

Understanding Common Pathways of Menopause Symptoms

INTRODUCTION

Approximately 50% of all US women are age 40 or older, likely to be in perimenopause with menopause occurring at 51 years of age on average. Although these affect approximately half of a woman's life, this normal transition is poorly understood by clinicians and women, and individuals likely experience different journeys.

OBJECTIVE



This project provides the basis for identifying, quantifying, and enabling a better understanding of how menopause progresses using evidence-based methods. Understanding what may be common transition trajectories vs non-typical presentations should benefit both the individual and their clinician to provide better support and guidance.

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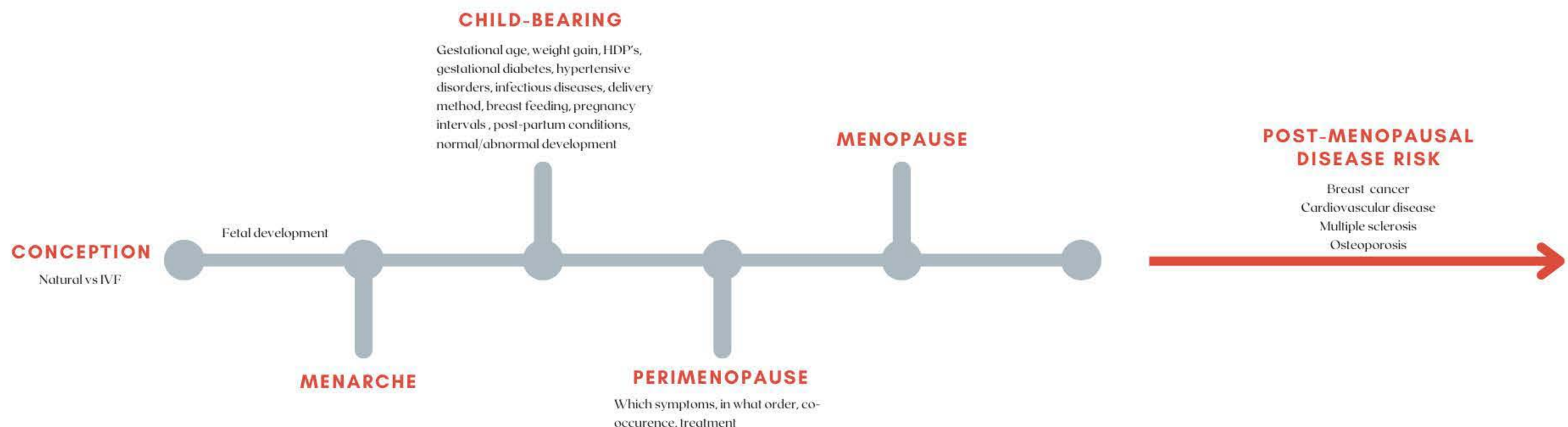


Figure 1. Female developmental landmarks

METHODOLOGY

We are using two complementary approaches: a new, comprehensive internet-based survey involving women in the US, Canada and Australia and a parallel analysis of several international women's health studies.

1. The initial survey includes underserved populations in collaboration with Pretty Moody Foundation (Delaware) and Morehouse School of Medicine. This study is intended to serve as a pilot that will lead to a broader public health study where more detailed personal health data will be collected.
2. In parallel, we have initiated analyses using the All of Us dataset that aims to investigate the relationship between pregnancy histories, e.g. multiple pregnancies and intervals, gestational age at delivery, etc., potential effects on perimenopause and menopause, and the incidence of post-menopausal health conditions. The research explores whether variations in the length of gestation have a significant impact on a mother's risk for developing conditions such as cardiovascular disease, breast cancer, and others noted in the dataset during this transition. Additional analysis will include and compare results with the UK Biobank, Nurses Health Study, Australian Women's Longitudinal Study and several Scandinavian databases.

Both studies utilize novel methods we have developed for redefining "next generation phenotyping" that recognizes that both disease and development are processes that evolve over time and involve a complex series of interactions.

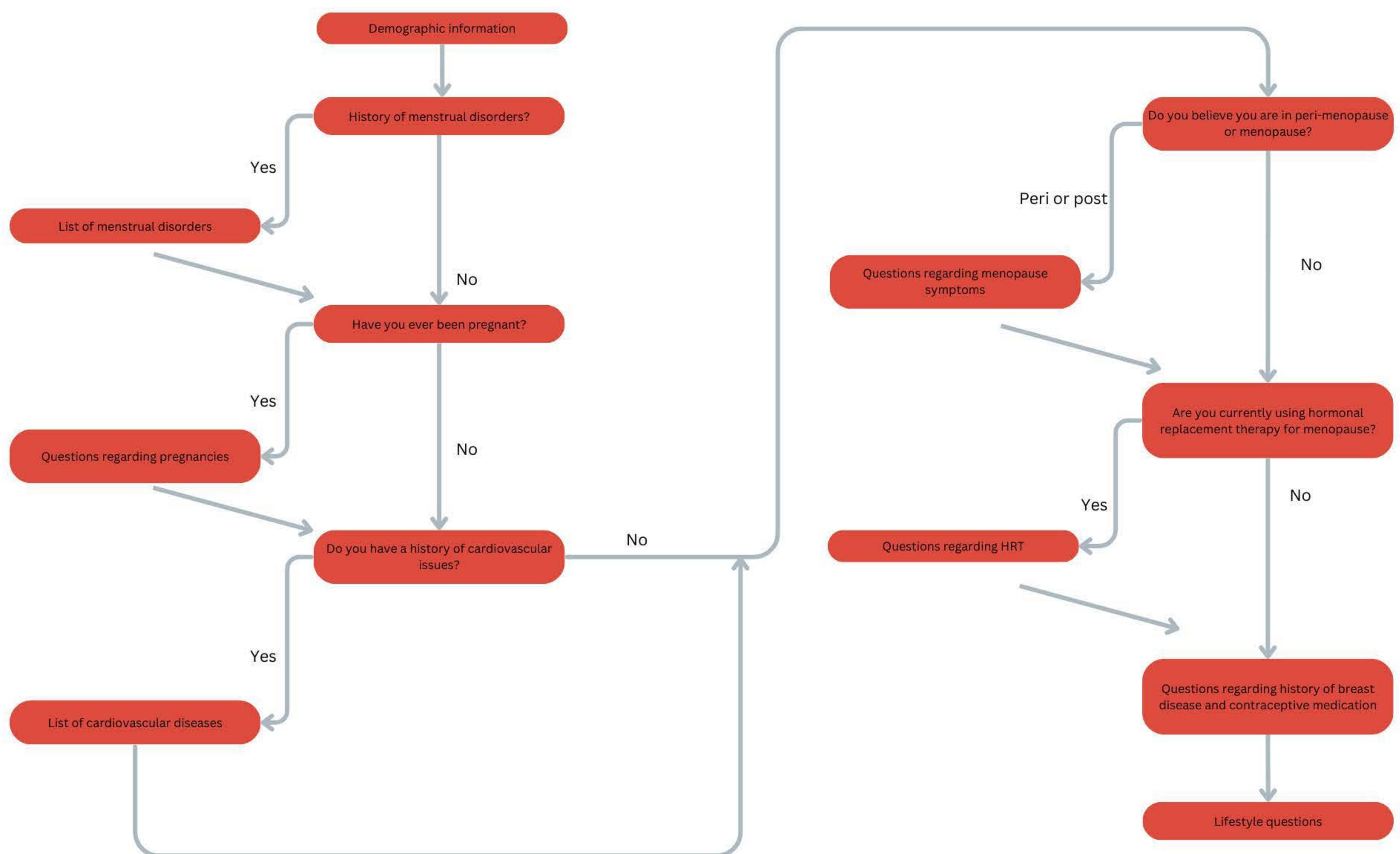


Figure 2. Outline of survey: The survey will collect data on severity, timing, and treatment of symptoms; both detailed menstrual and reproductive history; and history of chronic disease and development, starting with menarche and extending through pregnancy(ies) to perimenopause.

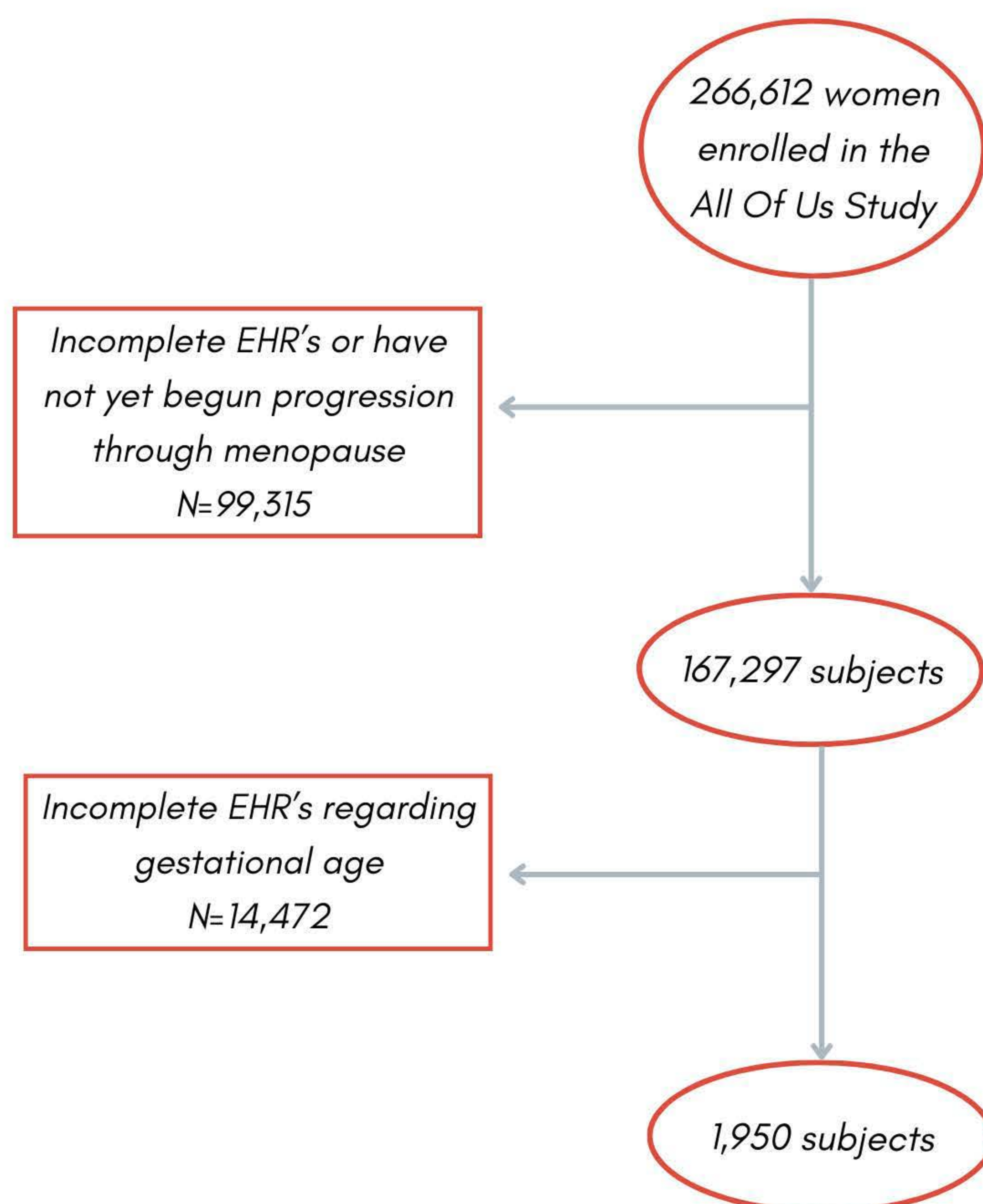


Figure 3. The flow diagram of cohort selection from the All Of Us dataset. While there have been many detailed studies in women's health, these tend to focus on specific observations/correlations rather than examine potential critical inter-relationships and interactions, limiting the ability to move from correlation to causality.

DISCUSSION

IPO Analytics is focused on studying the personalized journey of women across their lifespan, involving both development and disease and their interactions. The goal is to evolve from correlation towards causality, to improve decision making about an individual's health and risk. To accomplish this, IPO, in collaboration with 23Strands, is taking a multi-pronged approach that includes the perimenopause-menopause survey and stratification described in this poster

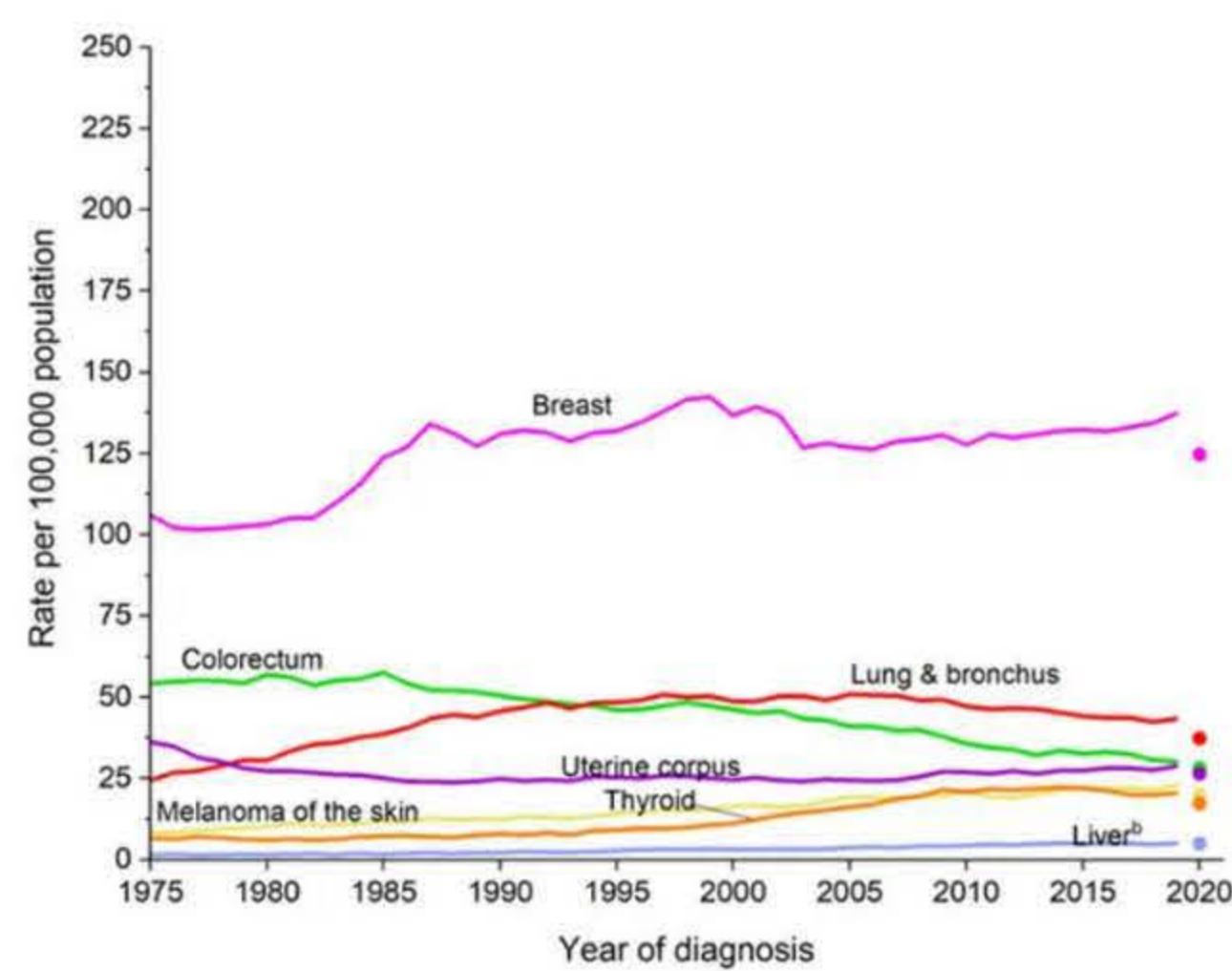


Figure 4. Although breast cancer survival continues to improve, breast cancer incidence continues to rise. (Kurtzman, N., Cancer Statistics 2024)

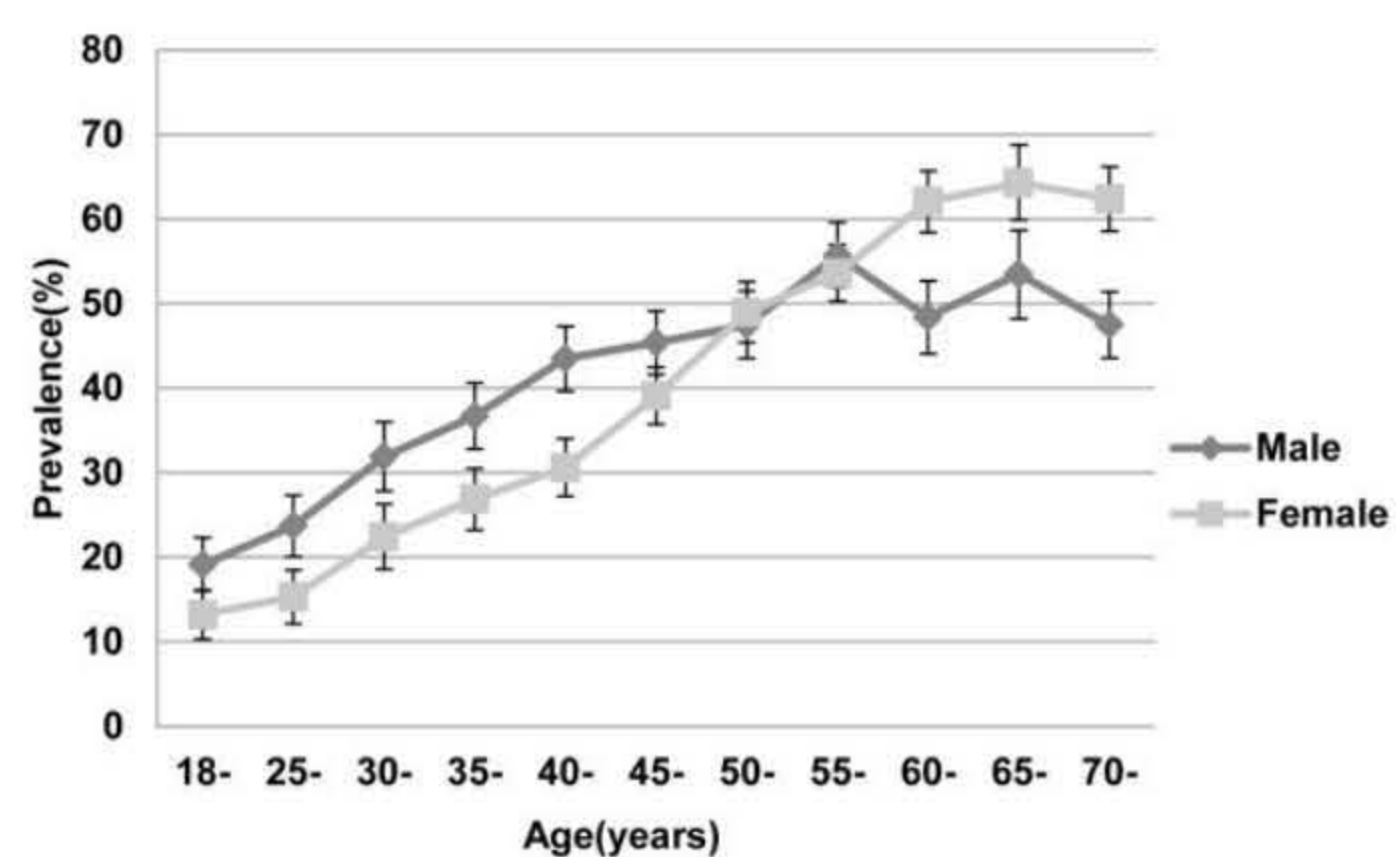


Figure 5. Cardiovascular disease risk in women fall below males until entering the perimenopause period. (Gao, Bixia, et al. "Clustering of Major Cardiovascular Risk Factors and the Association with Unhealthy Lifestyles in the Chinese Adult Population." PLoS One, vol. 8, no. 6, 2013)

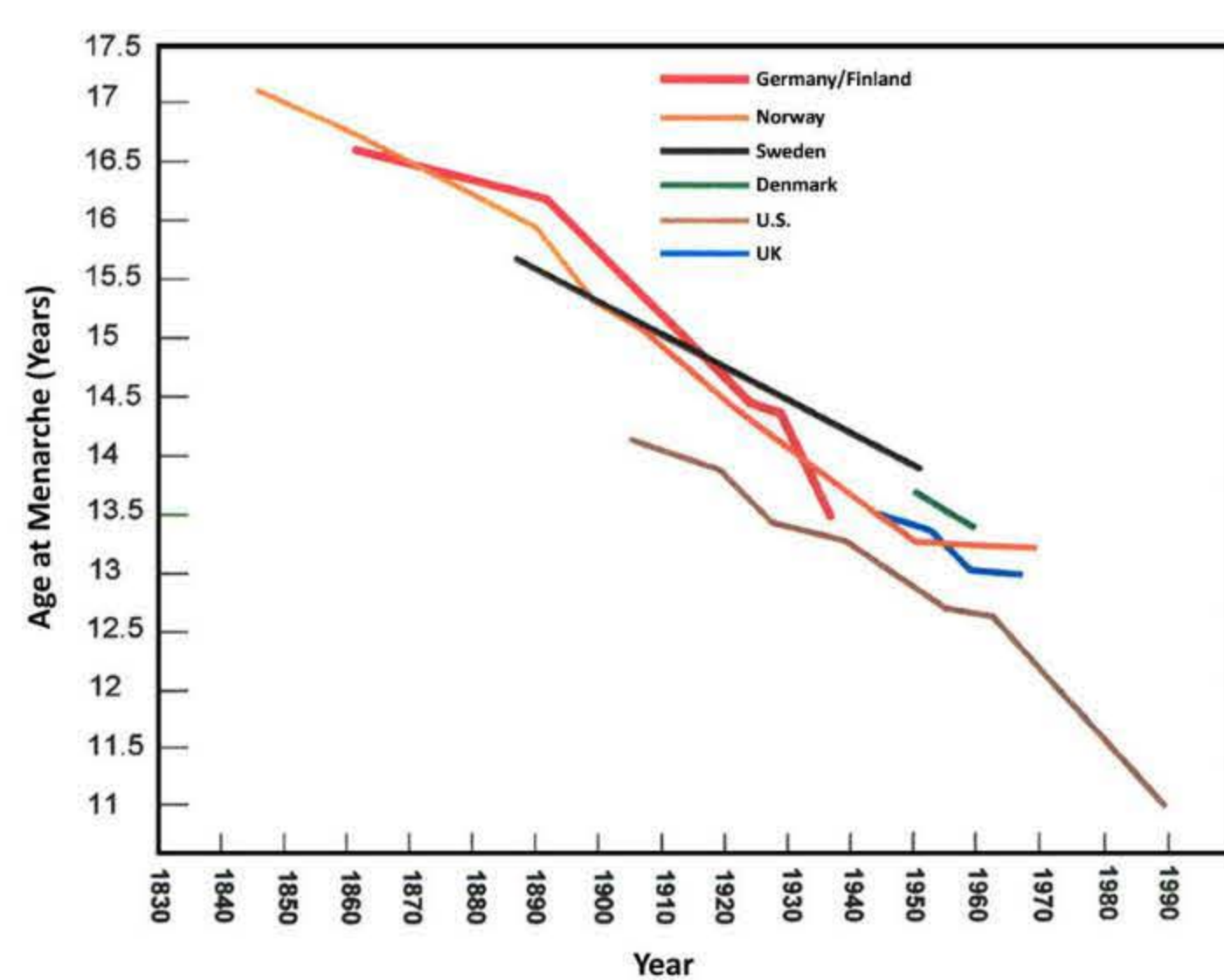


Figure 6. Age of menarche continues to decline. (Boaz N. T. (1999): Essentials of biological anthropology. Prentice Hall, New Jersey)

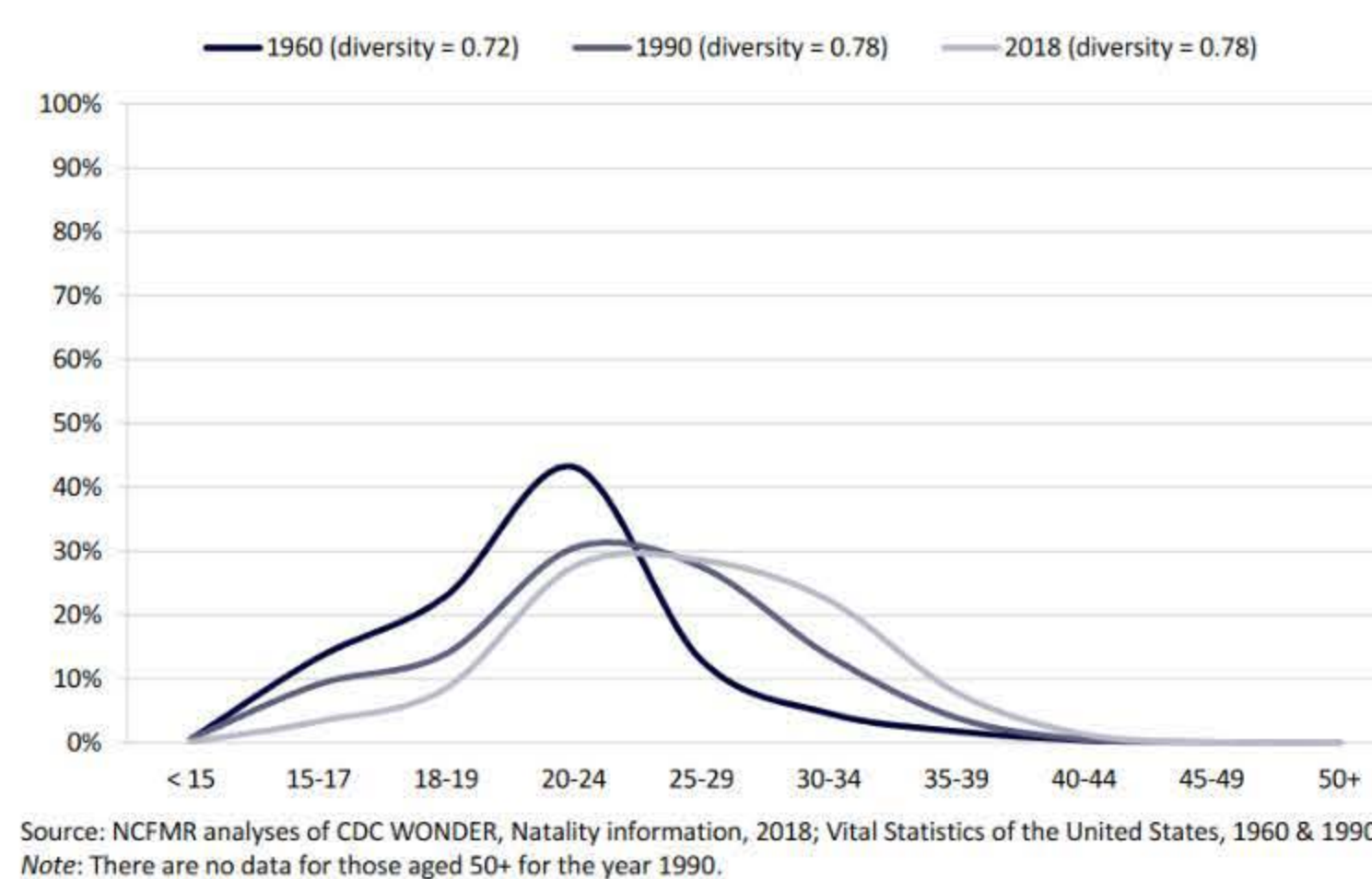


Figure 7. Maternal age of first pregnancy continues to rise. (Schweizer, Valerie, and Karen Guzzo. "Distributions of Age at First Birth, 1960-2018." 2020.)

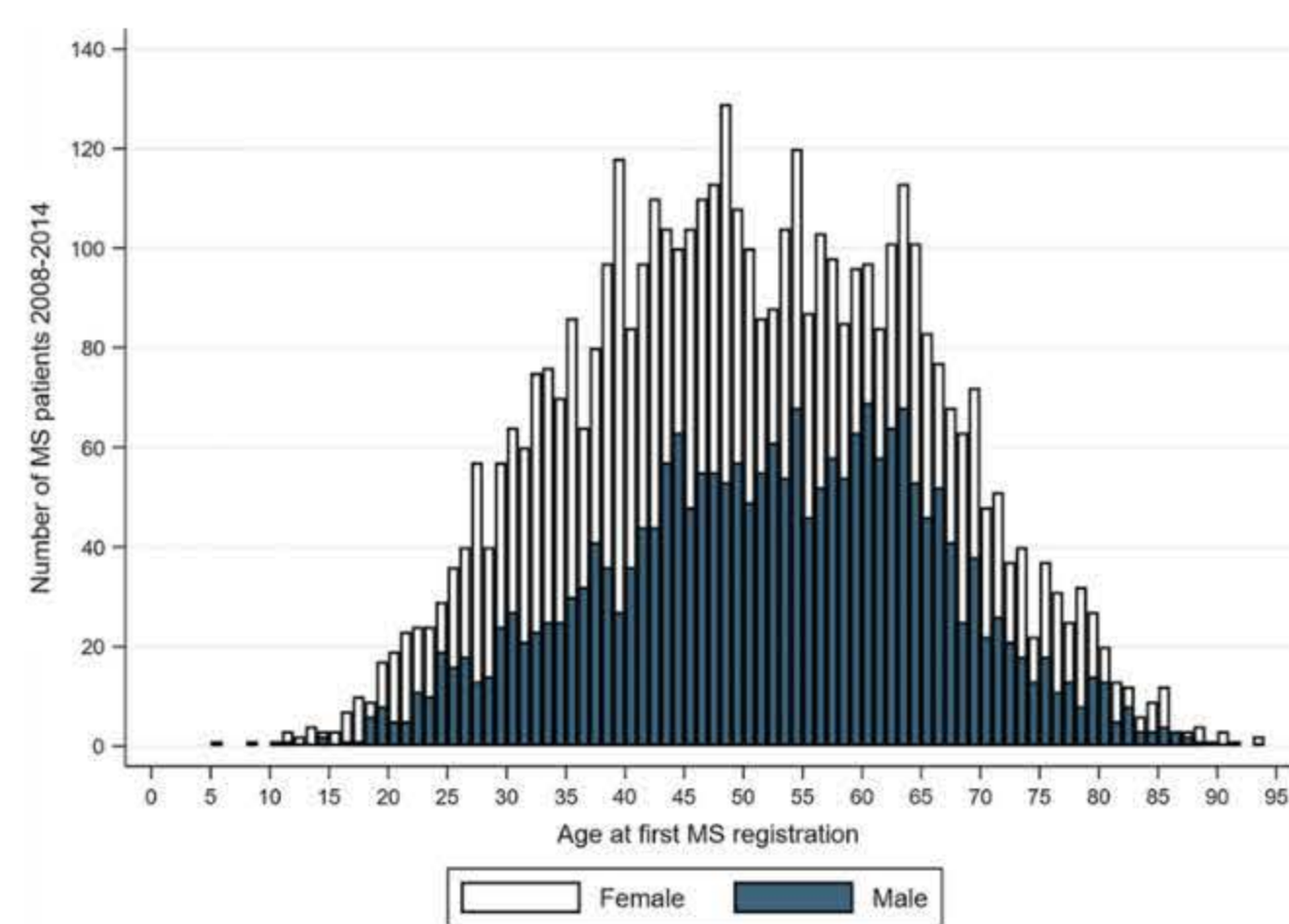


Figure 8. Multiple sclerosis, which affects more women than men, appears to exhibit peak occurrence during perimenopause period and shares several common symptoms (Ghaderi, Sara, et al. "Hospitalization Following Influenza Infection and Pandemic Vaccination in Multiple Sclerosis Patients: A Nationwide Population-Based Registry Study from Norway." European Journal of Epidemiology, vol. 35, no. 4, 23 Dec. 2019, pp. 355-362, <https://doi.org/10.1007/s10654-019-00595-2>. Accessed 1 Nov. 2021.)

MENOPAUSE

- Mood changes
- Changes in sexual desire
- Trouble concentrating
- Headaches
- Night sweats
- Hot flashes
- Vaginal dryness
- Trouble with sleep
- Joint and muscle aches
- Heavy sweating
- Having to pee often
- PMS-like symptoms

MULTIPLE SCLEROSIS

- Fatigue
- Vision problems
- Numbness and tingling
- Muscle spasms, stiffness and weakness
- Mobility problems
- Pain
- Problems with thinking
- Depression and anxiety
- Sexual problems
- Bladder problems
- Bowel problems
- Speech and swallowing difficulties

CONCLUSION

The current survey has been launched as a pilot to provide the basis for establishing a more comprehensive study of the interaction and impact of personal physiological development with disease over the course of a woman's lifetime. The intent is development of a "digital twin" to support understanding of a woman's health and developmental status at the individual level. Evaluation of multiple international data repositories have shown variability in data completeness and data definitions that we are addressing in this new survey, particularly in the inclusion of underserved populations across international boundaries.

ACKNOWLEDGEMENTS

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