Introduction

Reducing the number of severe injuries and fatalities on Indiana roads can be accomplished through comprehensive consideration of safety in transportation planning, design, management, and operations. To accomplish this goal, knowledge of the safety factors and countermeasures that may be applied to improve safety are needed, as well as tools for facilitating application of that knowledge. The main components of the safety knowledge are crash reduction factors (CRFs) and the associated crash modification factors (CMFs), which can be utilized to estimate the benefit cost ratio (BCR) and the net benefit (B-C) of safety projects in the planning, design, and management stages. There is a need to update the CRFs and CMFs applicable to Indiana conditions. This study addressed this concern by updating the CRFs/CMFs for various traffic, geometrics, and other improvements that may be applied in Indiana. Furthermore, the study calibrated the components of the Interactive Highway Safety Design Model (IHSDM) to better reflect Indiana conditions.

Findings

A set of criteria was developed for determining the existing CRFs and CMFs that are most suitable for Indiana conditions. This research identified more than 80 safety countermeasures and their associated CRFs/CMFs for various geometric, traffic, pavement, and other characteristics. The identified CRFs/CMFs are applicable to different crash types and severities at urban and rural segments, intersections, and interchanges. CRFs and CMFs presented as functions were discretized for various levels of the change in safety in order to provide ease of implementation in Indiana.

Additionally, a comprehensive approach for calibrating the predictive components of the Highway Safety Manual (HSM) method was developed that fits within the constraints of the IHSDM. This included calibrating the tool’s default parameters for SPFs and CMFs for rural and urban segments, as well as updating the default crash proportions to reflect Indiana conditions. In some cases, the Indiana parameters and crash proportions show similarities with their HSM counterparts.
However, the results also show considerable differences that highlight the need for calibrating the crash prediction method for local conditions. The presented example studies show how the HSM default parameters may understate or overstate the safety performance of road facilities in comparison to using parameters developed specifically for Indiana.

**Implementation**

A comprehensive table of CRFs and CMFs that may be implemented in Indiana was presented. Furthermore, the study provides the Indiana specifications of the IHSDM CMFs, SPFs, and crash proportions, both in tabular form and in files that may be implemented directly in the software by the user.