Mahidol University • Faculty of Public Health

PHOH 456 • Occupational Health and Safety Seminar

Research Methodology in Occupational Health and Safety

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Wisdom of the Land

Research is .....

- The **systematic study** of materials, sources, etc., in order to establish facts and reach conclusions.
- Knowledge acquisition gained through reasoning and the use of appropriate methods.

Scientific Method

Why Conduct Research?

- To develop knowledge for professions
- To develop effective policies
- To solve practical problems
- To make informed decisions
- To increase the knowledge base of larger society

Huge amounts of daily life and experience in our society are based on what we have learned using the logic and evidence involved in scientific research.

Types of Research

- General Classification
  - Quantitative Research
  - Qualitative Research
- Classified by Nature of the Study
  - Descriptive Research
  - Analytical Research
- Classified by Purpose of the Study
  - Fundamental/Basic Research
  - Applied/Action Research

Types of Research (cont.)

- Classified by Design of the Study
  - Observational Research
    - Cross-sectional Studies
    - Cohort Studies -- *Prospective/Retrospective*
    - Case-Control Studies
  - Experimental Research
    - Randomized Controlled Trial Studies
    - Other Non-randomized Interventional Studies

Steps to do Research

- Identifying a project idea
- Determining the possibility
- Looking for a potential funder – study priorities, guidelines, application forms, etc.
- Selecting a study topic
- Reviewing the literature
- Preparing preliminary information
- Focusing the research question
- Matching topic to population

Steps in Research Process

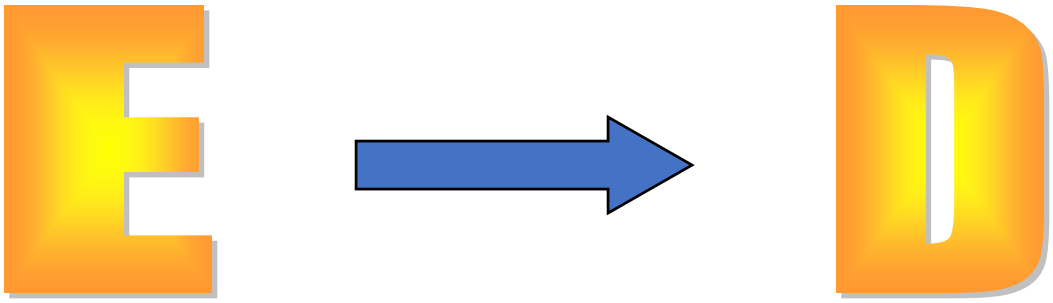
- Identifying a hypothesis related to the question
  - Make testable predictions in the hypothesis
  - Design an experiment to answer that hypothesis
- Collecting evidence/data
  - Primary data – questionnaire, measurement, etc.
  - Secondary data – obtained from other sources
- Analyzing the data & Interpreting the findings
  - Determine results and assess their validity
  - Determine if results support/reject the hypothesis

More Steps in Research Process

- Making conclusions and discussion of findings
- Sharing/Informing others of your findings
  - Write-up manuscript for publication
  - Present your research work
- Establishing initial contact and creating network or partnerships

Basic Question in Health Research

- Are exposure and disease/outcome linked?
- Is there an association between them? (statistically significant?)



Exposure

Disease / Health Outcome

Global Situation & Facts

- Workers all over the world, face OH&S hazards in the complex work settings due to:
  - Rapid industrialization
  - Technological advancement
  - Globalization over the last decades
- Wide variety of chemical, physical, biological and psychological hazards at work
- Poor working conditions especially in developing countries due to lack of practicing simple preventive measures.

Global Situation & Facts (cont.)

- This is resulting into injuries, accidents, illnesses, disabilities and death.
- Workers expect safe working environment as their fundamental human right.
- Some determinants of workers' health and safety:
  - OH&S legislations/standards
  - OH&S knowledge
- Research & development in various OH&S topics has been placed in top priorities.

OH&S Researches

- Purpose varies across different fields/disciplines:
  - To explore and describe some OH&S issues
  - To identify OH&S risks/problems
  - To establish association between risk factors and suspected outcomes
  - To develop intervention/countermeasures to solve the problem
  - Appropriation and validation of a method/technique for OH&S assessment
  - Formulation of OH&S policies/standards

etc.

Research Priorities

- Several organizations/studies have attempted to identify future research needs in the field of occupational health and safety
- EU classified into 4 thematic areas:
  - Psychosocial Work Environment
  - Musculoskeletal Disorders (MSDs)
  - Dangerous Substances
  - OH&S Management

Psychosocial Work Environment

- Growing concern about the negative effects of work organization and design on:
  - Workers' health and well-being
  - Quality of work
  - Creativity and innovation needed by organizations

Psychosocial Work (cont.)

- There is a need to prioritize the following issues:
  - Changing 'World of Work' and its impact on health and safety (including work-life balance issues)
  - Organizational interventions to improve the psychosocial work
  - Environment (especially work-related stress, and physical and psychological violence)
  - Interaction between MSDs and psychosocial work
  - Role of psychosocial and organizational factors in accidents and errors.

Musculoskeletal Disorders (MSDs)

- MSDs have been identified as a top priority for preventive action in many countries:
  - The most commonly reported work-related injury/ health problem.
  - Surveys suggest that such problem is increasing in some respects.
  - Reducing musculoskeletal risks is part of creating quality jobs, by enabling workers to stay in employment, and ensuring that work and workplaces are suitable for a diverse population.

Musculoskeletal Disorders (cont.)

- Main priorities in this field:
  - Developing tools to assess the total load/overload on the body's musculoskeletal system
  - Developing assessment/evaluation methods, intervention methods and preventive measures
  - Some overlooked MSDs (such as standing work and other static work)
  - Specific high-risk sectors; a diverse workforce; new sources of risk (e.g. good design for new technology such as multi-screen workplaces);
  - Approaches to include ergonomics at design state.

Dangerous Substances

- An increasingly large number of chemicals are present in workplaces.
  - Exposure to dangerous chemicals may also occur at many workplaces outside the chemical industry, e.g. in agriculture or construction work
  - From EU survey, 16% of workers handle or are in contact with dangerous substances for at least 1/4 of their working time.

Dangerous Substances (cont.)

- Main research priorities in this field:
  - Validation and improvement of models of assessment for workers' exposure to chemicals
    - Identifying exposure reduction needs and methods
    - Defining exposure-response relationships in epidemiological studies (longitudinal studies)
  - Specific groups of chemical substances: e.g. nanoparticles and ultrafine particles, carcinogens, reproductive toxicants;
  - Exposure assessment to biological agents in the workplace

OH&S Management

- Nature and organization of work are changing, becoming more client- and knowledge-driven.
- Workforce has also been changing:
  - Aging, less male-dominated, more precarious and more difficult to monitor, as it has spread out into small companies.
- As a consequence, health issues have become more complex and there is a need to find new ways or strategies in management to improve OH&S in this context of profound changes.

OH&S Management (cont.)

- The focus should be on:
  - Economic dimension of OH&S (cost and benefits, impact on overall performance, development of management tools integrating OH&S dimension);
  - Life expectancy and work (to identify work-related factors in the burden of disease);
  - Managing aging workforce (analysis of relationship between age and work, identification of policies to prevent age-related exclusion from work).

Emerging Risks related to OH&S

- An 'emerging risk' has been defined as any risk that is both new and increasing.
  - Risk was previously non-existent; or
  - A long-standing issue is now considered to be a risk due to a change in social or public perceptions, or to new scientific knowledge.

Top Emerging Physical Risks

- Lack of physical activity (e.g. prolonged sitting at the workplace, or due to use of automated systems);
- Combined exposure to vibration and awkward posture;
- Poor awareness of thermal risks among low-status worker groups exposed to unfavourable thermal conditions (e.g. migrant workers in agriculture and construction);
- Combined exposure to MSD risk factors and psychosocial risk factors (e.g. fear of future, insecurity);
- Multi-factorial risks (e.g. in call centers: combined effects of poor ergonomic design, poor work organization, mental and emotional demands);

Top Emerging Physical Risks (cont.)

- Combined exposure to vibration and muscular work;
- Thermal discomfort;
- Complexity of new technologies, new work processes and human-machine interfaces leading to increased mental and emotional strain;
- Insufficient protection of high-risk groups (older workers, low status workers, foreign workforce, etc.) against long-standing ergonomic risks;
- Increase of exposure to UV radiation (during occupational outdoor activities, new UV technologies or increasing sensitivity at the workplace)

Top Emerging Chemical Risks

- Nanoparticles and ultrafine particles:
  - Increasing industrial applications creating nanoparticles (e.g. laser treatment of material)
  - Lack of knowledge on exposure and toxicity
  - Inappropriate or insufficient protective measures
- Poor risk control of chemical substances in SMEs;
- Dermal exposure leading to skin diseases;
- Outsourcing (e.g. for cleaning and maintenance activities) performed by sub-contracted companies with poor knowledge of chemical risks;

Top Emerging Chemical Risks (cont.)

- Use of epoxy resins (e.g., in the construction sites);
- Exposure to dangerous substances (dust, micro-organisms, endotoxins, etc.) in waste treatment activities
- Exposure to diesel exhaust;
- Exposure to isocyanates in the construction sector;
- Isocyanates leading to allergic reactions;
- Man-made mineral fibers (e.g. refractory ceramic fibers, carbon/graphite fibers), potential health effects of fiber substitutes for asbestos, such as respiratory diseases, cancer.

Top Emerging Biological Risks

- Poor or difficult assessment of biological risks;
- Use of antibiotics for human health care and for animal breeding in the food industry;
- Lack of information on biological risks in various workplaces (e.g. offices, agriculture);
- Poor maintenance of air-conditioning and water systems (e.g. legionella, aspergilosis in hospitals);
- Biohazards in waste treatment plants;
- Bioaerosols and chemicals, whose combined effects are under-researched but lead to allergies;

Top Emerging Biological Risks (cont.)

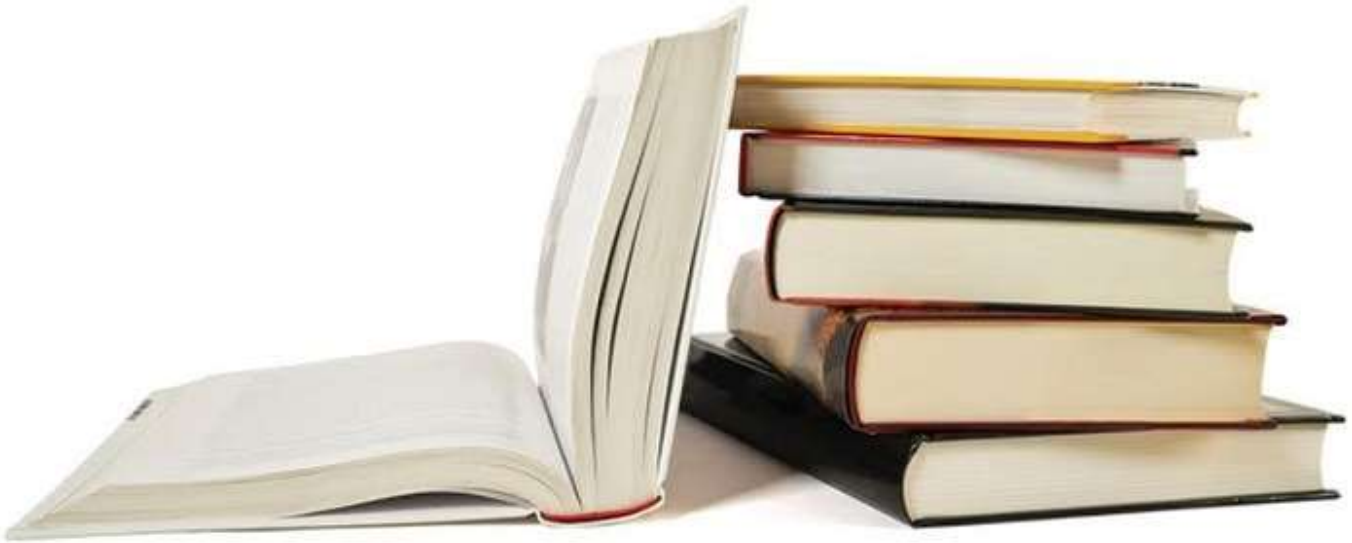
- Endotoxins: high concentrations in various industrial settings such as workplaces exposed to organic materials (straw, wood, cotton dust), waste treatment, poultry houses, swine confinement buildings;
- Moulds in indoor workplaces due to new construction methods and materials, inappropriate heating, ventilation and air conditioning practices, and lack of maintenance.
- Global epidemics of old and new pathogens, e.g. severe acute respiratory syndrome (SARS), viral hemorrhagic fever, avian flu, tuberculosis, HIV/AIDS, hepatitis C, hepatitis B.

Top Emerging Organizational, Social and Human Risks

- New forms of work/employment contract, associated with the emergence or aggravation of psychosocial problems and related health effects;
- Feeling of job insecurity in the context of globalization and unstable labour market, affecting workers' health and workers' safety behavior at work;
- Increasing work-related stress and difficulty in balancing work and life (e.g., due to work intensification and growing complexity of tasks, and increase of working time);
- Aging workforce vs. how to achieve a better fit of jobs;
- Violence and bullying

Cross-overs: Multifactorial Risks

- Combined exposure to multiple risk factors in the work environment, including physical, chemical, psychosocial, biological, ergonomic issues, for example:
  - Work organization and workplace design issues, leading to multiple health problems (such as MSDs, obesity);
  - Physical and cognitive ergonomics of human-machine interfaces (such as complex automated systems, high-technology devices) and their impact on stress and MSDs
  - Combined exposure to noise and ototoxic substances;
  - Impact of stress on the occurrence of MSDs.



Review of Literature

What is a Literature Review?

- An overview of previous research/study on your research topic
- A comprehensive review of all published research that is relevant to your proposed investigation and guided by your research objectives
- An essay that covers the major findings of a field, how they relate to or are dissimilar from other findings, and major methodological and informational problems in the research.

Purpose of a Literature Review

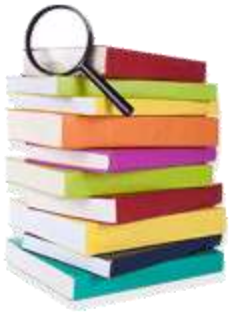
- Convey the depth and breadth of research that has been accomplished on a subject
- Supports the motivation/significance of research
- Identify important issues and link to hypotheses
- Identify key areas of missing knowledge
- Describe methodologies used
- Describe existing data sets
- Link proposed research to previous and ongoing research efforts

How to do a Literature Review

- Define the research topic
- Compile and prioritize a list of keywords
- Identify sources of information
- Read, evaluate, analyze all the works
- Discuss findings and conclusions with others
  (to understand context, gaps in previous research)
- Divide works into supportive and antithetical positions
- Identify relationships between works in the literature
- Articulate how these apply to your research

Identify Resources

- Books
- Journals
- Conference Papers
- Theses/Dissertations
- Bibliographies
- Maps
- Internet
- Indexes/Abstracts Printed
- Electronic Databases
- Government Publications
- Interviews and other Unpublished Research



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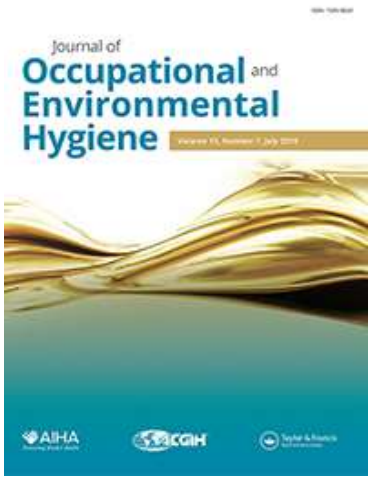
OH&S Journals

- Accident Analysis and Prevention
- American Journal of Industrial Medicine
- Annals of Occupational Hygiene
- Annals of Work Exposures and Health
- Applied Ergonomics
- Archives of Environmental & Occupational Health
- EHS Today
- Industrial Health
- International Archives of Occupational and Environmental Health
- International Journal of Environmental Health Research

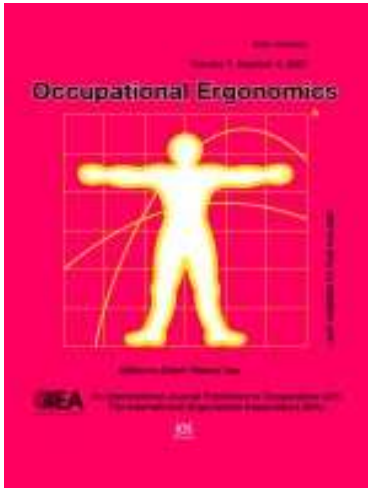
OH&S Journals

- Intl. Journal of Industrial Ergonomics
- Intl. Journal of Injury Control and Safety Promotion
- Intl. Journal of Workplace Health Management
- Journal of Environmental Science and Health.
- Journal of Hazardous Materials
- Journal of Health, Safety and Environment
- Journal of Occupational and Environmental Hygiene
- Journal of Occupational and Environmental Medicine
- Journal of Occupational Health Psychology
- Journal of Safety Research
- Journal of Toxicology and Environmental Health
- Noise & Health



OH&S Journals

- Occupational and Environmental Medicine
- Occupational Ergonomics
- Occupational Medicine
- Safety & Health Practitioner
- Safety and Health at Work
- Safety Science
- Toxicology and Industrial Health
- Work and Stress



SH@W
Safety and Health at Work

Questions & Comments

Next Session:

Emerging OH&S Issue – Nanotechnology:

Health and Safety at Work