

Understanding Pelvic Organ Prolapse:
A Comprehensive, Biofidelic Computational Model of the Pelvic Floor
(Technical Report)

Combatting Maternal Mortality in the United States
(STS Research Paper)

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by

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Preface

Improvements in healthcare require both better treatments and better access to care.

Pelvic organ prolapse (POP) occurs when pelvic organs descend into the vagina, causing painful symptoms including a bulging sensation and disruption of daily activity. In the US, POP afflicts 50 percent of women over the age of 50; over 20 million women will be affected by 2030. Pessaries provide mechanical support to non-surgically treat POP, but are inefficient in treating rectocele. Computational modeling of the pathology of rectocele may reveal new treatment possibilities. A three-dimensional model was created from healthy female MRI data to run finite element analysis (FEA) in FEBio. FEA simulations were first conducted by changing the force of the rectum onto the rectovaginal fascia, then measuring the displacement of the posterior wall of the vagina. The results showed increased displacement upon greater applied force, validating that FEA of the model can be used to study rectocele. Then, the mechanical properties of the rectovaginal fascia and vagina were varied to model possible causes of rectocele. The data indicates that rectocele can be attributed to weakened mechanical properties in the vagina. This model can be applied to the study of pelvic organ prolapse etiology and work towards the development of novel treatments for rectocele.

African American women are 3 times more likely to die from complications of childbirth compared to white women. In the US, how are advocacies and health professionals striving to diminish maternal mortality among African American females? Although groups agree that disparities in maternal health by race must be diminished, mainstream groups favor incremental change while many advocacies demand more fundamental institutional transformation. Healthcare professionals and institutions, African American mothers, and families of women who have died from childbirth complications have led efforts to combat maternal health disparities.