EnVIE Project

EnVIE Project: INDOOR AIR RELATED HEALTH EFFECTS

Paolo Carrer – Coordinator EnVIE WP1: Health Effects

Dpt. Occupational and Environmental Health,
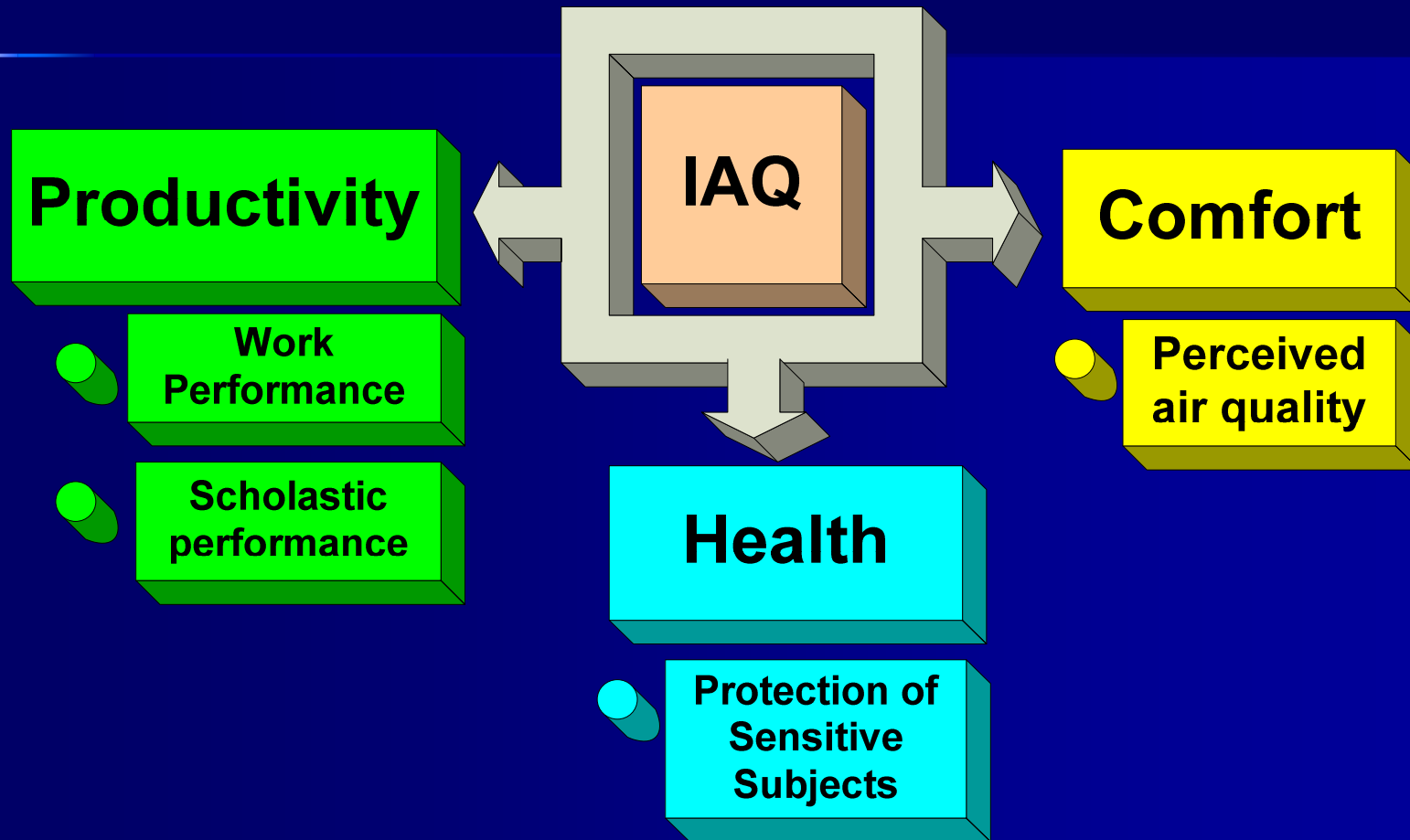University of Milan, Italy

Indoor Air and Health

People spend 80-90% time indoors

Indoor environments have changed enormously with often bad IAQ:

- Outdoor air, human activities, soft furnishings, fitted carpets, equipments and mechanical air ventilation systems
- Decrease of the rate at which indoor air is exchanged for fresh air

Evidence of Health effects

EnVIE WP1 – Health Effects: OBJECTIVES

To promote an interactive forum for the collection, review and critical evaluation of the findings and developments of research results on the health effects of indoor air relevant contaminants, in particular for patients with asthma and/or allergies.

- Critically review and collate European (and non-European) research on the health effects of indoor air relevant contaminants,

- Assess the policy relevance of their objectives and conclusions, and identify epidemiological and toxicological research needs lying on the critical path for knowledge based policy development (Task 1).

- Evaluate the risk assessment relevance of indoor exposure threshold levels considering the extremely low coverage of indoor monitoring, heterogeneity of both indoor environments and temporary/chronic susceptibility of the occupants, and the underlying baseline risk levels (Task 2).

- Evaluate A) the significance of indoor sources on the onset of asthma and allergy symptoms (Task 3) and B) the potential of building envelope and HVAC system to protect the susceptible individuals (Task 4).

EnVIE WP1 – Health Effects: UNITS INVOLVED

- Department of Occupational Health, University of Milan, Italy
  (UNIMI) - Paolo Carrer

- International Centre for Indoor Environment and Energy, Technical University of Denmark
  (DTU) - Jan Sundell

- Department of Environmental and Occupational Medicine, University of Aarhus, Denmark
  (AU-DOEM) - Lars Mølhave

- Pulmonary Environmental Epidemiology Group, CNR Institute of Clinical Physiology, Italy
  (IFC- CNR) - Giovanni Viegi and Marzia Simoni

- Charles University of Prague, First Faculty of Medicine, Institute of Hygiene & Epidemiology
  (IHE) - Ivana Holcátová

- Department of Epidemiology, Health Authority RM-E, Rome, Italy
  (ASLRME.DE) - Francesco Forastiere

+ Paul Harrison – Isabella Annesi Maesano

YEARLY DIRECT MEDICAL COSTS OF INDOOR-RELATED DISEASES IN ITALY

Italian National Commission "Indoor", Minister of Health, G.U. n. 276, 27/11/2001

Pollutant	Disease	Impact	Direct medical costs
Allergens (acarus, moulds, animal dander)	Bronchial asthma in children/teenagers	>160,000 prevalent cases/yr	>80 millions
Radon	Lung cancer	1,500-6,000 deaths/yr	26-105 millions
Environmental Tobacco Smoke	Bronchial asthma in children/teenagers	>30,000 prevalent cases/yr	>15 millions
	Acute airways infections	>50,000 new cases/yr	>12 millions
	Lung cancer	>500 deaths/yr	>9 millions
	Acute heart infarction	>900 deaths/yr	>8 millions
Benzene	Leukemia	36-190 cases/yr	0.5-4 millions
Carbon Monoxide	Acute poisoning	>200 deaths/yr	1 million
TOTAL			>152-234 millions

Note: The table takes into consideration only the main health impacts. Other recognised indoor-related health effects have been omitted

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Institute for Health and Consumer Protection
Physical and Chemical Exposure Unit
I-21020 Ispra (VA), Italy

Final Report

The INDEX project

Critical Appraisal of the Setting and Implementation of Indoor Exposure Limits in the EU

Dimitrios Kotzias, Kimmo Koistinen, Stylianos Kephalopoulos,
Christian Schlitt, Paolo Carrer, Marco Maroni,
Matti Jantunen, Christian Cochet, Séverine Kirchner,
Thomas Lindvall, James McLaughlin, Lars Mølhave,
Eduardo de Oliveira Fernandes and Bernd Seifert

EU Scientific Committee on Health and Environmental Risks (SCHER)

Report on risk assessment on indoor air quality (2007)

A number of factors in the indoor environment can affect well-being and health. The main factors are:

Chemicals for intended use or unintentional emissions from different sources (formaldehyde, carbon monoxide, nitrogen dioxide, benzene, lead and organophosphate pesticides)

ETS, radon, particles, microbes, humidity, pets and pests.

US National Occupational Research Agenda (NORA) on Indoor Work Environments

For the priority area "Indoor work environment" the team identified 3 types of heath effects as priorities for increased research

1. building-influenced communicable respiratory infections, due to occupant sources (e.g. influenza, common cold, tubercolosis) or building sources (Legionnaires' disease, Pontiac fever, fungal infections);

2. building-related asthma, hypersensitivity pneumonitis and allergic diseases;

3. non-specific building-related symptoms (including so-called sick building syndrome)

(Mendell et al. 2002)

Development of WHO Guidelines for Indoor Air Quality

Report on a Working Group Meeting
Bonn, Germany
23-24 October 2006

EnVIE: health endpoints

The following diseases (not in rank order) have been prioritised as being caused or aggravated by poor indoor air quality:

- Allergic and asthma symptoms
- Lung cancer
- Chronic obstructive pulmonary disease (COPD)
- Airborne respiratory infections
- Cardiovascular morbidity and mortality
- Odour and irritaton
- Others: Acute/chronic CO poisoning
            Foetus development

EnVIE WP1 – Health Effects: FOR EACH DISEASE

Review research on the health effects of indoor air relevant contaminants

Description of the disease

- identify the main indoor air pollutants and related sources causing the disease
- incidence / prevalence of the disease / attributable risk to IAQ; Time trend
- identify potential susceptible populations

Assess the policy relevance of the conclusions of the studies

- evaluate the risk assessment relevance of indoor exposure threshold levels
- evaluate the potential of building envelope and HVAC system to protect people, including the susceptible individuals
- identify epidemiological and toxicological research needs lying on the critical path for knowledge based policy development

EnVIE OBJECTIVES AND APPROACH: Flowchart of the EnVIE project highlighting the health, exposure, and source issues

2. Exposures

1. Effects

	Tobacco	Combustion Particles	CO	Radon	Dampness, mold, dust mites, bio-aerosols	(S)VOCs Indoor chemistry products
Allergic and Asthma symptoms	○	●			●	○
Lung Cancer	○	●		●		
Chronic obstructive pulmonary disease	○	●			●	
Airborne respiratory infections	○	●			●	
Cardiovascular morbidity and mortality	○	○	●			
Odour and irritation	○	●			●	●

3. Causes & Sources → **4. Policies**

	Tobacco	Combustion Particles	CO	Radon	Dampness, mold, dust mites, bio-aerosols	(S)VOCs Indoor chemistry products
Outdoor Air		○	○		○	○
Building / Equipment / Ventilaton	○	●	●	●	●	○
Consumer Products		○				●
Occupant behaviour & maintenance	○	●	●	○	●	○

Different colours degrees ○● mean different levels of impact.
Out of ENVIE scope. ●