Human Exposure Modeling using SHEDS

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The Stochastic Human Exposure and Dose Simulation (SHEDS) modeling framework was developed for EPA's Office of Research and Development (ORD). The SHEDS models are stochastic time/activity-based multi-media, -pathway, and -chemical microenvironmental models used to estimate pollutant exposures through various mechanisms. While the specifics of the SHEDS models are dependent on their applications, the inhalation, dermal, non-dietary ingestion, and dietary ingestion pathways have all been incorporated and the media have included air, surfaces, and soil and dust. Chemical concentrations are based on user supplied inputs and are tracked within microenvironments via decay, chemical applications, and fugacity calculations. Here, overviews of the SHEDS-Multimedia and SHEDS-HT models are presented.

Model inputs were developed from a variety of sources such as modeled air pollution concentrations, physical and chemical properties of pollutants, human physiological parameters (e. g., absorption coefficients), census data, and specific product information. As the models are stochastic, the model inputs were developed in the form of statistical variability and uncertainty distributions.

The presentation will include brief discussion of some modeling aspects incorporated during development, such as correlation of input variables, energy expenditure adjustments for EPOC/fatigue, sensitivity analyses, and adaptation of an existing fugacity model.

Keywords: human exposure, pollutants, stochastic models