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Information Resources for Users of Statistics and Modeling Tools

[aiha.org](https://www.aiha.org)

Exposure Assessment

Exposure Assessment Strategies

Jahn, Steven D., William H. Bullock, and Joselito S. Ignacio (Eds.). (2015). *A strategy for assessing and managing occupational exposures*. (4th Ed.). Fairfax, VA: AIHA.

Accurate Decision Making

Logan, P., G. Ramachandran, J. Mulhausen and P. Hewett. (2009). Occupational exposure decisions: can limited data interpretation training help improve accuracy? *Annals of occupational hygiene*, 53(4), 311-324.

Logan P., G. Ramachandran, J. Mulhausen, S. Banerjee, and P. Hewett. (2011). Desktop Study of Occupational Exposure Judgments: Do Education and Experience Influence Accuracy?. *Journal of Occupational and Environmental Hygiene*, 8(12), 746-758.

Vadali, M., G. Ramachandran, J. Mulhausen, and S. Banerjee. (2012). Effect of training on exposure judgment accuracy of industrial hygienists. *J. Occup. Environ. Hyg.* 9(4), 242–256.

Arnold, S. F., Stenzel, M., Drolet, D., & Ramachandran, G. (2016). Using checklists and algorithms to improve qualitative exposure judgment accuracy. *J. Occup. Environ. Hyg.*, 13(3), 159-16.

Neitzel, R., Daniell, W. E., Sheppard, L., Davies, H. W. & Seixas, N. S. (2011). Improving Exposure Estimates by Combining Exposure Information. *Ann. Occup. Hyg.* 55, 537–547.

Montgomery H., R., R Lipshitz., and B. Brehmer. (2005). *How Professionals Make Decisions*. Boca Raton, FL: CRC Press.

Nicas M: An Impractical Emphasis, *The Synergist*, Sept 2003.

Tools for Statistical Analysis

General Statistical Analysis

Making Accurate Exposure Risk Decisions Webinar. <https://www.aiha.org/education/elearning/online-courses/making-accurate-exposure-risk-decisions>

AIHA Train-the-Trainer PDC: Improving IH Exposure Judgments Course. <https://www.aiha.org/public-resources/aiha-academic-portal/train-the-trainer-pdc-resources>

Eun GL, Diana MC. (2020). Adoption of exposure assessment tools to assist in providing respiratory protection recommendations. *Annals of Work Exposures and Health*, 64(5), 547–557. <https://doi.org/10.1093/annweh/wxaa023>.

Censored Data Analysis

Hewett, P. Appendix VIII: Analysis of Censored Data. *A Strategy for Assessing and Managing Occupational Exposures*. (4th ed.). AIHA Press. 2015.



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Hewett, P., and G. Ganser. (2007). A comparison of several methods for analyzing censored data. *Ann. Occup. Hyg.*, 51(7), 611–632.

Ganser, G. and P. Hewett. (2010). An accurate substitution method for analyzing censored data. *Journal of Occupational and Environmental Hygiene*, 7(4), 233-244.

Huynh, T., Quick, H., Ramachandran, G., Banerjee, S., Stenzel, M., Sandler, D. P., Engel, L. S., Kwok, R. K., Blair, A., & Stewart, P. A. (2016). A Comparison of the β -Substitution Method and a Bayesian Method for Analyzing Left-Censored Data. *The Annals of Occupational Hygiene*, 60(1), 56–73. <https://doi.org/10.1093/annhyg/mev049>

Helsel, D. (2005.) *Nondetects and Data Analysis - Statistics for Censored Environmental Data*. Hoboken, NJ: John Wiley & Sons, Inc.

Helsel, Dennis R. (2012). *Statistics for Censored Environmental Data Using Minitab and R*. (CourseSmart). Wiley.

Bayesian Analysis Applied to Exposure Data

Jérôme L, Lawrence J, Peter K, Hugh D, France L, Frédéric C, Gautier M, Tracy K. (2019). Expostats: A Bayesian toolkit to aid the interpretation of occupational exposure measurements. *Annals of Work Exposures and Health*. 63(3), 267–279. <https://doi.org/10.1093/annweh/wxy100>.

Gurumurthy R. Progress in Bayesian statistical applications in exposure assessment. (2019). *Annals of Work Exposures and Health*, 63(3), 259–262. <https://doi.org/10.1093/annweh/wxz007>.

Ramachandran G, Vincent JH. A Bayesian approach to retrospective exposure assessment. (1999). *Applied Occupational and Environmental Hygiene*, 14(8), 547–557. <https://doi.org/10.1080/104732299302549>

Sottas PE, Lavoué J, Bruzzi R, David V, Nicole C, Droz PO. (2009). An empirical hierarchical Bayesian unification of occupational exposure assessment methods. *Statistics in Medicine*, 28(1), 75–93. <https://doi.org/10.1002/sim.3411>

Banerjee S, Ramachandran G, Vadali M, Sahmel J. (2014). Bayesian hierarchical framework for occupational hygiene decision making. *The Annals of Occupational Hygiene*, 58(9), 1079–1093. <https://doi.org/10.1093/annhyg/meu060>.

Hewett, P., Logan, P., Mulhausen, J., Ramachandran, G., & Banerjee, S. (2006). Rating Exposure Control Using Bayesian Decision Analysis. *Journal of Occupational and Environmental Hygiene*, 3(10), 568–581. <https://doi.org/10.1080/15459620600914641>

Ramachandran, G. (2001). Retrospective exposure assessment using Bayesian methods. *Annals of Occupational Hygiene*, 45(8), 651-667.

Tools for Modeling

General Exposure Modeling

Keil, C., Simmons, C. and Anthony, R. (Eds). (2009). *Mathematical Models for Estimating Occupational Exposure to Chemicals* (2nd ed.). American Industrial Hygiene Association Publications.



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- Keil, C. (Ed.). (2023). *A Case-Based Introduction to Modeling Occupational Inhalation Exposures to Chemicals*. American Industrial Hygiene Association, Falls Church VA.
- Chen K, Martin LF. (2021). Proper selection and application of mathematical models for estimating occupational exposure to chemicals. *The Chemist*, 92(1), 95-107.
- Hewett, Paul, and Gary H. Ganser. (2017). Models for nearly every occasion: Part I-One box models. *Journal of Occupational and Environmental Hygiene*, 14(1), 49-57. <https://doi.org/10.1080/15459624.2016.1213392>
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- Foat, T., Drodge, J., Nally, J., & Parker, S. (2020). A relationship for the diffusion coefficient in eddy diffusion based indoor dispersion modelling. *Building and Environment*, 169, 106591. <https://doi.org/10.1016/j.buildenv.2019.106591>
- Amiri, Z., Bayatian, M., & Mozafari, S. (2024). Numerical simulation application in occupational health studies: A review. *International Journal of Occupational Safety and Ergonomics*, 30(3), 946-967. <https://doi.org/10.1080/10803548.2024.2369423>
- Nicas M, Armstrong (2021). *Mathematical Modeling of Indoor Air Contaminant Concentrations*. Wiley.
- IH modelling and its application quantitative exposure assessment. Section three: safety, PSM, and industrial hygiene. PSCI China Supplier Conference. <https://pscinitiative.org/resource?resource=1773>
- AIHA-ACC FCRI Workshop #3: Making the Most of Near Field Exposure Modeling for Diverse Occupational Risk Assessment. https://www.aiha.org/assets/icons/AIHA-FCRI-Workshop-3_Presentation_Modeling.pdf
- Global CEM Net Report of the Workshop no. 2 on "Source Characterization, Transport and Fate", Intra (Italy), 20-21 June 2005. <https://www.jayjock-associates.com/app/download/7237027351/Global+CEM+Net+Workshop+2+-SOURCES.pdf>
- The Exposure Modeling Toolbox: Contains info on 12 computer models including IHMod, IH Skinperm, Advanced Reach Tool and others. <https://www.aiha.org/public-resources/healthierworkplaces/healthier-community-resources/apps-and-tools-resource-center/aiha-risk-assessment-tools/exposure-modeling-toolbox/exposure-modeling-toolbox-download>.



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SDM 2.0

Improving Professional Judgments of Inhalation Exposure and Risk Assessments Using the Structured Deterministic Model (SDM 2.0) – Webinar Recording. <https://www.aiha.org/events/aiha-university-live-online-pdc-improving-professional-judgments-of-inhalation-exposure-and-risk-assessments-using-the-structured-deterministic-model-sdm-2-0>

Using the SDM 2.0 to Assess Real-World Situations - Webinar Recording. <https://www.aiha.org/events/aiha-university-webinar-using-the-sdm-2-0-to-assess-real-world-situations>



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