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Hypertensive Disorders of Pregnancy:
Pregnancy and Beyond

Cardiovascular Symposium India
January 22, 2023

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DISCLOSURES

No relevant COI/RWI

Grant support

- AHA
- NIH

CASE PRESENTATION

- 27-year-old woman who recently had an uncomplicated delivery (G1P1) who presented 5 days postpartum with acute shortness of breath
- ED: HR 90, BP 184/83
- Exam: JVP 12-14cm H_2O; RRR, nl s1, s2, no murmurs, bibasilar crackles on pulmonary exam

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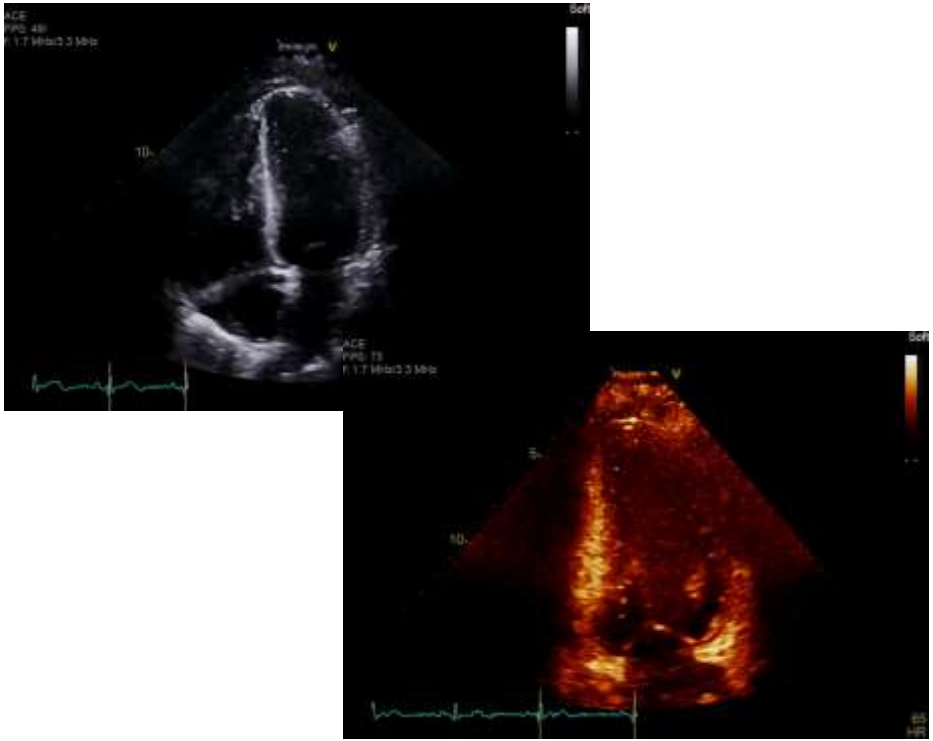

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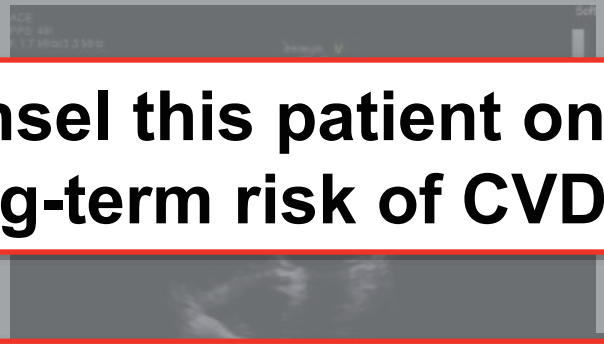

What should we counsel this patient on her short-term and long-term risk of CVD?

What evidence-based strategies exist to reduce her lifetime risk of CVD?

KEY OBJECTIVES

1. Describe the critical periods in a woman's life course during the reproductive years for CVD risk
2. Define the epidemiology of HDP and its risk factors and complications
3. Define emerging opportunities and strategies to equitably target cardiovascular health in the peripartum period

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The Female Life Course

The Female Life Course

Birth

Adolescence

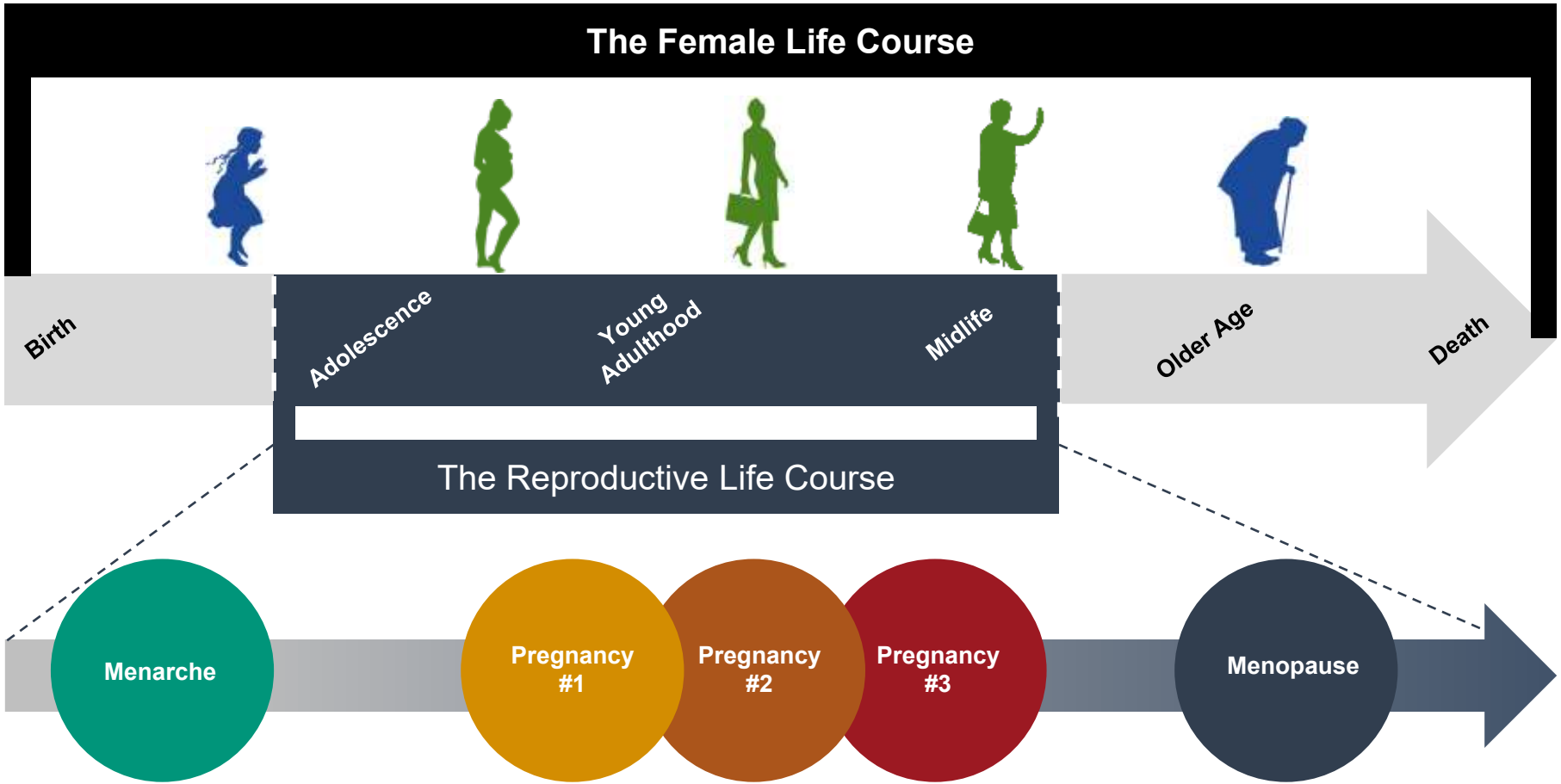
Young Adulthood

Midlife

Older Age

Death

The Reproductive Life Course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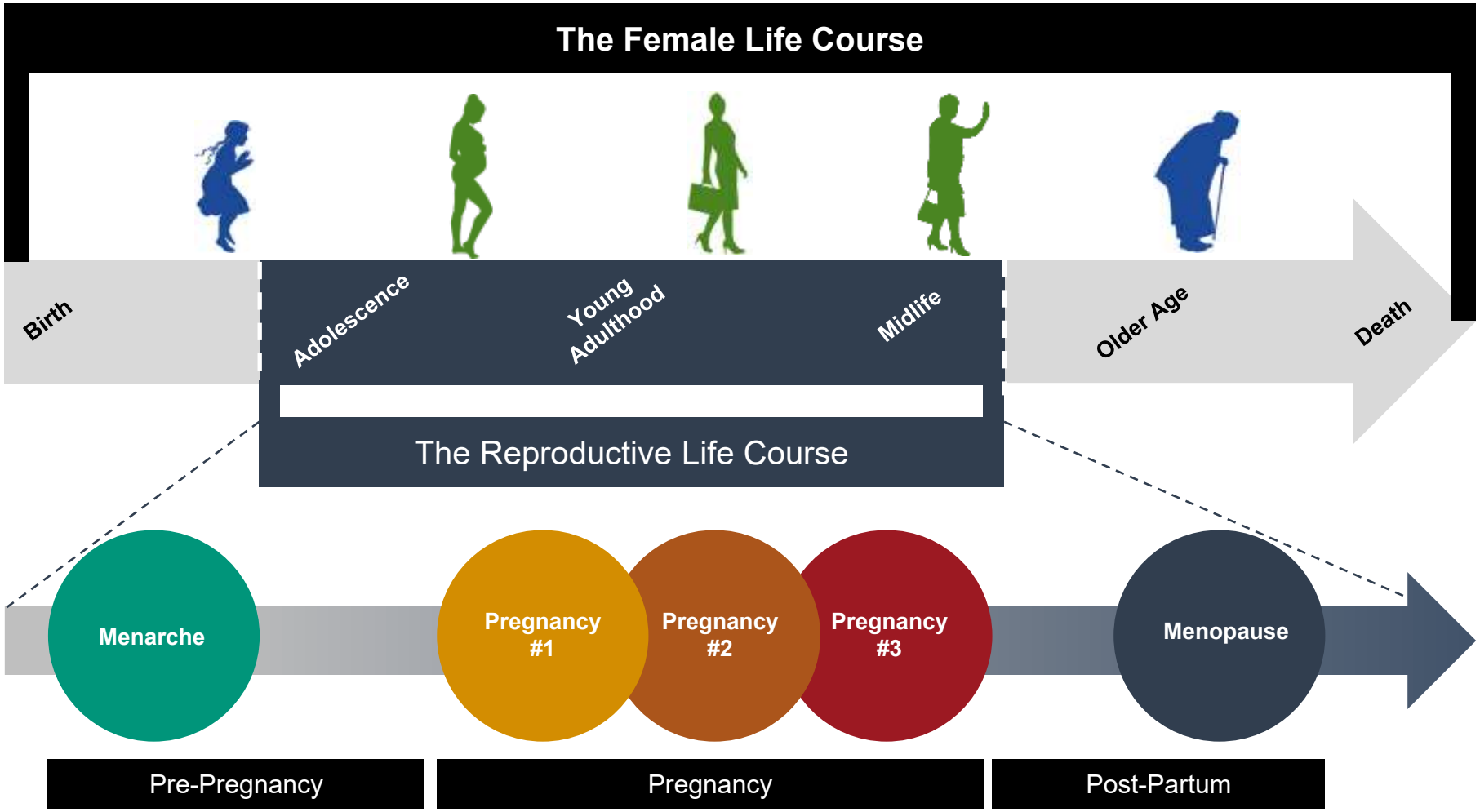
Pregnancy #3
Menopause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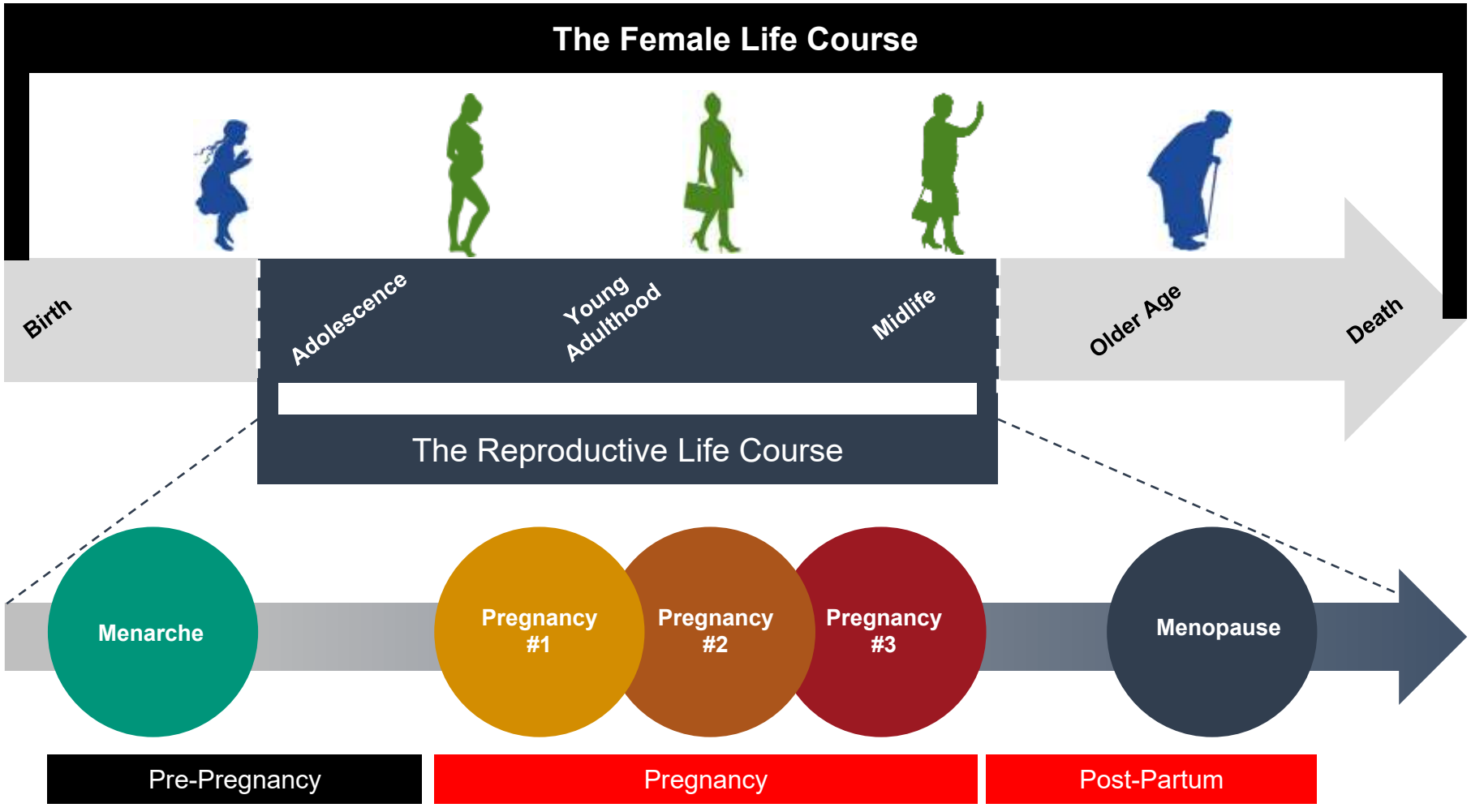
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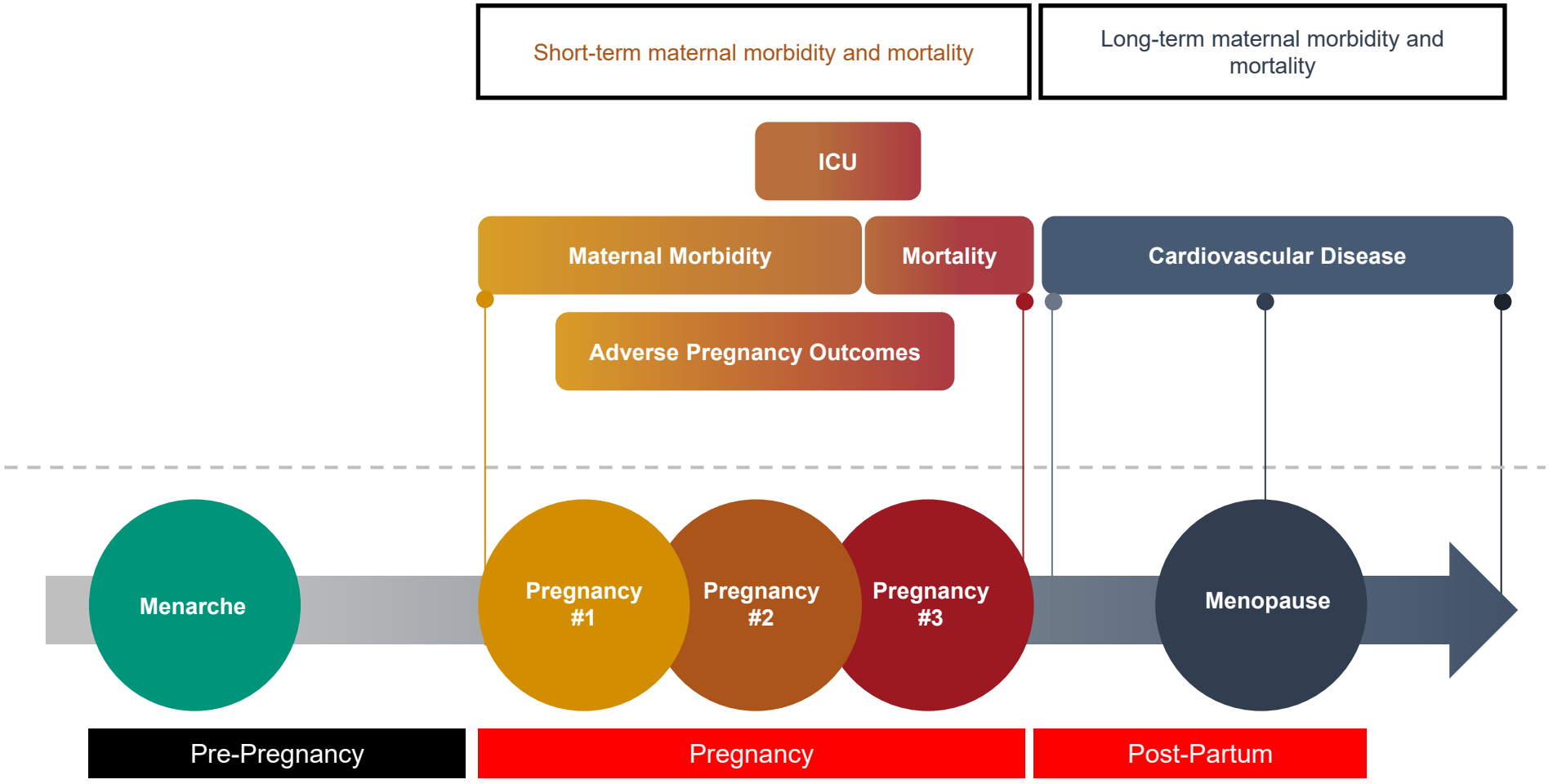
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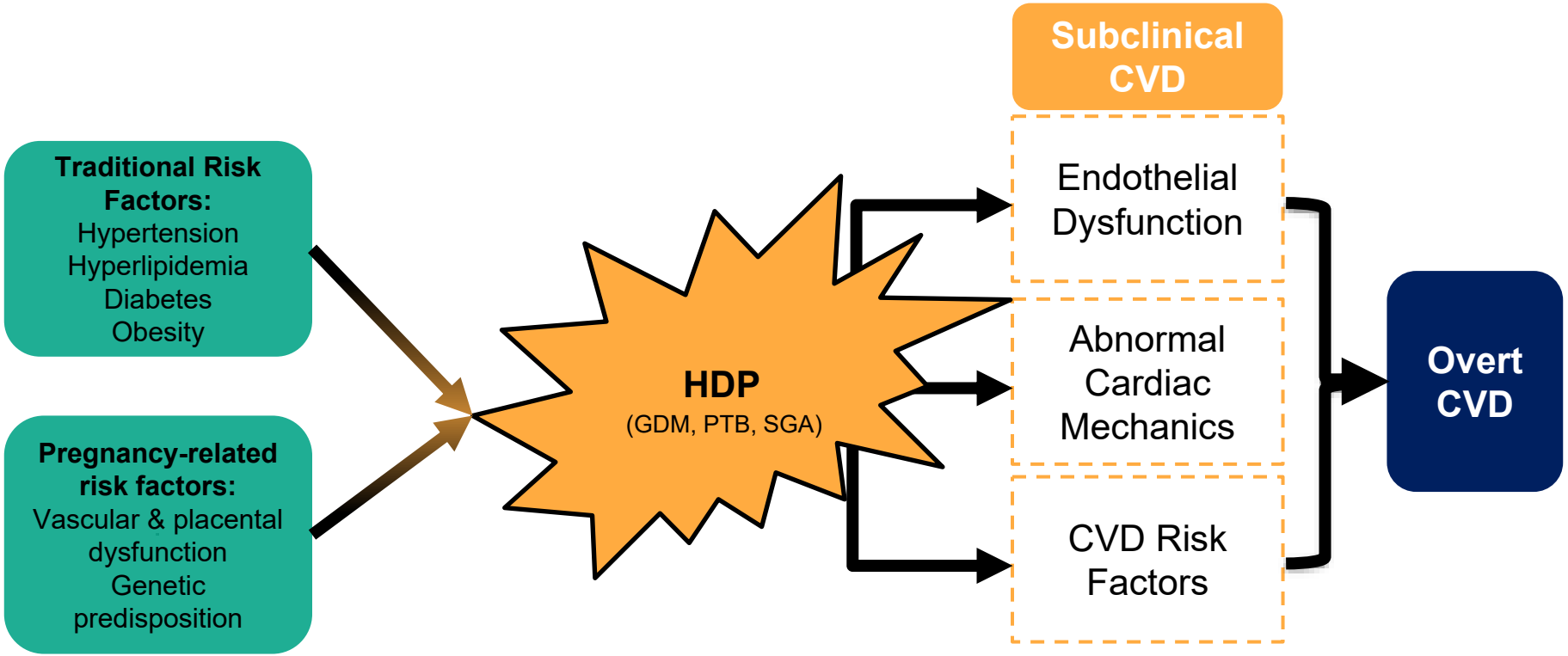
PREGNANCY = NATURE'S STRESS TEST



Adapted from Lane-Cordova et al. *JACC* 2019

DEFINITIONS: HTN SUBTYPES IN PREGNANCY

HTN Subtype	Definition
Chronic Hypertension	SBP≥140 and/or DBP ≥90 mm Hg predating pregnancy
Pre-eclampsia	New-onset hypertension and proteinuria or end-organ dysfunction (e.g., elevated liver enzymes, low platelet count, renal insufficiency) after 20 weeks gestation
Chronic hypertension with superimposed preeclampsia	Worsening BP with new-onset proteinuria or other evidence of end-organ dysfunction
Gestational hypertension	Elevated BP first detected after 20 weeks gestation without proteinuria or systemic features of PE

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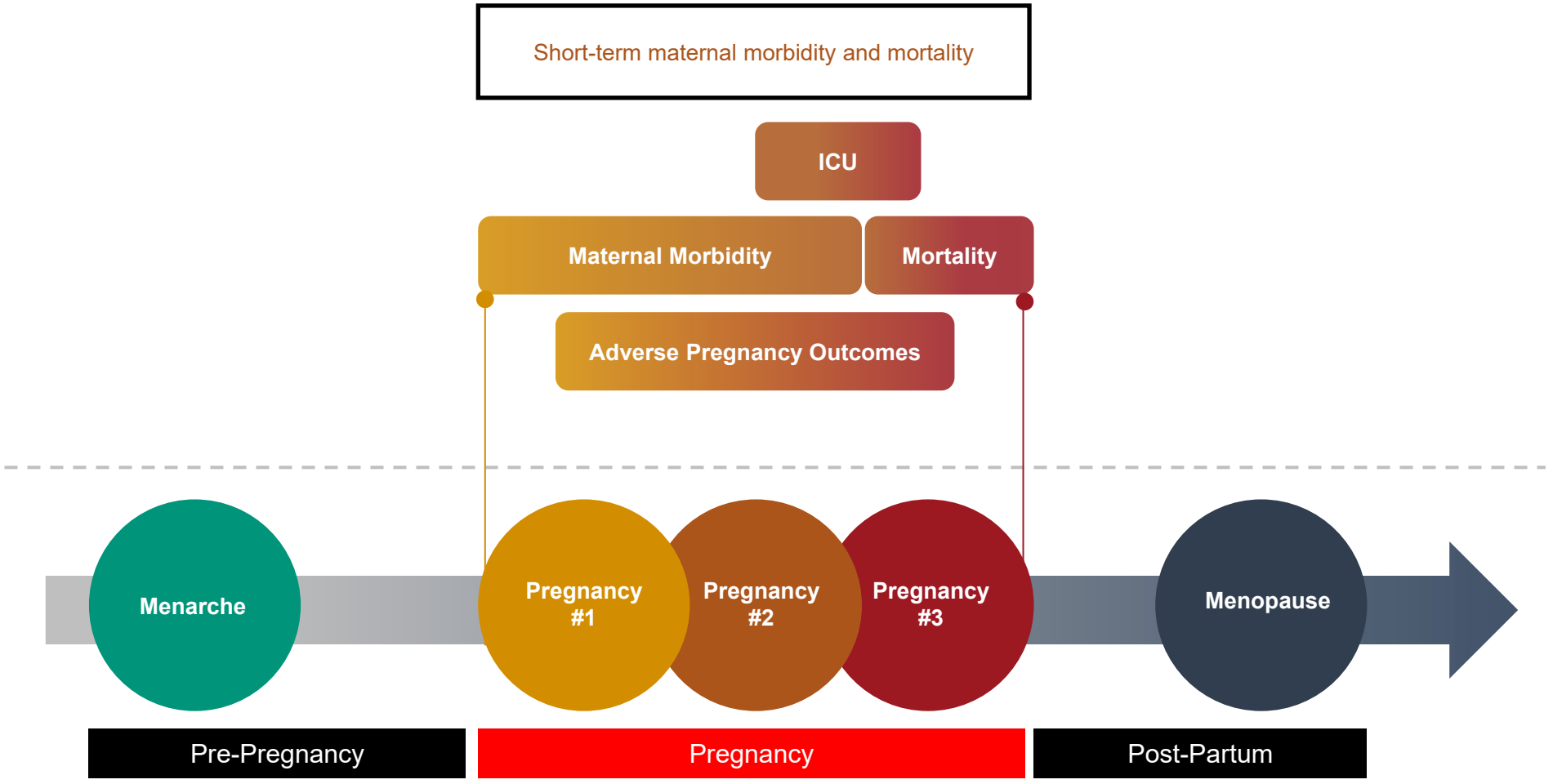
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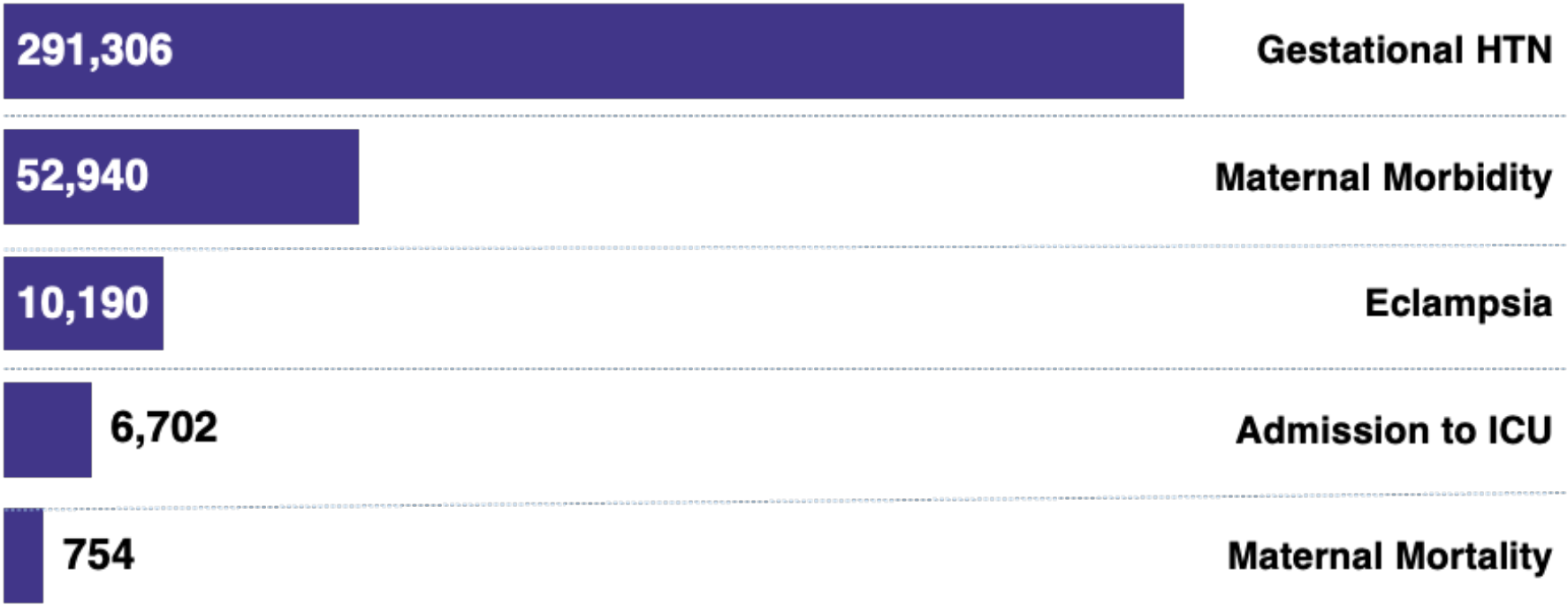
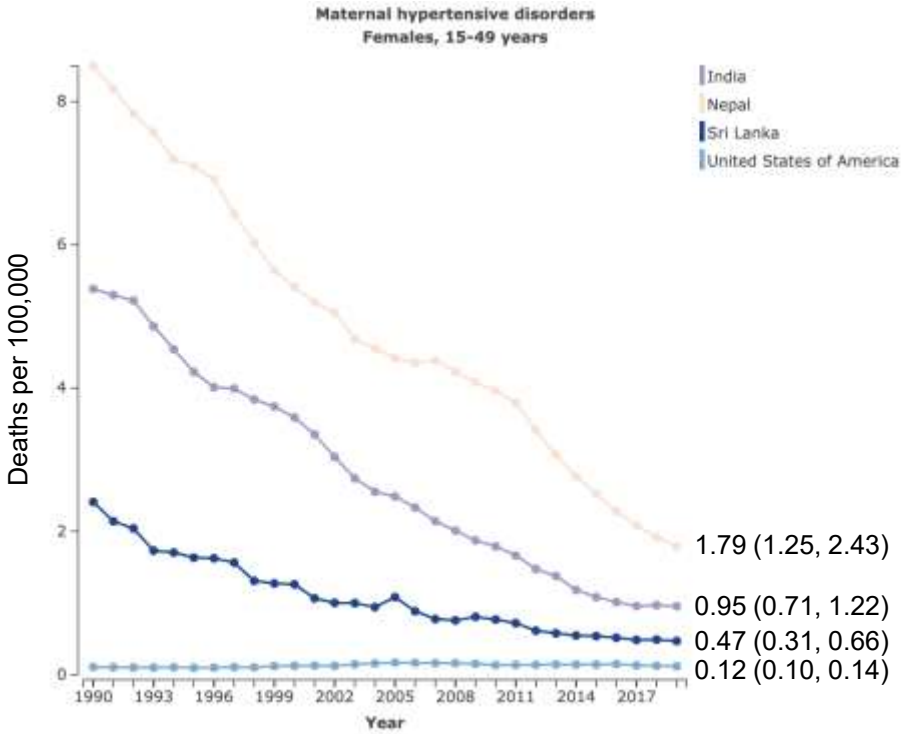
BURDEN OF MMM IN 2019 IN THE US



*Not to scale

CDC WONDER Vital Statistics 2019 accessed January 11, 2021

BURDEN OF MATERNAL HTN DEATHS: INDIA



BMC Pregnancy and Childbirth

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Research article | Open Access | Published: 05 September 2019

Utilisation, equity and determinants of full antenatal care in India: analysis from the National Family Health Survey 4

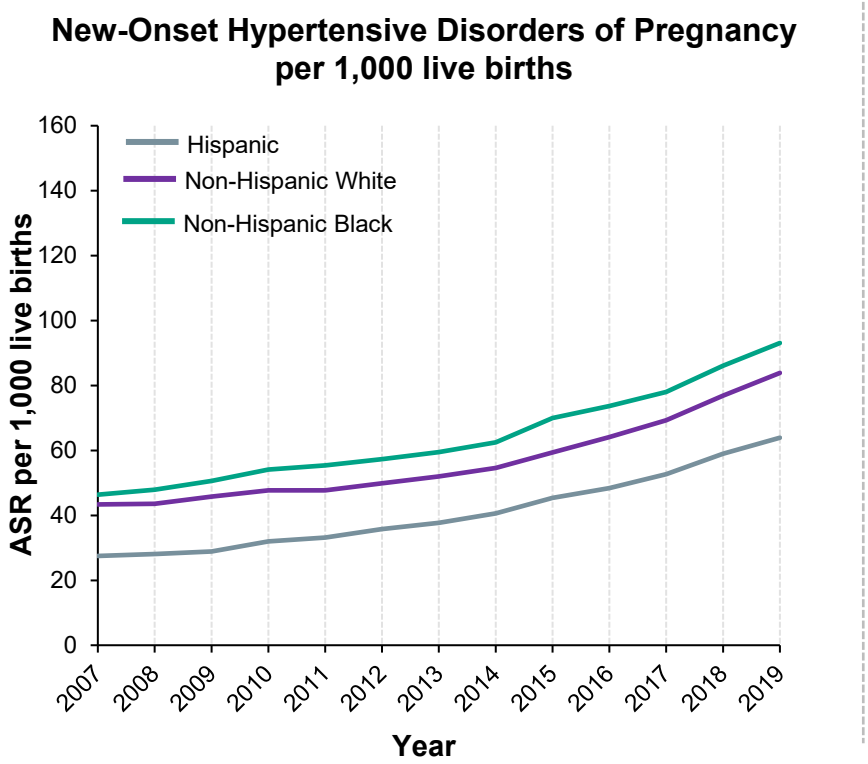
Gunjan Kumar, Tarun Shankar Choudhary, Akanksha Srivastava, Ravi Prakash Upadhyay, Sunita Taneja, Rajiv Bahl, Jose Martines, Maharaj Kishan Bhan, Nita Bhandari & Sarmila Mazumder

BMC Pregnancy and Childbirth **19**, Article number: 327 (2019) | Cite this article

17k Accesses | **43** Citations | **19** Altmetric | Metrics

**IHME GBD 2019*

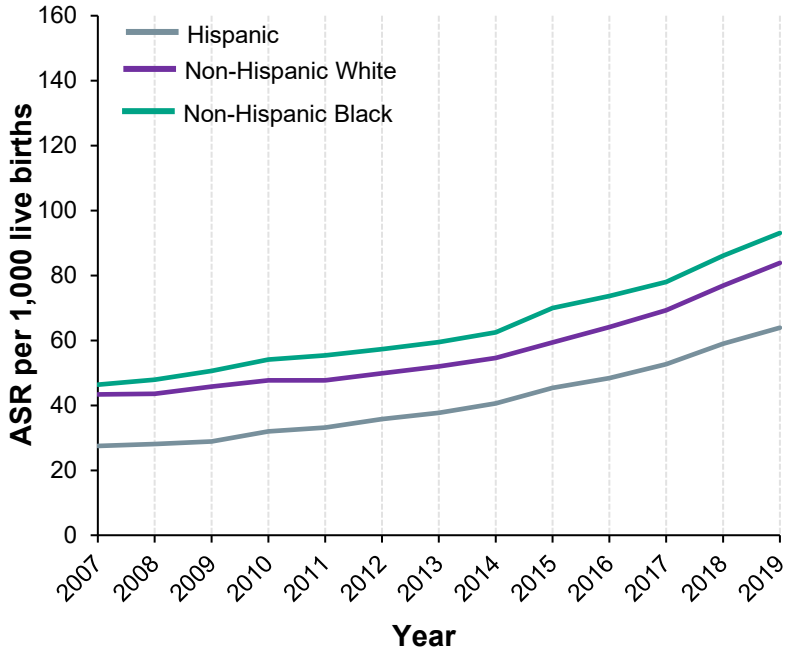
HDP: GROWING BURDEN



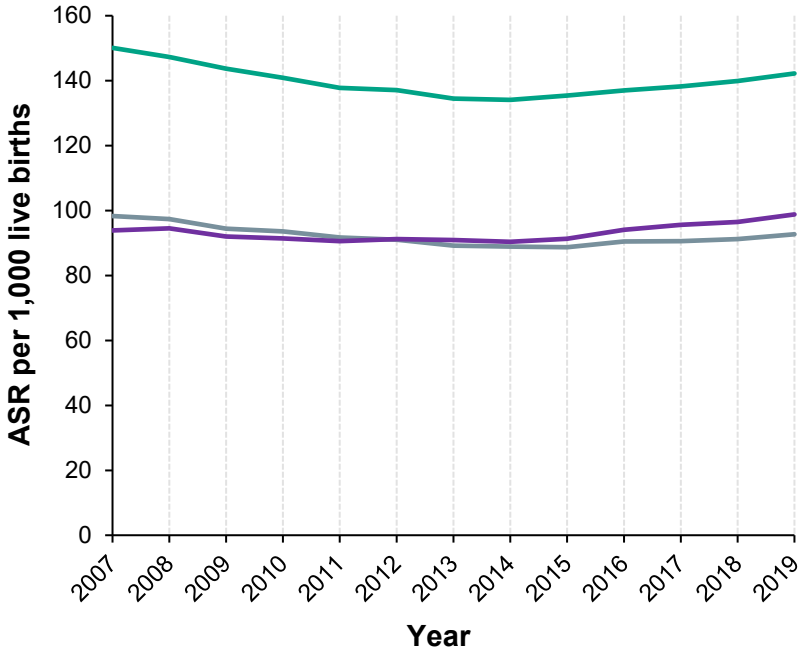
Freaney PM…Khan SS. *JAHA* 2022

HDP: GROWING BURDEN AND COMPLICATIONS

New-Onset Hypertensive Disorders of Pregnancy per 1,000 live births



Preterm Birth (<37 weeks gestational age) per 1,000 live births



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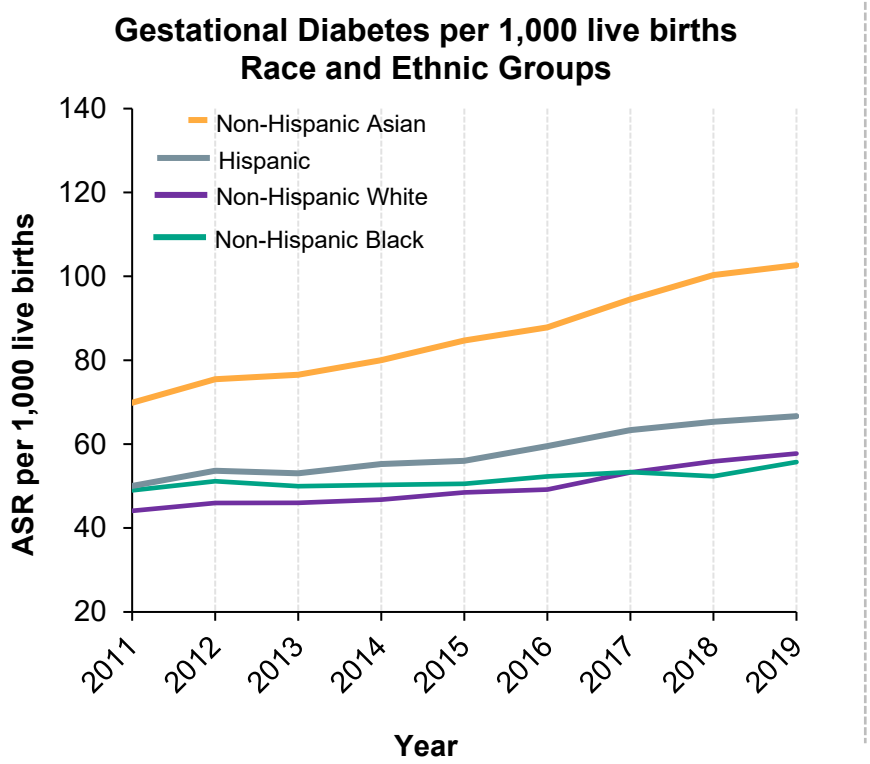
GDM: RF FOR HDP



Shah NS…Khan SS. *JAMA* 2021

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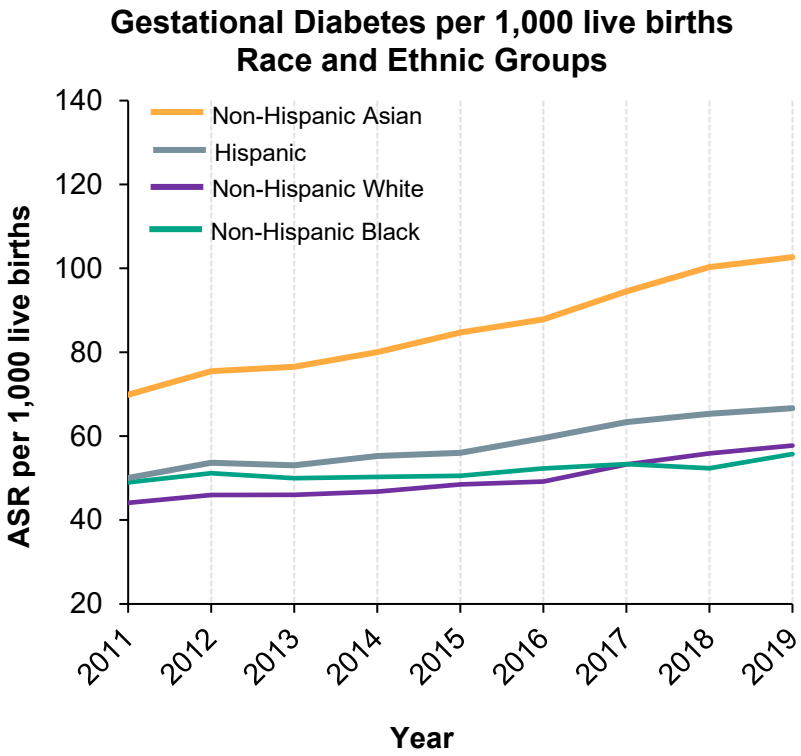
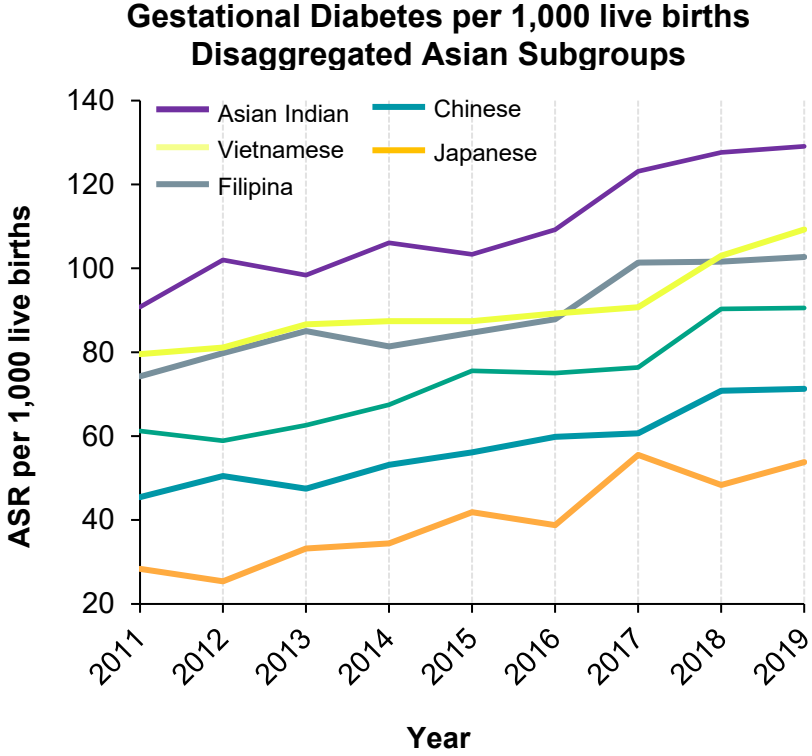
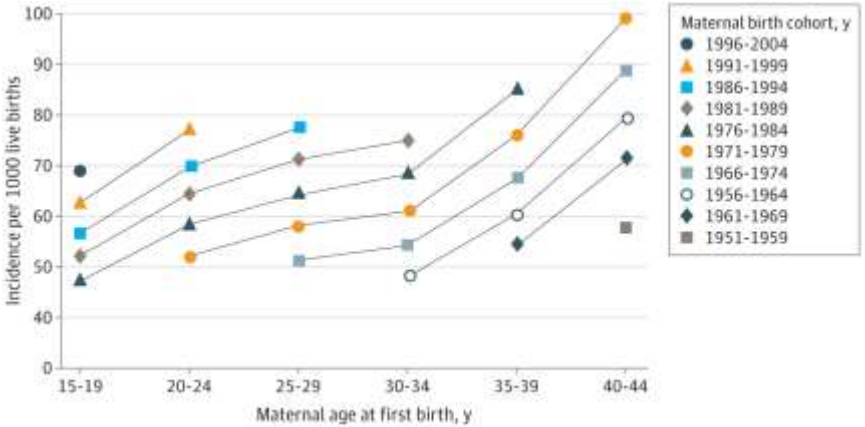




Shah NS…Khan SS. *JAMA* 2021

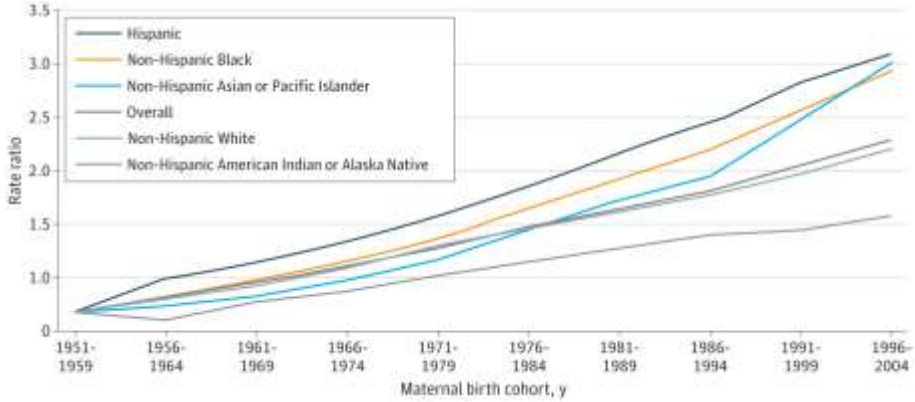
HIGHER HDP RISK IN YOUNGER GENERATIONS

Maternal Age Distribution at Delivery in the US 2007-2019



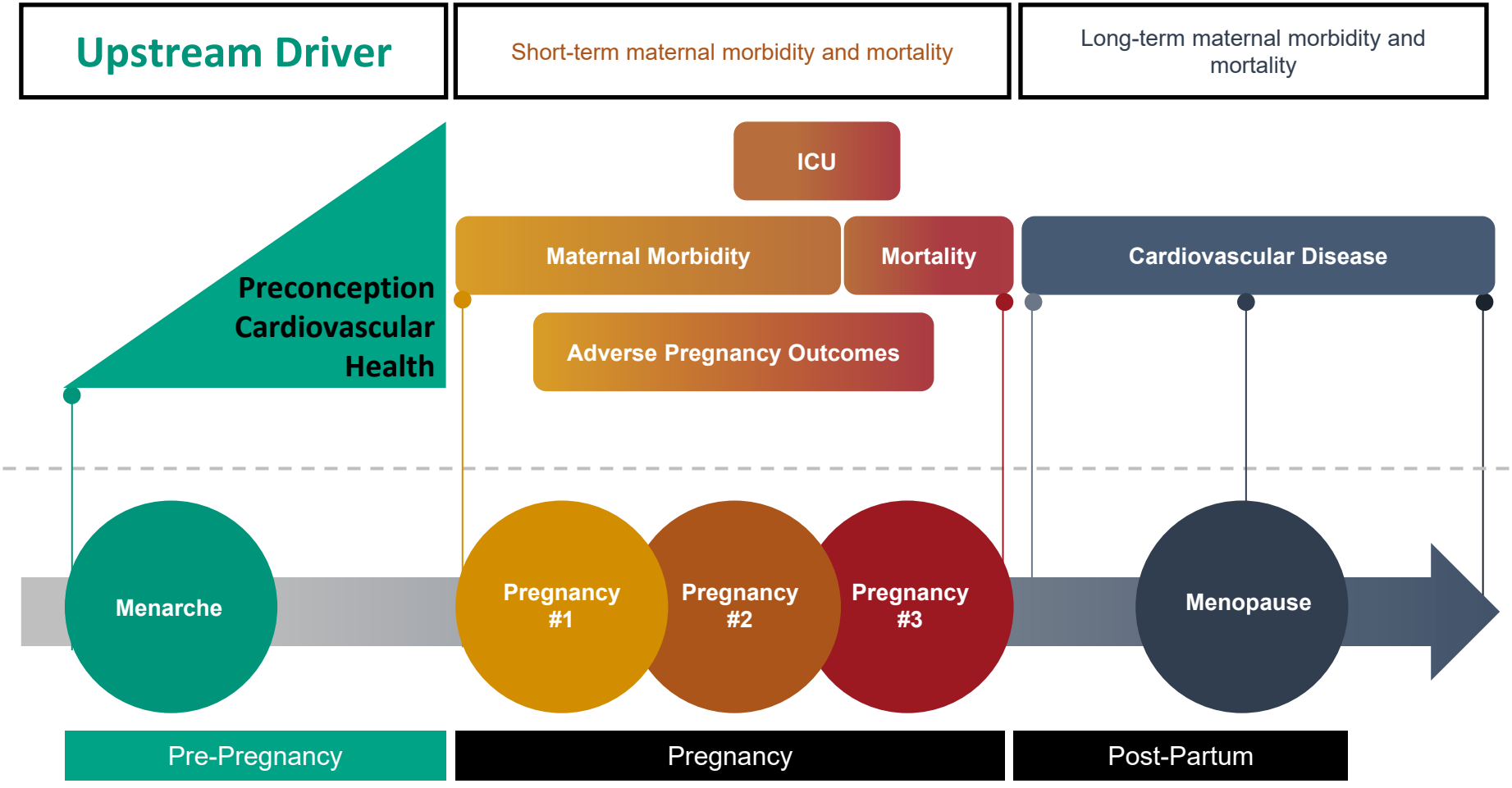
N= 38,141,561 nulliparous pregnant individuals born between 1951-2004
aRR for 1996-2004 vs. 1951-1959: 2.61 (95% CI 2.41-2.84)

Maternal Age Distribution of New-Onset HDP 2007-2019



Based on self-reported race and ethnicity
Higher birth cohort aRR for Hispanic individuals, non-Hispanic Black individuals, and non-Hispanic Asian individuals

Cameron NA…Khan SS. *JAMA Netw Open* 2022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CVH IS DECLINING IN THE US, PARTICULARLY IN YOUNG

Rates of obesity and severe obesity are on the rise

Rates of HTN are on the rise

Rates of pre-diabetes and diabetes are on the rise

Ogden et. al. *JAMA* 2020; Hirode et. al. *JAMA* 2020
CDC WONDER accessed *January 11, 2021*

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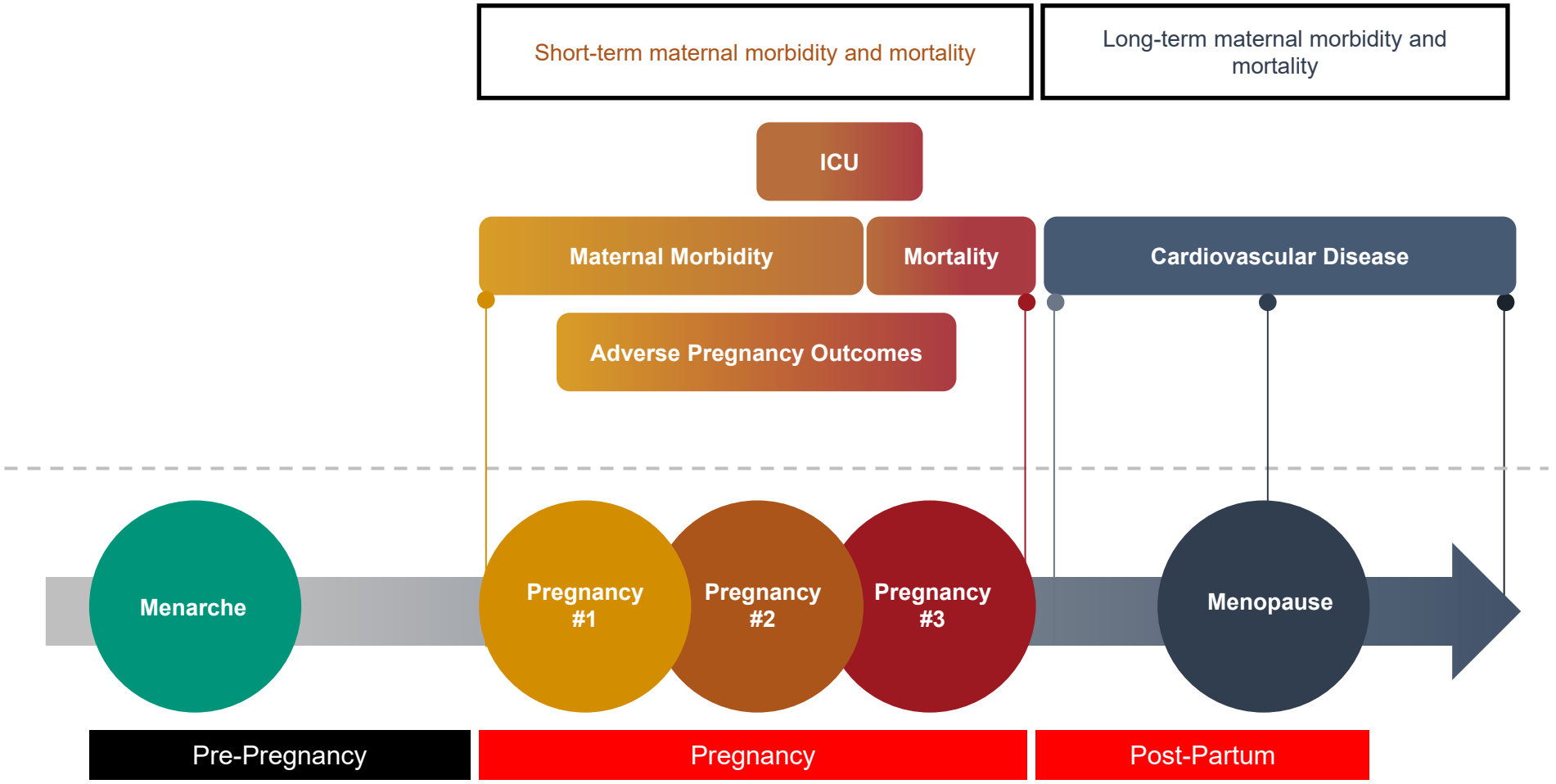
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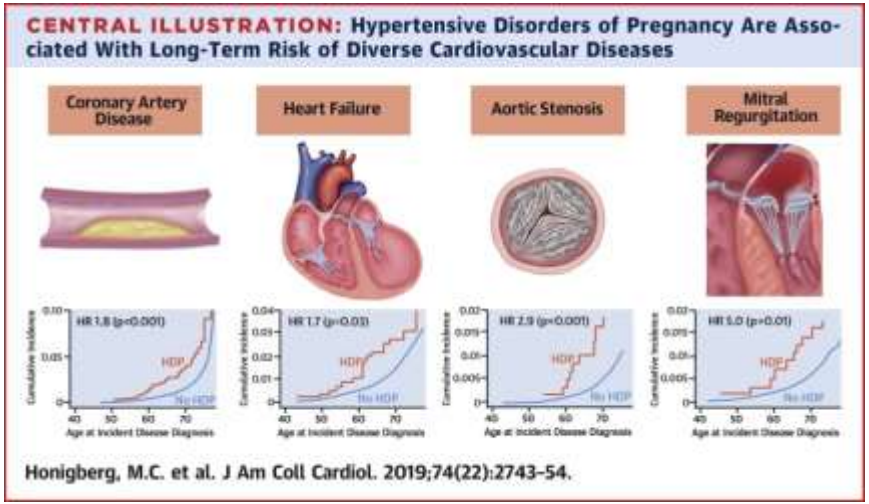
ASSOCIATION OF HDP AND CVD

Association of HDP with Long-term Cardiovascular Outcomes in the UK Biobank



Among N= 220,024 women, 1.3% reported HDP
Mean age 57.4 (7.8) years with median f/u 7 (6.3-7.7) years

Honigberg et al *J Am Coll Cardiol* 2019
Hansen et. al. *JAMA Netw Open* 2021

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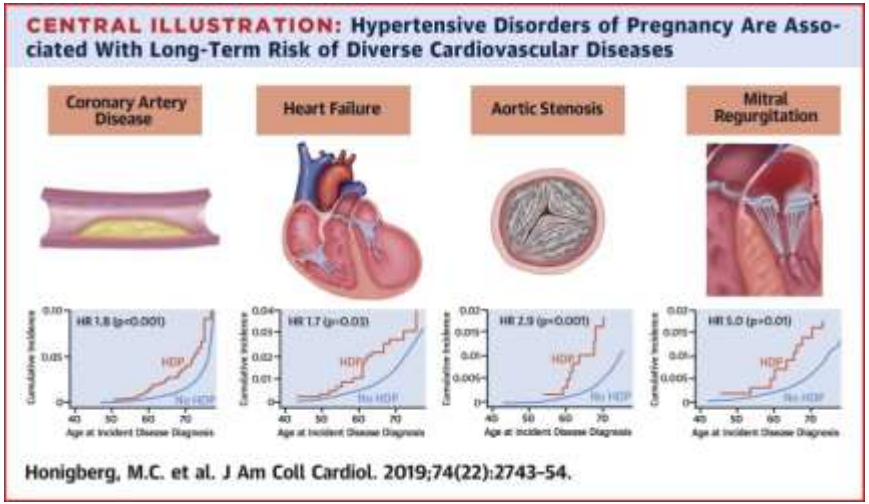

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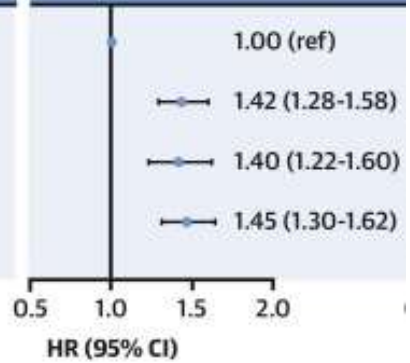
Association of HDP and Premature Mortality (<70 years) in the Nurses Health Study

The Occurrence of HDPs	Deaths	Crude Incidence Per 1,000 PY	Age-Adjusted Model
No HDPs	1,957	0.96	1.00 (ref)
Either GHTN or pre-eclampsia	430	1.34	1.42 (1.28-1.58)
GHTN only	235	1.48	1.40 (1.22-1.60)
Pre-eclampsia only	384	1.35	1.45 (1.30-1.62)

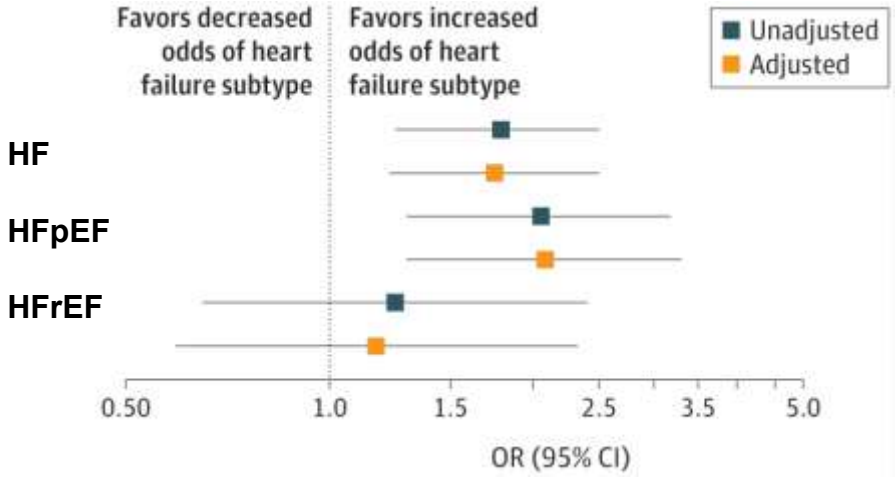


Among N= 88,394 women, 14% reported HDP
2,355,049 person-years of follow-up, 2,387 premature deaths

Honigberg et al *J Am Coll Cardiol* 2019

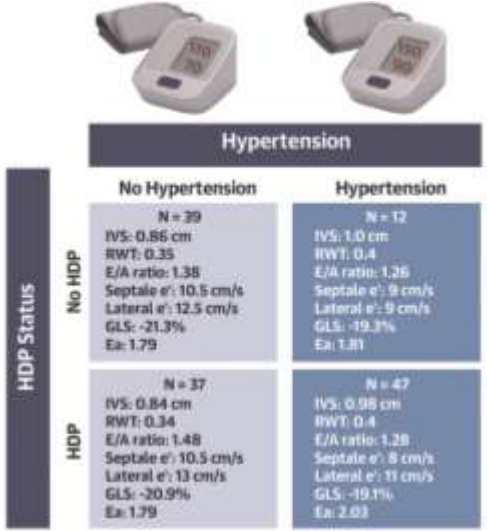
ASSOCIATION OF HDP AND OUTCOMES

Association of HDP and Incident Heart Failure in the Women's Health Initiative



Among N= 10,292 women, 7.4% reported HDP
Median age 60 (55-64) years with ~20 years f/u

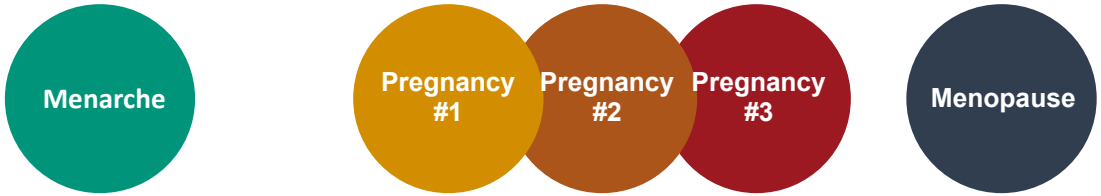
Cardiovascular Risks Ten Years after HDP Driven by Development of HTN



Among N= 135 women (84 with and 51 without HDP)
Patients with vs. without HDP: prevalence of HTN was 56% vs. 24%

Hansen et. al. *JAMA Netw Open* 2021
Levine LD et al *J Am Coll Cardiol* 2022

POSTPARTUM INTERVENTIONS TO MITIGATE CVD RISK



Reproductive Life Course

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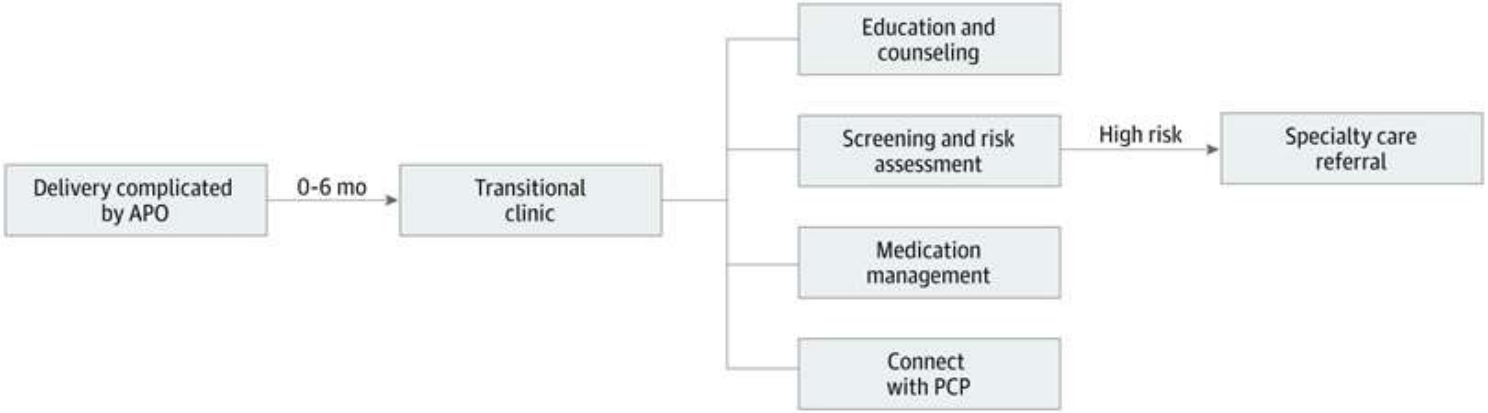

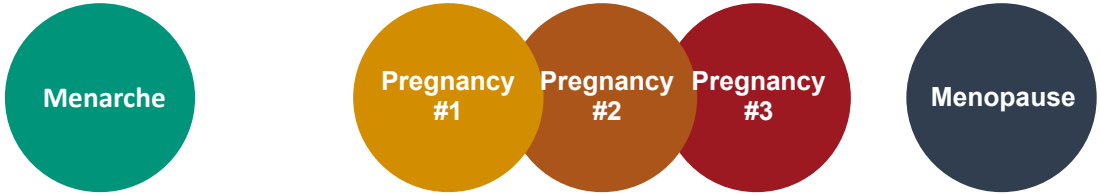

Reproductive Life Course

Jowell et. al. *JAMA Cardiol* 2021

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease emphasize sex-specific risk enhancing factors (e.g., HDP) when assessing ASCVD risk

Circulation

ACC/AHA CLINICAL PRACTICE GUIDELINE

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

Recommendations for Assessment of Cardiovascular Risk		
COR	**LOE**	**Recommendations**
I	B-NR	For adults 40 to 75 years of age, clinicians should routinely assess traditional cardiovascular risk factors and calculate 10-year risk of ASCVD by using the pooled cohort equations (PCE).
IIa	B-NR	For adults 20 to 39 years of age, it is reasonable to assess traditional ASCVD risk factors at least every 4 to 6 years.
IIa	B-NR	In adults at borderline risk (5% to <7.5% 10-year ASCVD risk) or intermediate risk (≥7.5% to <20% 10-year ASCVD risk), it is reasonable to use additional risk-enhancing factors to guide decisions about preventive interventions (e.g., statin therapy).

KEY TAKEAWAYS FOR HDP, HTN, AND CVD

1. Pregnancy is a critical life period when **risk for CVD is unmasked** and can serve as a prompt to intensify prevention

2. **Adverse trends** have been observed in HDP and its complications (PTB) and RF (GDM), particularly in younger generations

3. HDP is associated with short- and long-term CVD, which is **mediated through chronic hypertension**

Thank you.

Questions?

@HeartDocSadiya

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