Salmonella is a major cause of human gastroenteritis worldwide. To prioritize interventions and assess the effectiveness of efforts to reduce illness, it is important to attribute salmonellosis to the responsible sources. Studies have suggested that some Salmonella subtypes have a higher health impact than others. Likewise, some food sources appear to have a higher impact than others. Knowledge of variability in the impact of subtypes and sources may provide valuable added information for research, risk management, and public health strategies. We developed a Bayesian model that attributes illness to specific sources and allows for a better estimation of the differences in the ability of Salmonella subtypes and food types to result in reported salmonellosis. The model accommodates data for multiple years and is based on the Danish Salmonella surveillance. The number of sporadic cases caused by different Salmonella subtypes is estimated as a function of the prevalence of these subtypes in the animal-food sources, the amount of food consumed, subtype-related factors, and source-related factors. Our results showed relative differences between Salmonella subtypes in their ability to cause disease. These differences presumably represent multiple factors, such as differences in survivability through the food chain and/or pathogenicity. The relative importance of the source-dependent factors varied considerably over the years, reflecting, among others, variability in the surveillance programs for the different animal sources. The presented model requires estimation of fewer parameters than a previously developed model, and thus allows for a better estimation of these factors to result in reported human disease. In addition, a comparison of the results of the same model using different sets of typing data revealed that the model can be applied to data with less discriminatory power, which is the only data available in many countries. In conclusion, the model allows for the estimation of relative differences between Salmonella subtypes and sources, providing results that will benefit future risk assessment or risk ranking purposes.