GLOSSARY

Symbols

$\sigma(\theta)$	Standard deviation of the random variable θ
$\theta(a,b)$	The CMF for implementing 'a' instead of 'b'
^	Caret above denotes 'estimate'
$\hat{\theta}$	An estimate of a CMF - what we expect to be the safety effect of doing 'a' instead of 'b' in some specific circumstances.
$E\{\theta\}$	The mean value of a distribution of θ
$\bar{\theta}$	Estimated CMF for a future action.
μ	Expected number of (target) crashes.
a and b	Action (intervention, countermeasure, treatment, decision etc.)
$s\{.\}$	Standard error of $\{.\}$
$VAR\{\theta\}$	Variance of the random variable θ

Terms

Bayesian statistics—statistical method of analysis which bases statistical inference on a number of philosophical underpinnings that differ in principle from frequentist or classical statistical thought. First, this method incorporates knowledge from history or other sites. In other words, prior knowledge is formally incorporated to obtain the "best" estimation. Second, the method considers the likelihood of certain types of events as part of the analysis process. Third, it uses Bayes' theorem to translate probabilistic statements into degrees of belief (e.g., the belief that we are more certain about something than others) instead of the classical confidence interval interpretation.

before-after study—the evaluation of implemented safety treatments, accomplished by comparing frequency or severity of crashes before and after implementation. There are several different types of before-after studies. These studies often develop CMFs for a particular treatment or group of treatments. Also known as *BA studies*.

comparison group—a group of sites, used in before-and-after studies, which are untreated but are similar in nature to the treated sites. The comparison group is used to control for changes in crash frequency not influenced by the treatment.

control group—a set of sites randomly selected to not receive safety improvements.

cost-effectiveness - a type of economic criteria for assessing a potential implementation of a countermeasure or design to reduce crashes. This term is generally expressed in terms of the dollars spent per reduction of crash frequency or crash severity.

countermeasure—a roadway-based strategy intended to reduce the crash frequency or severity, or both at a site.

crash—a set of events not under human control that results in injury or property damage due to the collision of at least one motorized vehicle and may involve collision with another motorized vehicle, a bicyclist, a pedestrian or an object.

crash estimation—any methodology used to forecast or predict the crash frequency of an existing roadway for existing conditions during a past period or future period; an existing roadway for alternative conditions during a past or future period; a new roadway for given conditions for a future period.

crash modification factor/function - an index of how much crash experience is expected to change following a modification in design or traffic control. CMF is the ratio between the number of crashes per unit of time expected after a modification or measure is implemented and the number of crashes per unit of time estimated if the change does not take place.

crash reduction factor (CRF)—the percentage crash reduction that might be expected after implementing a modification in design or traffic control. The CRF is equivalent to (1 – CMF).

crash severity—the level of injury or property damage due to a crash, commonly divided into categories based on the KABCO scale.

dependent variable—in a function given as $Y = f(X1, …, Xn)$, it is customary to refer to $X1,…, Xn$ as independent or explanatory variables, and Y as the dependent or response variable. In each crash frequency prediction procedure, the dependent variable estimated in the base model is the annual crash frequency for a roadway segment or intersection.

efficiency assessment tools - a systematic assessment of the improvement in road safety that can be realised by means of various road safety measures.

Empirical Bayes (EB) methodology—method used to combine observed crash frequency data for a given site with predicted crash frequency data from many similar sites to estimate its expected crash frequency.

entrance ramp—a ramp that allows traffic to enter a freeway.

expected average crash frequency—the estimate of long-term expected average crash frequency of a site, facility, or network under a given set of geometric conditions and traffic volumes (AADT) in a given period of years. In the Empiracal Bayes (EB) methodology, this frequency is calculated from observed crash frequency at the site and predicted crash frequency at the site based on crash frequency estimates at other similar sites.

expected crashes—an estimate of long-range average number of crashes per year for a particular type of roadway or intersection.

experimental studies—studies where sites are randomly assigned to a treatment or control group and the differences in crash experience can then be attributed to a treatment or control group.

ex-post evaluations - before-after ex-post evaluations examine how safety has changed following the implementation of some action; cross-section ex-post evaluations examine how the safety of units where action X was implemented differs from the safety of other units where action Y was taken.

external validity - the possibility of generalising the findings of a study (or set of studies) to other contexts than those in which the study was made. In this study, the term "transferability" is used interchangeably with external validity.

geometric condition—the spatial characteristics of a facility, including grade, horizontal curvature, the number and width of lanes, and lane use.

holistic approach—a multidisciplinary approach to the reduction of crashes and injury severity.

human factors—the application of knowledge from human sciences, such as human psychology, physiology, and

independent variables—a variable which is used to explain (predict) the change in the value of another variable.

meta analysis—a statistical technique that combines the independent estimates of crash reduction effectiveness from separate studies into one estimate by weighing each individual estimate according to its variance.

motor vehicle crash—any incident in which bodily injury or damage to property is sustained as a result of the movement of a motor vehicle, or of its load while the motor vehicle is in motion. Also referred to as a *motor vehicle crash*.

observational studies—often used to evaluate safety performance. There are two forms of observational studies: before-after studies and cross-sectional studies.

predicted average crash frequency—the estimate of long-term average crash frequency which is forecast to occur at a site using a predictive model found in Part C of the HSM. The predictive models in the HSM involve the use of regression models, known as Safety Performance Functions, in combination with Crash Modification Factors and calibration factors to adjust the model to site-specific and local conditions.

publication bias – the tendency not to publish studies whose findings are not statistically significant, counterintuitive or difficult to interpret.

quantitative predictive analysis—methodology used to calculate an expected number of crashes based on the geometric and operational characteristics at the site for one or more of the following: existing conditions, future conditions, or roadway design alternatives.

randomized controlled trial—experiment deliberately designed to answer a research question. Roadways or facilities are randomly assigned to a treatment or control group.

regression analysis—a collective name for statistical methods used to determine the interdependence of variables for the purpose of predicting expected average outcomes. These methods consist of values of a dependent variable and one or more independent variables (explanatory variables).

regression-to-the-mean (RTM)—the tendency for the occurrence of crashes at a particular site to fluctuate up or down, over the long term, and to converge to a long-term average. This tendency introduces regression-to-the-mean bias into crash estimation and analysis, making treatments at sites with extremely high crash frequency appear to be more effective than they truly are.

safety effect – the difference between the number of crashes by severity that one should expect with and without a countermeasure.

safety effectiveness - extent to which predicted or actual safety performance of a countermeasure manifests itself in reduced target crashes.

safety performance function (SPF)—an equation used to estimate or predict the expected average crash frequency per year at a location as a function of traffic volume and in some cases roadway or intersection characteristics (e.g., number of lanes, traffic control, or type of median).

target crashes - a specific type and severity category of crashes that can be affected by a countermeasure. For example, fatal crashes in a region for a countermeasure, all injury crashes on curves, crashes where alcohol was a causal factor for blood alcohol content limits, etc.

transferability – synonymous with external validity. See definition above.

variance- a measure of the average distance between each of a set of data points and their mean value; equal to the sum of the squares of the deviation from the mean value.