

## ***Comparing Motor Vehicle Collision (MVC) Injury Incidence Between Pregnant and Non-Pregnant Individuals: A Case Control Study***

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In industrialized nations, such as Canada, injuries sustained from motor vehicle collisions (MVCs) are the leading cause of non-obstetric gestational trauma and fetal mortality<sup>1-3</sup>. In British Columbia, Canada, almost 40% of all reported deaths during pregnancy between 2000-2006 were caused by MVCs<sup>4</sup>. While seat belts are proven to reduce injury risk in the event of an MVC<sup>5,6</sup>, studies have shown that even when the pregnant individual is properly restrained, the risk of adverse fetal outcomes exceeds 60% at 50 km/h<sup>7</sup>. During later stages of pregnancy, 50-80% of the uterus will lie below the midline of a properly positioned seatbelt, meaning that in the event of a frontal collision, the loads may be applied to the uterus rather than the preferred bony landmarks<sup>8</sup>. Because the anthropometry of pregnant occupants changes the relative positioning of vehicle restraint systems, it is important to understand if these changes influence injury risk. Therefore, the goal of this study is to **identify if pregnant motor vehicle occupants are at a greater risk of injury than their non-pregnant counterparts.**

All data included in this study were extracted from the *Crash Investigation Sampling System* (CISS) from the *National Highway Traffic Safety Administration* (NHTSA) database. All cases between 2017 and 2022 were downloaded as .csv files and uploaded to MATLAB<sup>9</sup> to extract the population of interest. The study population included all women between the ages of 19 and 45 in the USA that were involved in an MVC that had been reported in the CISS. We compared women who were pregnant with those who were not pregnant at the time of the MVC. The primary outcomes were based on the Maximum Abbreviated Injury Scale (MAIS). The risk of moderate to critical injury (MAIS 2-5) and risk of fatal injury (MAIS 6) was compared between the two groups.

Potential confounding factors such as vehicle model year, age, seat belt positioning, and position within the car were accounted for in the study design. The risk of each primary outcome was calculated by dividing the risk of that outcome in each group by the total population of that group. The risk ratio of pregnant versus non-pregnant occupants was calculated by dividing the risk of injury for the pregnant group by the risk of injury for the non-pregnant group. A modified Poisson regression was applied to both primary outcomes to identify the significance of potential confounders and relative risk.

Preliminary results have indicated that pregnant occupants may be less likely to be severely injured but more likely to sustain a minor to moderate injury. While these results were not significant based on a 95% confidence intervals, the sample size will be increased in future work to mitigate this. These results indicate the importance of evaluating seat belt and restraining hardware performance in pregnant occupants. In the final submission, a parallel ongoing study will be discussed which aims to evaluate the routing of contemporary seat belts relative to the underlying anatomy of pregnant volunteers to elucidate potential injury mechanisms in this population.

## References

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