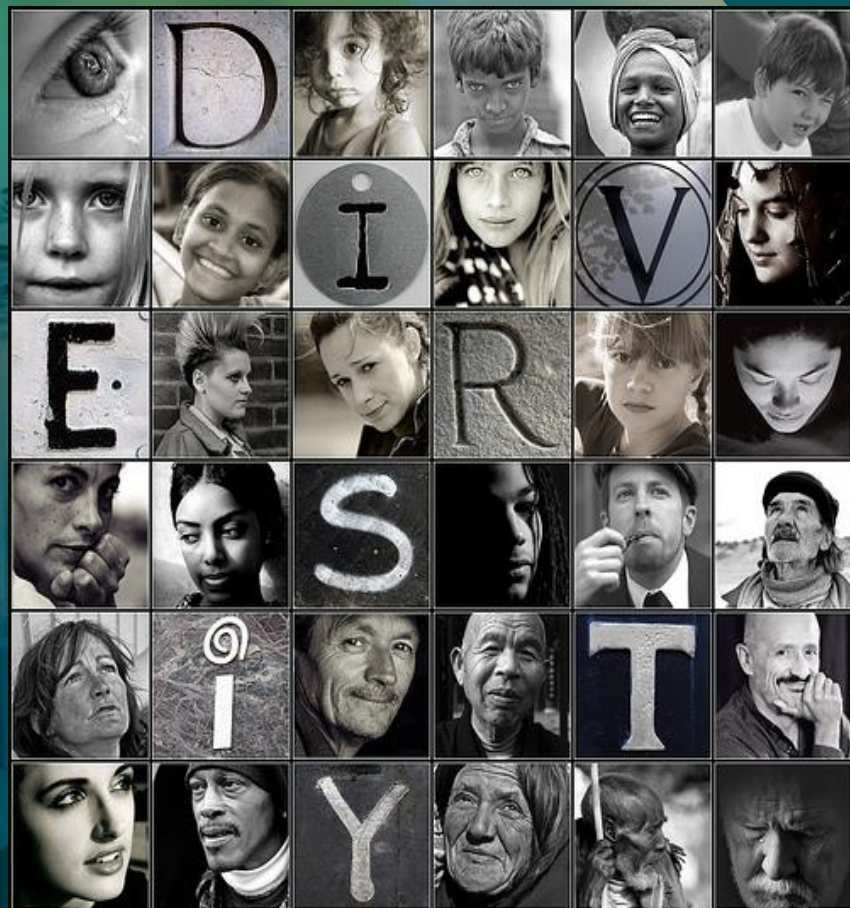
- State-of-Knowledge on the health of Underrepresented, Understudied, and Underreported (U3) women
- How social and structural factors perpetuate health disparities.



https://orwh.od.nih.gov/sites/orwh/files/docs/Health-of-Women-of-U3-Populations-Data-Book-5.10.24_508c.pdf



*Imagine a world in which
“every woman receives
evidence-based disease
prevention and treatment
tailored to her own
needs, circumstances,
and goals.”*



If not designed
to address equity,
research
will perpetuate
disparities
and injustices

- me

