CONCLUSION: Given the significance in disparity of preterm birth between racial and ethnic groups, it is logical to consider the role of mitochondrial genetics and the microbiome. However, within this study, when we rigorously accounted for race and ethnicity using mitochondrial DNA sequencing we failed to observe an association. This was not due to underpowering, since; we identified taxa-by-mtDNA SNP associations among rare species in the vaginal microbiome. However, they were weakly predictive of PTB.
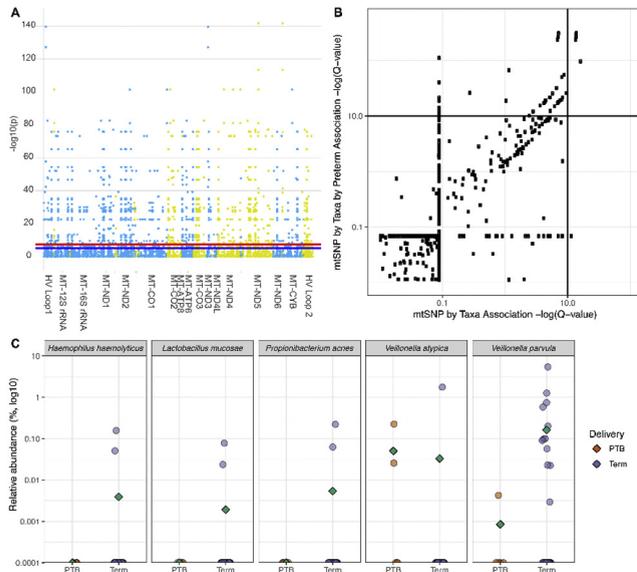

Figure 1. Associations of the vaginal microbiome (WGS metagenomics) with mitochondrial DNA single nucleotide polymorphisms in the context of preterm birth. **A.** Manhattan plot demonstrating significant associations between the average gestational abundance of individual taxa and mtSNPs as determined by PLINK associations. **B.** Identification of taxa-SNP associations significantly different in the context of preterm birth. Q-values for taxa-SNP associations are plotted on the x-axis, while q-values for quantitative trait interaction (taxa-SNP-preterm birth) are plotted on the y-axis. **C.** Relative abundance of bacterial species identified as significantly different between subjects with term and preterm deliveries based on PLINK taxa-SNP-preterm birth associations; group means are denoted by green diamonds.

15   Novel, sensor-based quantitative cervical elastography: objective quantification of cervical softness

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OBJECTIVE: Cervical ripening is a necessary physiologic phenomenon that precedes all labor, both term and preterm. Tissue elastography works by applying pressure to tissue and measuring tissue displacement. It is quantified by Young's modulus, a ratio of pressure to displacement. The harder the tissue, the less displacement and the higher the Young's modulus. It is a promising technique for measuring cervical tissue stiffness to predict preterm birth, but to-date has been semi-quantitative because the exact force applied to the cervix is difficult quantify. We aimed to develop a novel, fully-quantitative cervical elastography system to objectively quantify cervical tissue stiffness.

STUDY DESIGN: A transvaginal ultrasound probe was modified with a pressure sensor at the tip to obtain real time synchronized pressure and tissue displacement measurements. Pressure and displacement were quantified to calculate the Young's modulus (**Figure1**). This system was applied in a pilot prospective cohort study of women receiving prenatal care at a tertiary care center and enrolled in a longitudinal observational study with the larger aim of developing novel predictive methods for PTB. Generalized linear models were used to test changes in Young's modulus (cervical stiffness) over advancing gestational age to determine if the tissue Young's modulus decreases with advancing gestational age as expected with softening.

RESULTS: A total 26 ultrasound elastography images from 12 patients were analyzed (9 term births and 3 preterm births). The Young's modulus of cervical tissue tended to decrease with advancing gestational age (-0.65 Young's modulus units per day) (**Figure 2**).

CONCLUSION: We report a novel, sensor-based, fully quantitative cervical tissue elastography system using a modified transvaginal ultrasound probe for synchronized tissue deformation and pressure measurements. As expected, Young's modulus tended to decrease over pregnancy as the cervix softens. This objective quantification of cervical tissue stiffness may be a promising tool for predicting preterm birth.
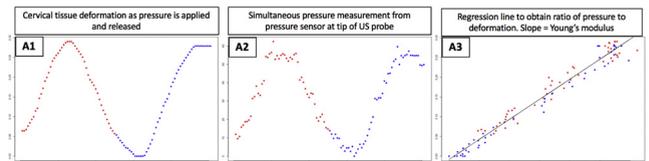

Figure 1: Panels A1-3: calculation of Young's modulus through cervical tissue deformation(A1), pressure (A2), and regression of stress-strain relationship (A3). Slope of A3 is the Young's modulus or tissue elasticity of the cervix.
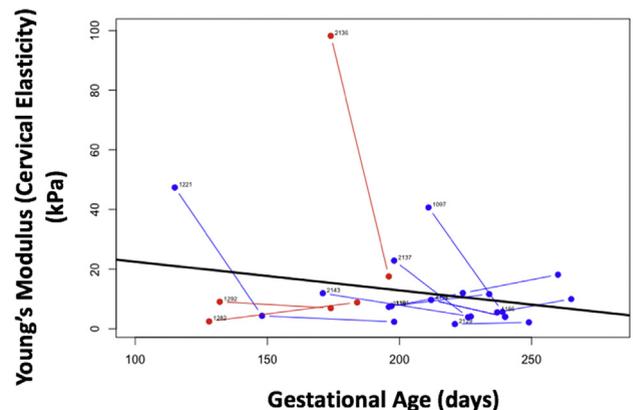

Figure 2: Young's modulus (cervical tissue softness) in patients with term birth (blue) and preterm birth (red) tends to decrease over gestation (black line).

16   Impact of severe stress after a major natural disaster on perinatal outcomes

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OBJECTIVE: Hurricane Harvey displaced over 60,000 of Houston's nearly 4.5 million residents. Natural disasters have been linked to posttraumatic stress disorders. Our objective was to evaluate the impact on perinatal outcomes of self-perceived stress among pregnant women in the weeks to months following Hurricane Harvey.

STUDY DESIGN: Data was abstracted from our perinatal research database (PeriBank). An abbreviated version of the PTSD checklist — civilian version (PCL-C), a validated tool for evaluating both pregnant women and development of PTSD, was prospectively administered to women delivering within our network. Severe stress was