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Introduction to epidemiology

- Study types. Experimental studies. Observational studies. Classical classification: cohort, case-control, cross-sectional. Alternative classification. Time series: basic concepts
- Measures of disease frequency (prevalence, cumulative incidence, incidence rate, odds). Time-dependent variables and immortal time bias
- Measure of association: Relative measures (risk ratio, rate/hazard ratio, odds ratio); Absolute measures (risk difference, rate difference)
- Validity and precision
- Role of variables: Exposure, outcomes, confounders, effect modifiers, mediators, synergistic factors
- Causality: Directed Acyclic Graphs (DAG)
- Methods to address confounding in the design and analysis phase
- Classical regression models: linear, logistic (binomial and multinomial), Poisson/Cox. Models for correlated outcomes
- G-models
- $P < 0.05$? No, thanks

The course will introduce the basics of Epidemiology, with few formulas and simple examples. For more advanced topics (eg, DAGs, models for correlated outcomes, G-models) only the essential concepts are addressed.

Students will learn some things that non-epidemiologists do not know:

- Incidence rate is perhaps the fundamental measure of occurrence
- Immortal time-bias occurs when we do not correctly deal with time-dependent variables
- In Epidemiology representativeness is not important, what matters is validity
- In cohort studies risk ratios are often preferable to odds ratios
- Controls are not a control group in case-control studies
- In case-control studies matching does not do what one thinks
- DAGs are essential to decide which variables are confounders and which are not
- G-models are the only solution when a confounder is also a mediator
- Statistical significance is a concept to be dismissed

Reference: book chapter.

Dario Consonni, Sara De Matteis. "Chapter 6. Introduction to epidemiological methods for studying effects of exposure to pesticides", pp.121-163.

In: Colosio C, Tsatsakis AM, Mandic-Raicevic S, Alegakis A. "EXPOSURE AND RISK ASSESSMENT OF PESTICIDE USE IN AGRICULTURE Approaches, Tools, and Advances". Elsevier, Academic Press 2021

Despite its name, it's a general introductory chapter on Epidemiology, not restricted to pesticides. Quite a long chapter, but shorter than an Epidemiology book.