

Study indicates longer reproductive life span experienced by US women

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TTUHSC's Duke Appiah, Ph.D., and a team of collaborators recently investigated factors that may be driving a link between the duration of a woman's reproductive life span and her overall metabolic health. Credit: TTUHSC

As females age, their bodies typically undergo two significant changes that generally occur during adolescence and middle age. The first, known

as menarche, is the time during puberty when a girl begins having monthly menstruation cycles, which often tends to range from 8-13 years of age. She enters the second change, known as menopause, 12 months following her last menstruation cycle when her ovarian function ceases, usually sometime in her 40s or 50s.

The time after menarche and prior to [menopause](#) is known as a woman's reproduction life span and marks the years when she is most able to bear children. For many women, these events occur naturally. However, women can enter menopause earlier than expected due to other issues. Women that undergo radiation therapy for cancer typically stop menstruating, as do women who undergo surgical menopause procedures such as having their ovaries removed.

Because each woman experiences these life stages at different times, one woman's reproductive life span is generally shorter or longer than that of another, sometimes significantly so. Duke Appiah, Ph.D., from the Texas Tech University Health Sciences Center (TTUHSC) Graduate School of Biomedical Sciences, said those differences can affect much more than a woman's [reproductive health](#).

For instance, Appiah said, researchers have known a link exists between the duration of a woman's reproductive life span and her overall metabolic health, but they haven't known why. Part of that link, he opined, could be caused by a woman being naturally exposed to estrogen and various estrogen compounds. Estrogens can be beneficial because they can help protect or delay the onset of certain health issues. However, they also have been associated with some diseases, and women that normally have less estrogen and remain that way through menopause are more likely to develop [heart disease](#) or osteoporosis.

"If the reproductive life span is longer, then that means they still have exposure to the [natural estrogens](#), which will also help delay some

diseases like cardiovascular disease and osteoporosis, and to some extent, even cancer," Appiah said.

But why do some women who have longer reproductive life spans, and therefore longer exposure to estrogens, still develop metabolic issues?

It's a question Appiah and a group of collaborators set out to address in a research letter to the *Journal of the American Medical Association (JAMA)*. The letter, "Trends in Age at Natural Menopause and Reproductive Life Span Among U.S. Women, 1959-2018," was published in *JAMA*'s April 8 issue. Appiah's collaborators included Chike C. Nwabuo, M.D., MPH, from Johns Hopkins University; Imo A. Ebong, M.D., M.S., from the University of California, Davis; Melissa F. Wellons, M.D., MHS, from Vanderbilt University Medical Center; and Stephen J. Winters, M.D., from the University of Louisville.

Appiah, an assistant professor of public health at the TTUHSC and director of the university's master's program in public health, said women who enter menopause at age 40-45 years have a higher risk of developing cardiovascular disease, whereas those who become menopausal after the age of 50 experience a higher risk of breast cancer.

"These characteristics have clinical significance, but we wanted to see in the United States over the past 60 years, if there have been any changes in age at menopause, reproductive life span and to age at menarche," Appiah explained. "If it was changing, we wanted to find out what factors are possibly associated with these changes. Not many studies have been done in the U.S. to look at trends in age at menopause. If we can see some of the factors which are associated with or are driving having natural menopause at an earlier age, perhaps we can intervene."

Appiah said many of the previous studies are outdated and used data from shorter time periods such as 1910-1950. None of these studies

investigate the link between age at menopause and the development of metabolic health issues. They also failed to address factors that may cause a woman to enter menopause earlier in her life.

To collect data for his study, Appiah used successive surveys spanning the 1959-1962 National Health Examination Survey I (NHES I) through the National Health and Nutrition Examination Survey (NHANES) for 2017-2018. The NHANES is a biennial survey conducted by the Centers of Disease Control and Prevention to generally evaluate the health of children and adults in the U.S. In addition to providing a significantly larger sample size, the NHANES provides a cross-sectional sample of the non-institutionalized U.S. adult population. It includes a detailed demographic and behavioral questionnaire, a physical examination, laboratory testing and a list of all prescription medications used by the respondent.

Using this data, Appiah was able to analyze 7,773 women aged 40 to 74 years at the time of the survey and who had reached natural menopause. From the 1959-1962 NHES I to the 2015-2018 NHANES, the mean age at which women reached natural menopause increased from 48.4 years to 49.9 years and the mean age at menarche fell from 13.5 years to 12.7 years. This resulted in an increase of the mean reproductive life span from 35.0 years to 37.1 years.

In multivariable adjusted models Appiah saw that race and ethnicity (Black and Hispanic), poverty, current and former smoking status and hormone therapy use were associated with earlier age at natural menopause and a shorter reproductive life span. Factors such as more years of education and use of oral contraceptives were associated with women who reached natural menopause at a later age and had longer reproductive life span.

Appiah said other factors not assessed in their study such as lifestyle and

behavior factors, improved access to health care, nutrition, obesity and environmental factors may be related to the increasing trends in age at natural menopause and reproductive life span.

In past research, Appiah has shown that menopause is associated with metabolic conditions, which also influence the development of certain diseases. More importantly, he said, his work has shown that researchers tend to be more concerned about the age at which women reach menopause when they actually need to identify factors that are causing women to reach menopause at an earlier age because those factors tend to be more important.

"This study was to give some empirical evidence to some of my past studies, but then for future studies, I'm still looking at how age and menopause is associated with cardiac structure and function, for instance, how the heart beats, how the heart becomes bigger with age," Appiah said. "This paper has given perspective to some of my past work, and it's also given some direction to my future work, whereby I'll look at whether age at natural menopause and length of reproductive life span is a marker for overall health in [women](#)."

More information: Duke Appiah et al, Trends in Age at Natural Menopause and Reproductive Life Span Among US Women, 1959-2018, *JAMA* (2021). [DOI: 10.1001/jama.2021.0278](https://doi.org/10.1001/jama.2021.0278)

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