

# Indoor Environment and Health

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## **Miljökvalitetsmål**

The Environmental Objectives was appropriated by the Swedish Parliament in 1999 - should be fulfilled in 2020

**Consists of 16 areas**

Pufendorf Indust



## 15. A Good Built Environment

By 2020 our built environment should not expose people to harmful levels of:

**Air pollutants**

**Chemical substances**

**Noise**

**Radon**

... or **other unacceptable health or safety risks**

*“Considering the current extent of indoor related health problems this aim will not be fulfilled by 2020.”*

*[www.miljomal.se](http://www.miljomal.se)*

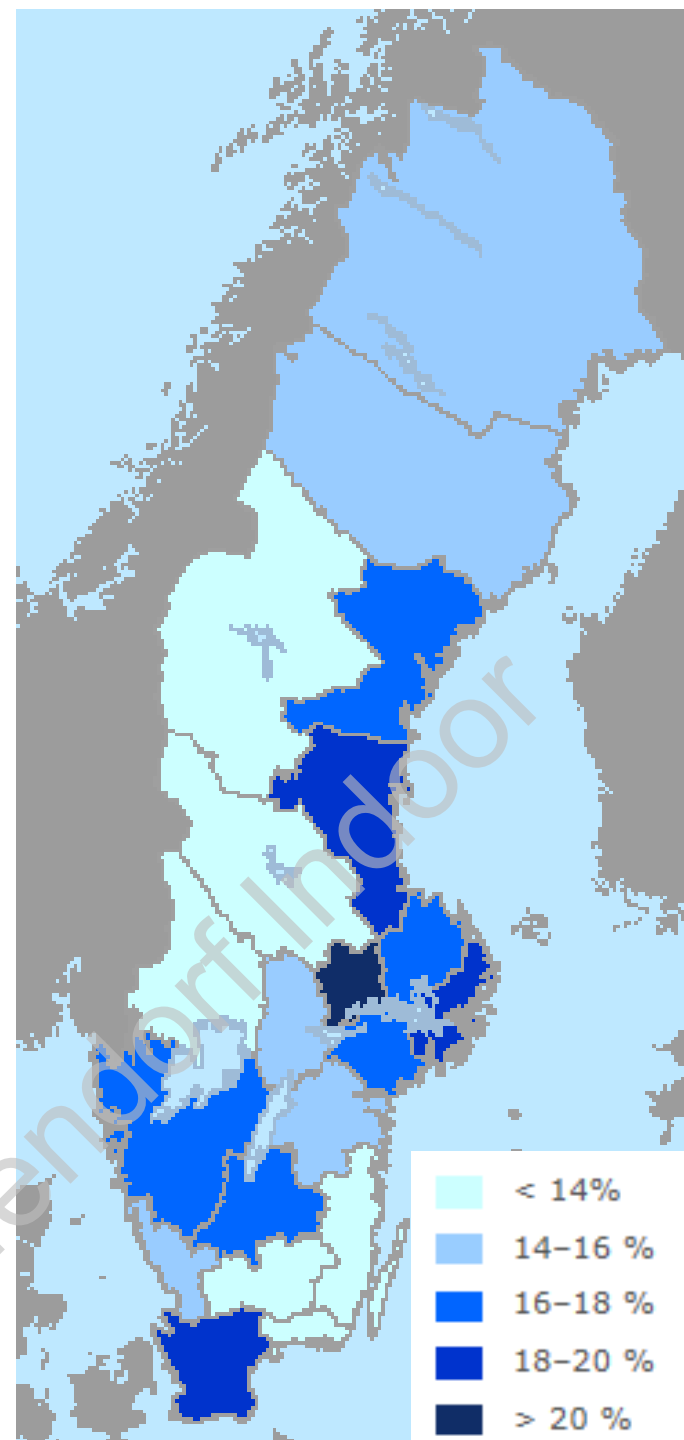
## 1,2 million swedes experience negative health effects from indoor environments

Distribution of adults (19-81) that experience negative health symptoms related to their indoor environment\* - at least once a week during a three month period.

Symptoms: tiredness, headache, skin irritation, eye irritation, nasal irritation

*\*home and/or school or work place*

*The national environmental health inquiry*



# What do we know?

People experience:

*Eye and airway symptoms*

Dry or runny eyes. Runny nose or nasal stuffiness. Throat irritation, coughing or wheezing, asthma

*Skin symptoms:*

Dry and irritated skin, itching, eczema, heating and redness

*General symptoms:*

Tiredness, loss of concentration, headache, nausea, dizziness

*Comfort problems:*

Unpleasant smells, dry or “bad” air, draught, too high or too low temperature, dusty environment, noise, bad lightening, ... **etc.**

# What do we know?

Indoor environments and their properties might cause:

Chronic obstructive pulmonary disease (COPD)

*(In swedish: kronisk obstruktiv lungsjukdom: KOL)*

Infections

Asthma

Cancer

Cardiovascular problems

Cardiac infarction

Stroke

Reduced lung function/development in children

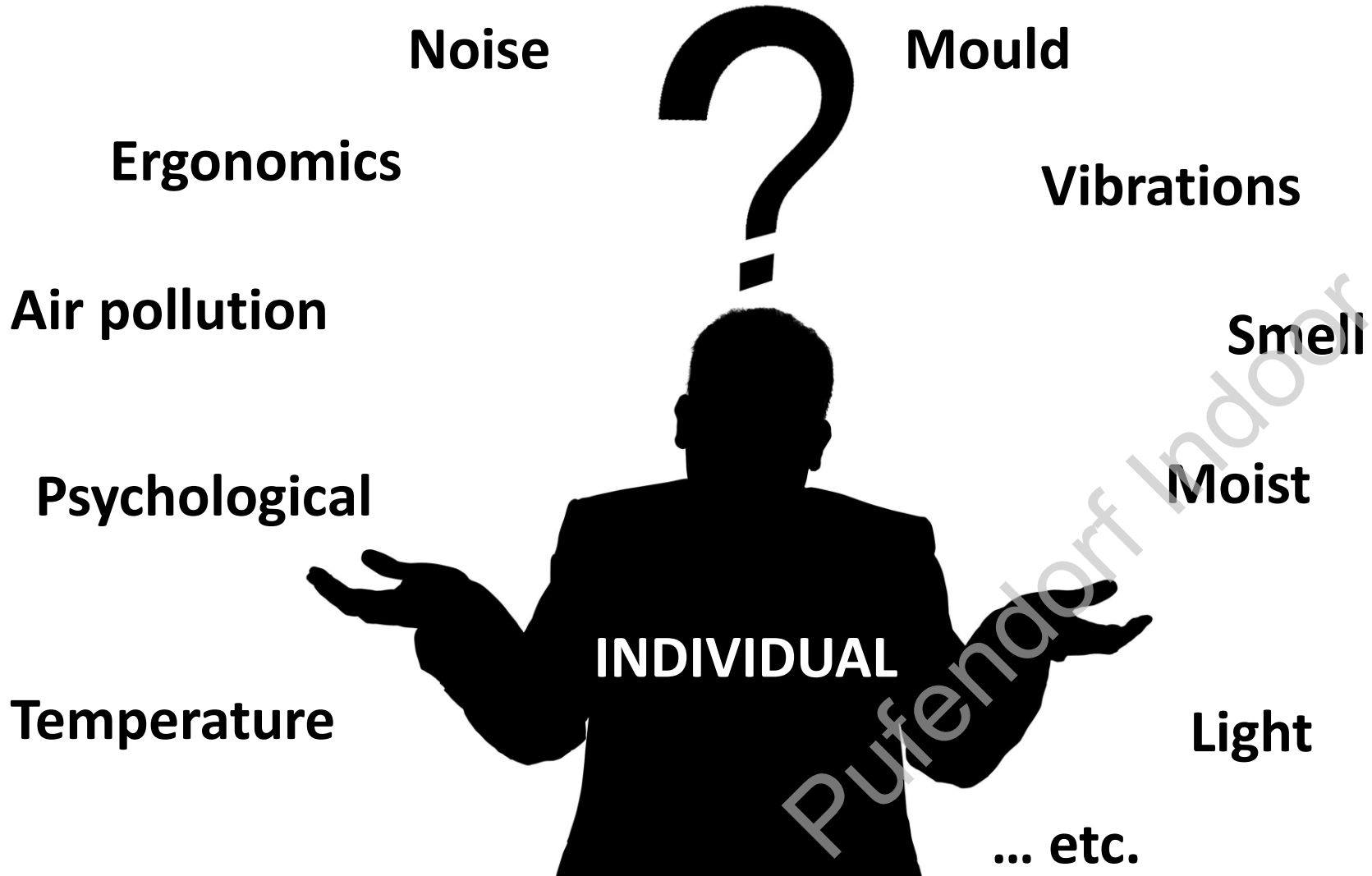
Endocrine disrupting function

**...etc.**

Purcell & Anderson Indoor

# What do we know?

Cause, exposure, thresholds, biomarkers, etc:



# The most common factors to indoor health problems:

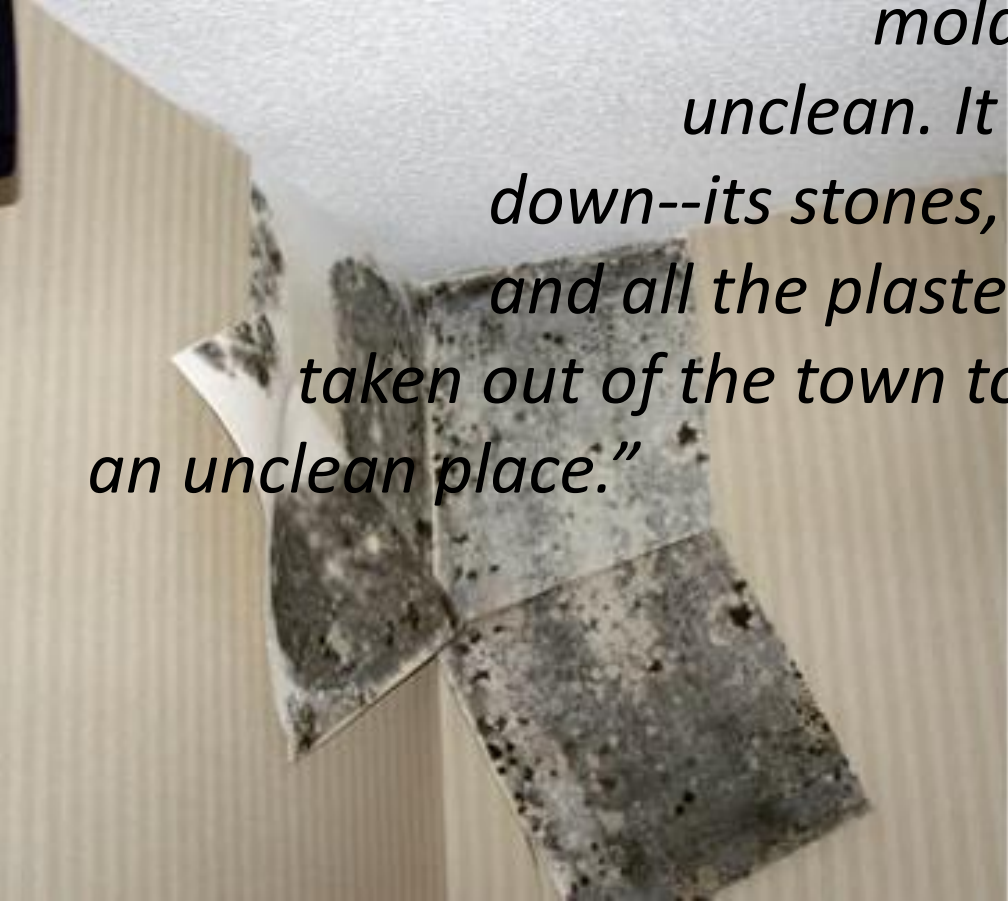
- 1) Moist and mould
- 2) Insufficient ventilation
- 3) Chemical emissions from building or interior materials





# MOIST AND MOULD (MOLD)

*"If the defiling mold reappears in the house after the stones have been torn out and the house scraped and plastered, the priest is to go and examine it and, if the mold has spread in the house, it is a persistent defiling mold; the house is unclean. It must be torn down--its stones, timbers and all the plaster--and taken out of the town to an unclean place."*



Pufendorf Indoor

Leviticus 14:43-45

# MOIST AND MOULD

Moist and mould in buildings correlate with indoor related symptoms and health effects, such as asthma symptoms.

Approximately 25000 adults are estimated to have asthma symptoms (yearly) due to exposure to moist damages at home.

*Socialstyrelsen – Miljöhälsorapport 2009*

Approximately 700 children (4 years of age) experience regular symptoms from the lower air ways due to exposure to damp home environments.

*IMM – Institute of Environmental Medicine, KI  
Miljöhälsorapport 2013*

## **We know that:**

In extreme environments, work environments, (handling mouldy hay) – mould spores might reach levels of 10 000 000 spores/m<sup>3</sup> which in turn will decrease lung functions and cause fever.

## **... however:**

Mouldy buildings seldom have spore levels > 200-300 spores/m<sup>3</sup> i.e. too few to cause these kind of symptoms.

**Outdoor levels during autumn are much higher.**



# GUIDELINE

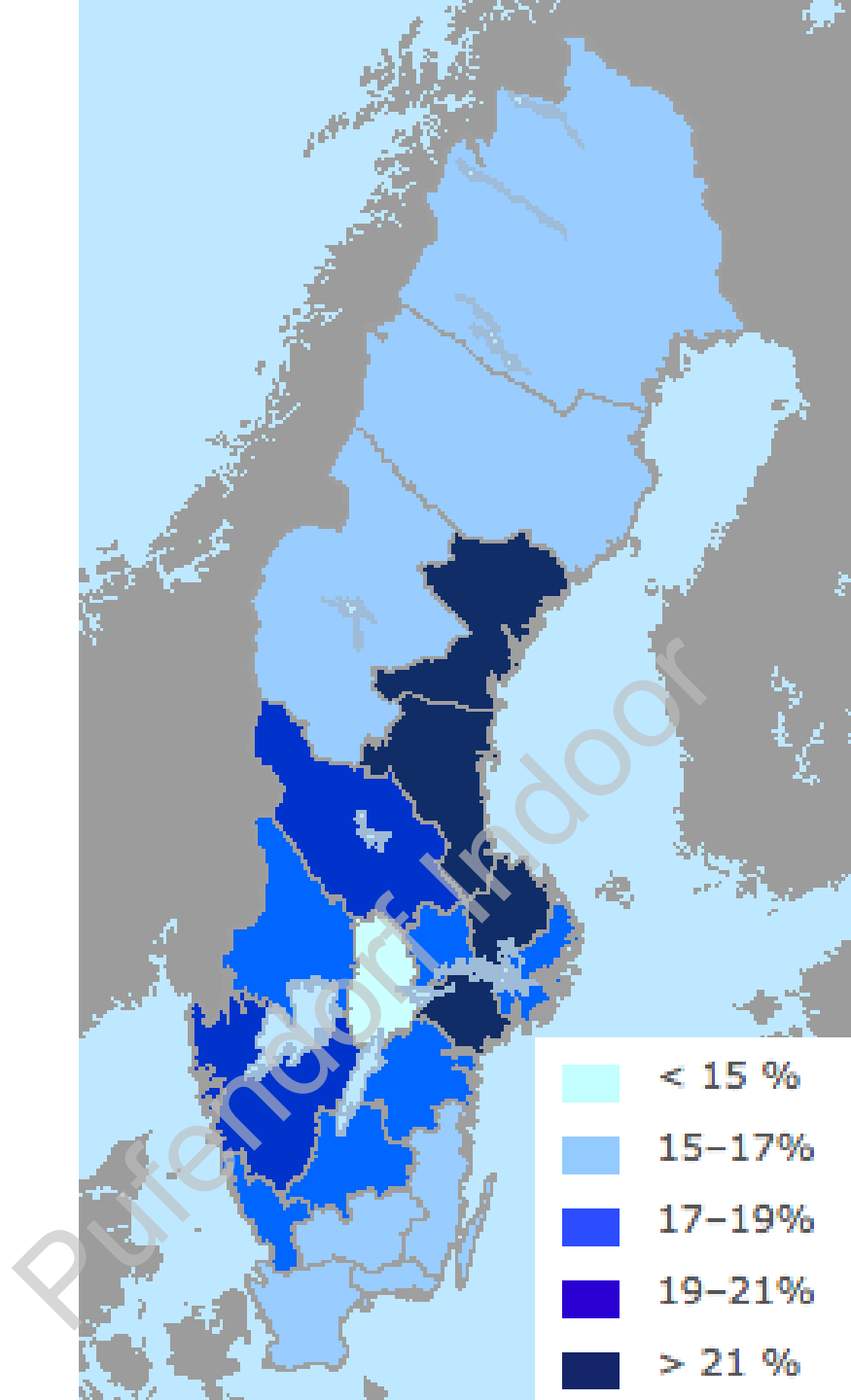
According to The National Board of Health and Welfare (Socialstyrelsen) the following indicators should be considered when estimating if moist or microbes in the indoor environment might be of concern to the human health:

1. Visual mould growth or microbiological smell
2. Microbes or microbiological smells might spread from building constructions (i.e. basements, crawl spaces or attics) to accommodation spaces.
3. Moist damages have not been taken care of so that there is a risk for microbes to grow.

Distribution of adults (19-81) that had had a visible mould or moist damage (or experienced smell from mould or moist) in their homes during the previous 12 months.

**National average 18%**

2013: 11% (25 000 children)



# INDOOR AIR

*“Studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2 to 5 times, and occasionally more than 100 times, higher than outdoor pollutant levels.*

*Indoor air pollutants have been ranked among the top five environmental risks to public health.”*



*EPA (United States Environmental Protection Agency)*

VOC (Volatile Organic Compounds /Lättflyktiga organiska föreningar), Formaldehyde, PAH, Particles, NOx, Phthalates, PCB (Polychlorinated biphenyl), Br retardants, ... **etc.**



## Ventilation

The National Board of Health and Welfare: ([SOSFS 1999:25](#))  
dwellings should have an air circulation (exchange)  $>0.5$   
room volumes/hour

## OVK (Obligatorisk Ventilations Kontroll)

## Guidelines

Not applicable to everyone  
Threshold levels? Safe for whom?

## Ban

Replaced by new (similar?) substances  
The old substances are still there ...





# WE NEED TO KNOW MORE ...



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**... etc.**