

Childhood environment influences reproductive function

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A study led by researchers at UCL (University College London) demonstrates that female reproductive function is influenced by childhood environment. This suggests there is a critical window of time from about 0-8 years of age that determines the rate at which girls physically mature and how high their reproductive hormone levels reach as adults.

Published today in *PLoS Medicine*, the study compares reproductive hormone levels of groups of Bangladeshi women who migrated at different periods of their life. It finds that women who migrated from Bangladesh to the UK during infancy and early childhood reach puberty earlier, are taller, and have up to 103 per cent higher levels of the hormone progesterone as adults in comparison to women who migrated at a later age, as well as those who had remained in Bangladesh. These higher hormone levels could potentially increase a woman's ability to conceive.

Lead author Dr Alejandra Núñez de la Mora, UCL Department of Anthropology, said: "The findings point to the period before puberty as a sensitive phase when changes in environmental conditions positively impact on key developmental stages. Put very simply, the female body seems to monitor its environment throughout childhood and before puberty, to gauge when and at what rate it will be best to mature. It then sets development, including reproductive hormone levels, accordingly. This is an advantage in evolutionary terms, as it makes the best of the resources and energy available for reproduction in any given

circumstance.

“Girls who migrate at a young age seem to mature more quickly when they find themselves in an environment where the body has more access to energy. In other words, when they’re under less physical strain due to factors like a better diet and general health. When energy is a limited resource, it must be allocated between maintenance, growth, and reproductive functions – the body makes trade-offs within the constraints it experiences. When conditions are better, these constraints are relaxed and more energy is diverted towards reproduction.”

The results of this study are relevant not only to Bangladeshi groups, but to other migrant groups and populations in transition worldwide. These findings add to accumulating evidence that humans have an evolved capacity to respond to chronic environmental conditions during growth and to make decisions about how to apportion energy between reproductive and other bodily functions.

Five groups of women were selected and compared for the study. These included women who had grown up in Bangladesh but moved to the UK as adults; those who had moved to the UK as children; second generation Bangladeshi women living in the UK; women who were born and raised in Bangladesh; and a comparison group of women of European descent who were born and raised in the UK. Bangladeshi migrants were chosen for this study because of the long and on-going history of migration to the UK and the general contrasts in conditions between the two countries.

The subjects in each group gave saliva samples over an extended period, to measure levels of the female hormones progesterone and oestradiol. These are key fertility hormones, influencing the female menstrual cycle, pregnancy and embryonic development. Health information and body measurements were also provided by the subjects.

Co-author Dr Gillian Bentley, UCL Department of Anthropology, who directed the project added: “The theory that early environmental factors may affect reproductive function has been suggested previously by anthropologists*, but this field study is the first to use measurements of hormone levels to demonstrate a link between childhood environment and reproductive maturation and function. However, hormone levels are not just relevant to reproduction. The significant increase in progesterone levels that we document in migrant women may result, for example, in higher breast cancer risks in subsequent generations of this community. The potential health implications are far-reaching.”

Bangladesh, in South Asia, is one of the most densely populated countries in the world. The Bangladeshis who took part in the study were middle class women from the Sylhet District. Although a relatively affluent area of the country, inhabitants still suffer from higher immune challenges, primarily due to poor sanitation and limited access to healthcare. These aspects of the environment in Bangladesh are thought to be responsible for the slower development of the Bangladeshi women who grew up there.

The study was co-authored by Dr Robert Chatterton in Obstetrics and Gynaecology at Northwestern University, Chicago who supervised the laboratory work, and Dr Osul Choudhury of the Sylhet Osmani Medical College, Bangladesh who co-ordinated research with Dr Núñez de la Mora in Bangladesh.

Source: UCL

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