

With the advancing use of risk-informed decision-making in dam safety, there is interest in identifying tolerable risk criteria or guidance for dam failures. Historic data has been used as a benchmark for establishing tolerable risk criteria that are in use today. A metric for measuring public safety risks has been the F-N curve. An F-N curve shows the frequency of exceedance per year (F) of fatalities (N). The last published estimate of an F-N curve for fatalities due to dam failures may have been the one presented by Professor Robert Whitman as part of his Terzhagi lecture (Whitman, 1978). In this paper, we report on the development of an updated F-N relationship for dam failure-related fatalities based on an up-to-date database, advanced statistical analysis, and the evaluation of uncertainties. As part of our analysis, we quantify the statistical uncertainty in estimating the frequency of events based on a limited period of record. In addition, we discuss potential sources of uncertainty in the dataset, including the variation in fatality estimates for a number of major events, the variation in population-at-risk below dams, etc. An issue of particular interest in terms of estimating the frequency of occurrence is being able to estimate the number of dam years of operation that exposes populations to the threat of dam breach floods. For instance, the frequency of occurrence of 1,000 or more fatalities depends on the number of dam years of operation for dams that expose large populations (at least 1,000 people, but in fact substantially more) to the dam breach flood hazard. We examine the impact of assessing the number of dam years of operations on the estimate of F-N curves. The final result of the analysis is an estimate of the F-N curve that includes estimates of the uncertainty (e.g., 5-95% confidence intervals).