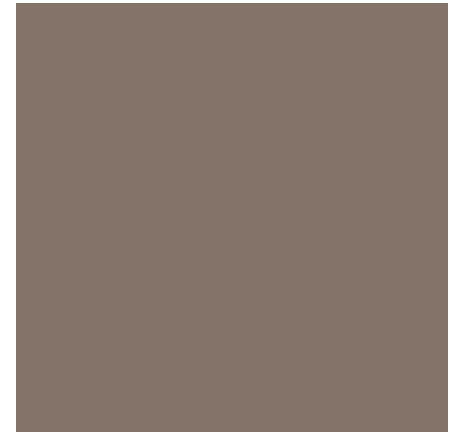
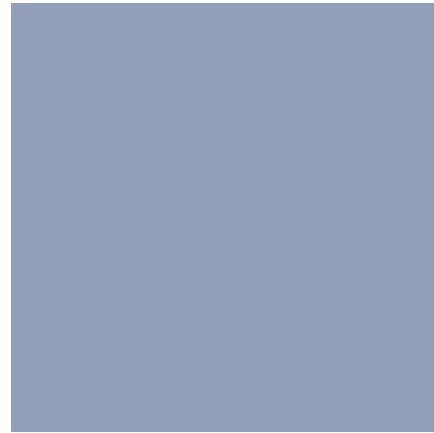




Residential environment and indoor air environment



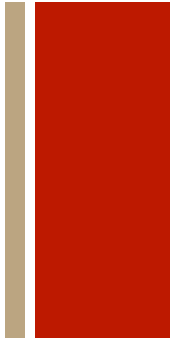
Dr. Zakirhusain Shaikh



- + Shelter is a basic human need next only to food and clothing.

All humans need protection
against the elements,
+ somewhere to store food and
prepare meals, and a secure
place to raise offspring.

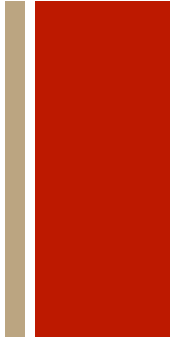
+ House



‘a building for human habitation, especially one that is lived in by a family or a small group of people and consists of a ground floor and one or more upper storeys.’

-Oxford Dictionary

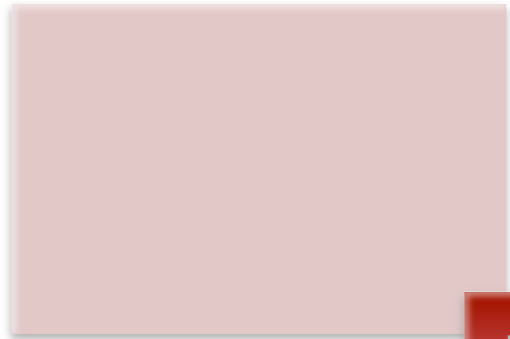
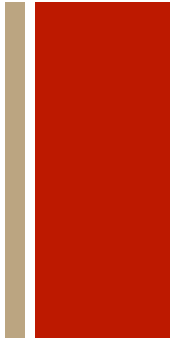
+ Housing



Houses and flats considered collectively

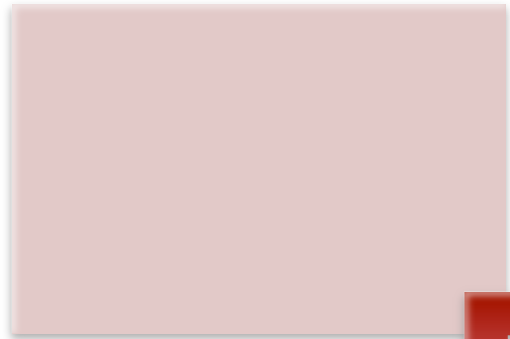
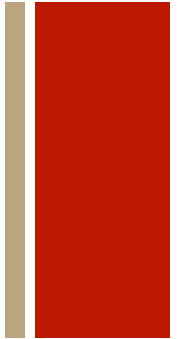
For the purpose of public health aspects, housing would also include adjacent walks, paths, streets, open space, shops, utilities, health centers, schools and administrative services.

+ Situation at home



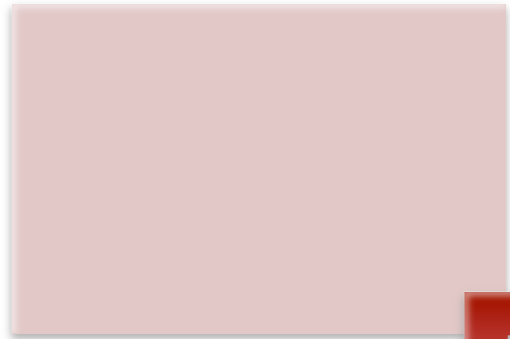
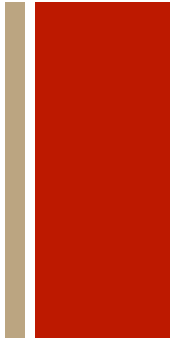
**Only 26%
live in pucca
houses**

+ Situation at home



**Only 28% have
access to piped
drinking water**

+ Situation at home



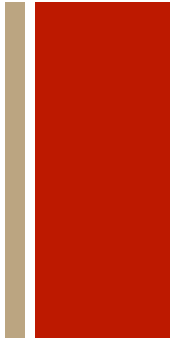
**Only 26%
have access to
toilet facilities**

+ Urbanization



30% urban
population

Increasing
density in
large cities

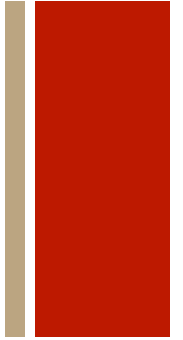




+

Indoor Air Pollution

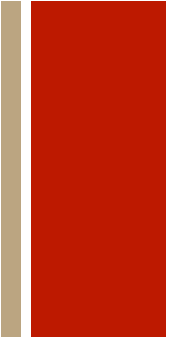
+ Indoor environment



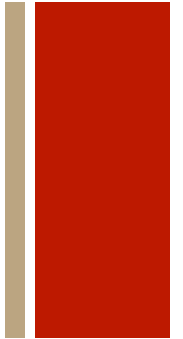
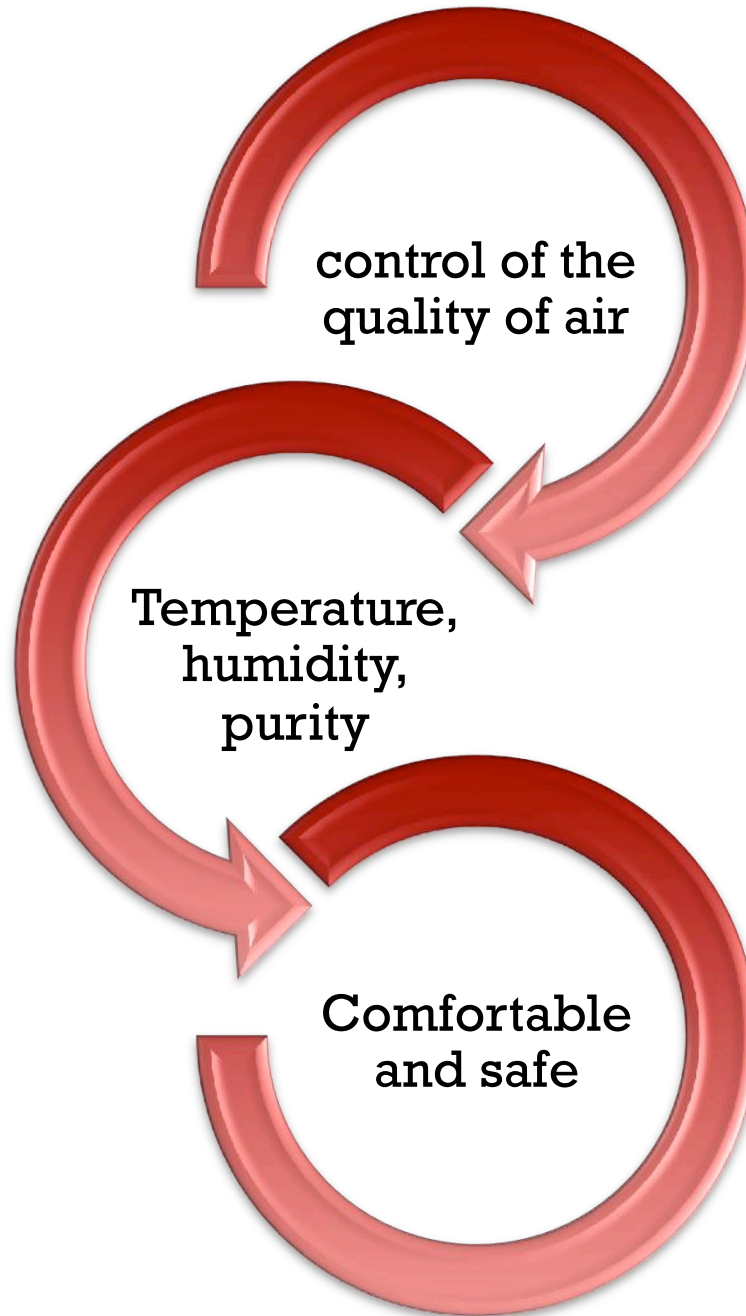
Indoor climate and indoor air pollution, biological exposure factors, and various physical hazards encountered inside the home

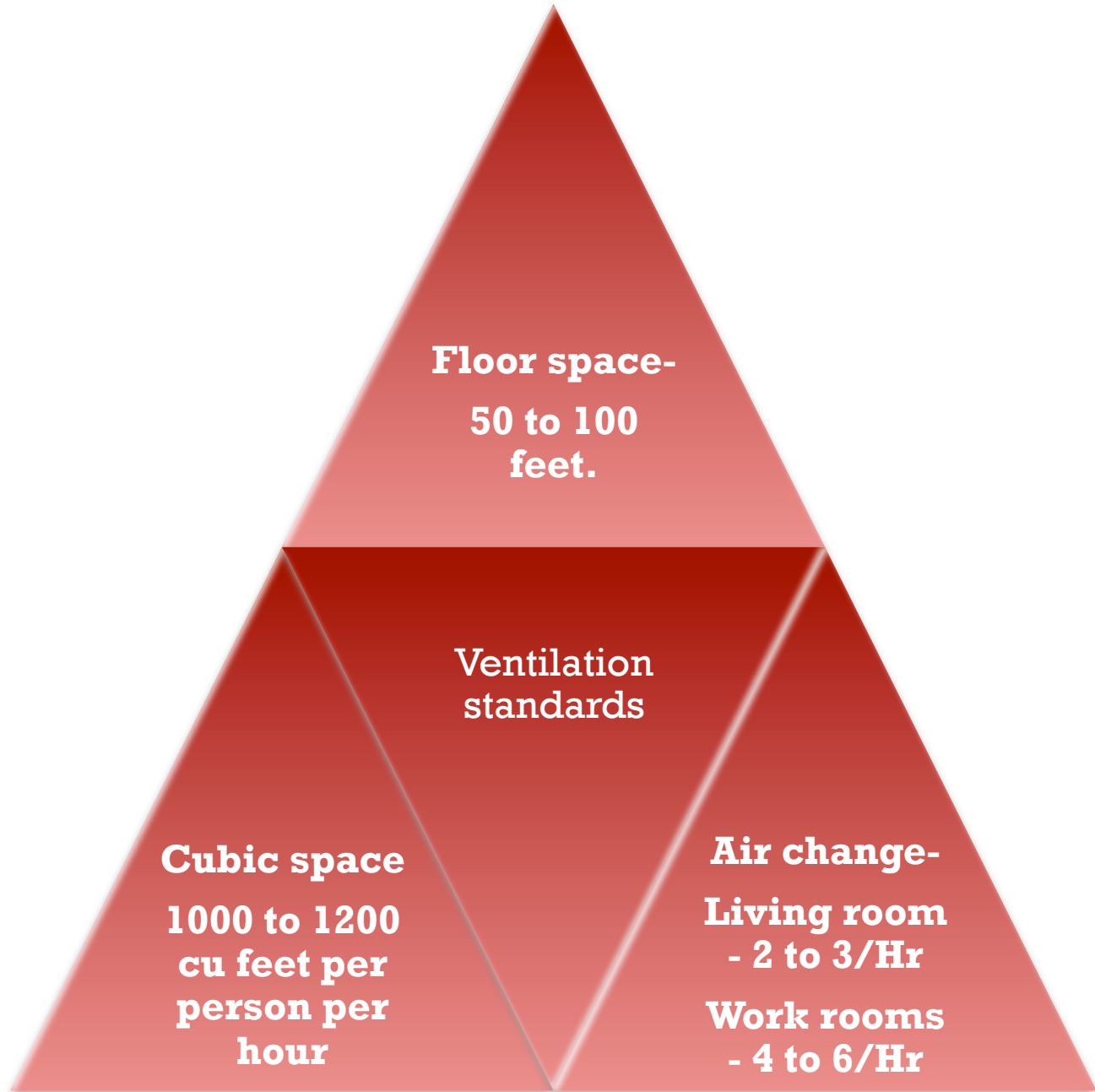
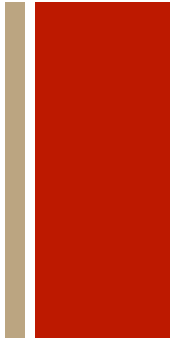
+ Ventilation

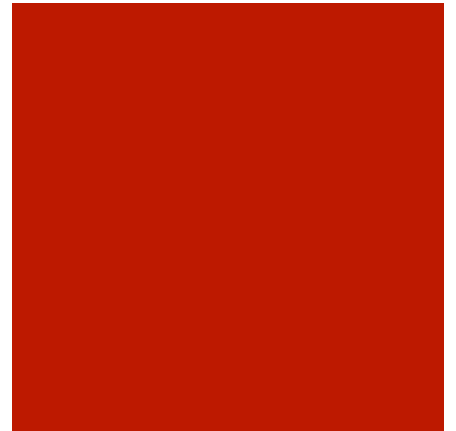
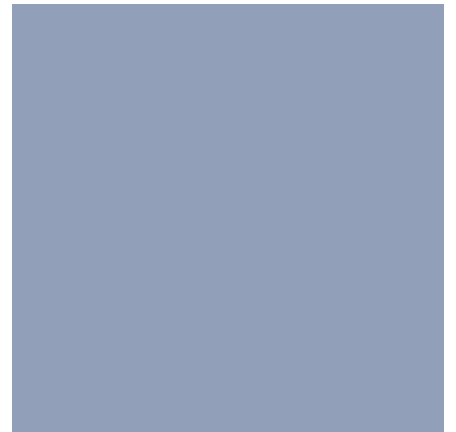
*'intentional movement of air
from outside a building to
inside'.*



+ Ventilation



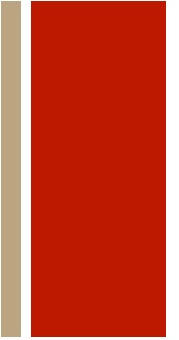




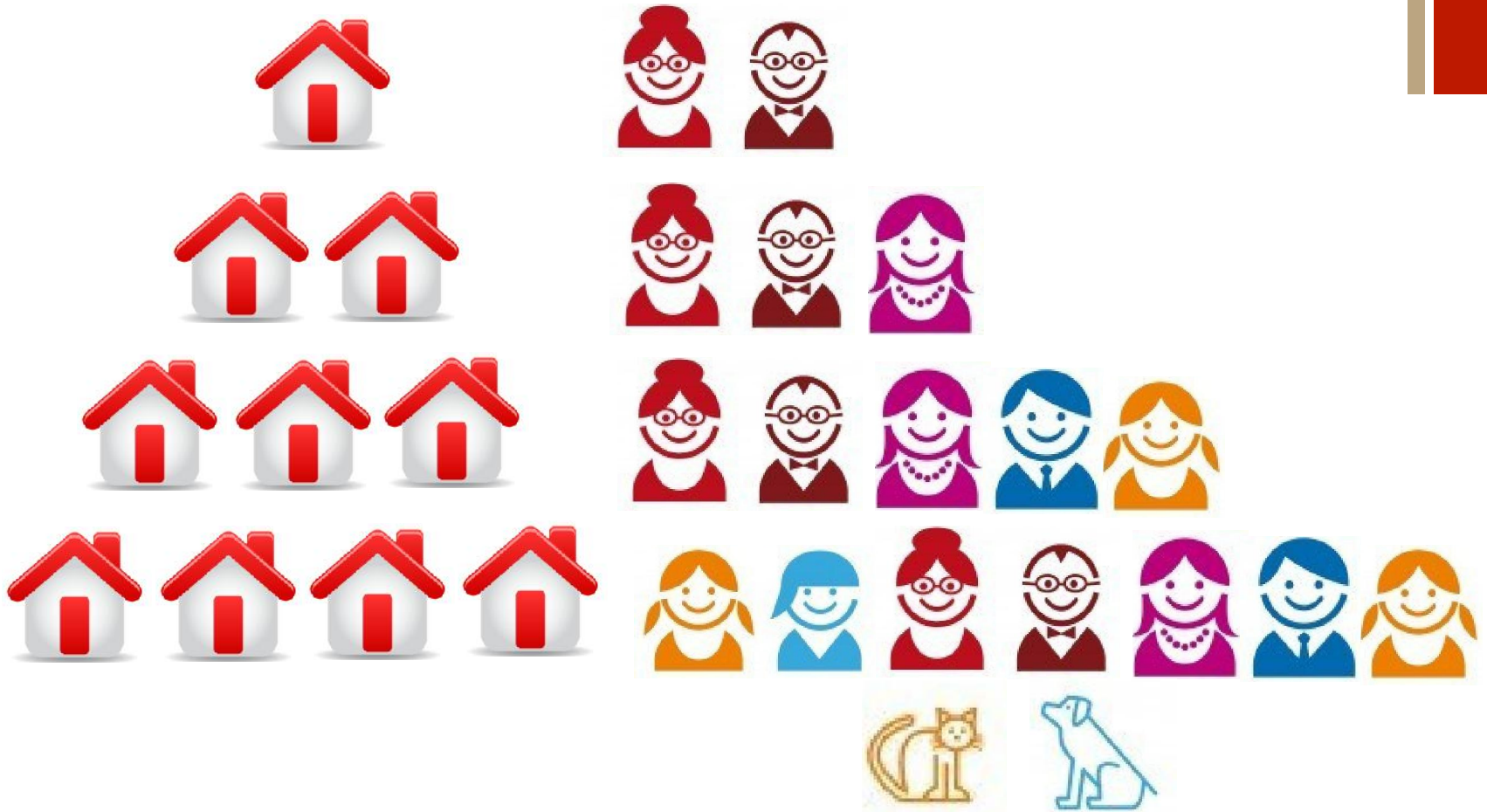
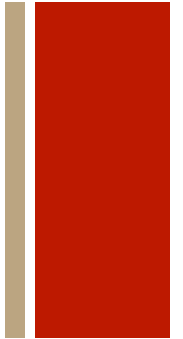
+ Overcrowding

+ Overcrowding

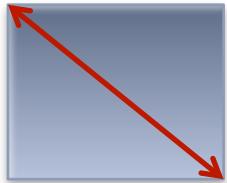
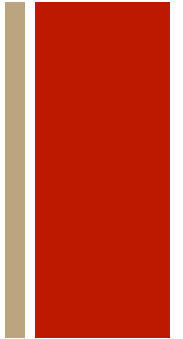
The situation in which **more people** are living within a single dwelling than there is space for, so that **movement is restricted, privacy secluded, hygiene impossible, rest and sleep difficult**



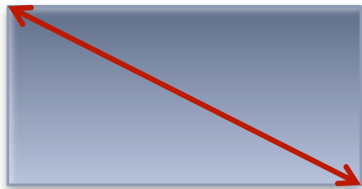
+ Overcrowding



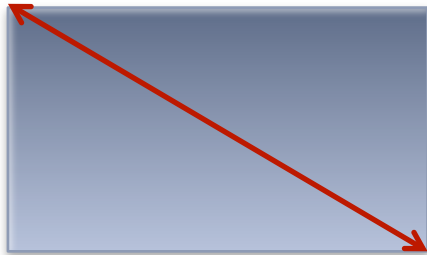
+ Overcrowding



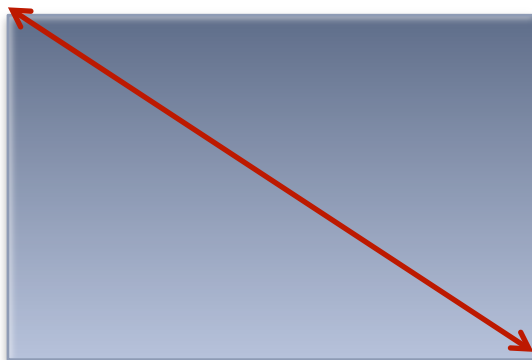
<50 sq.ft



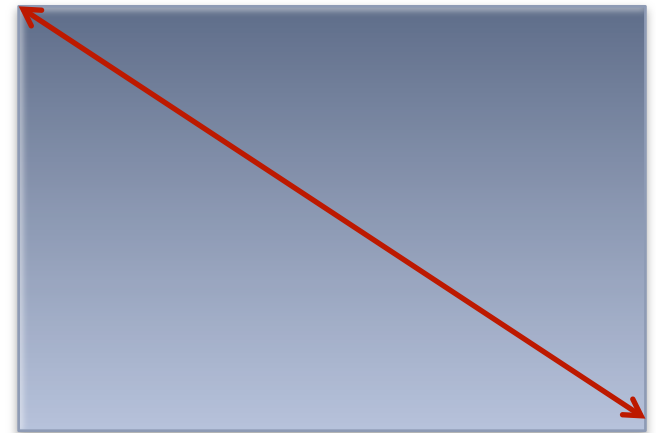
50-70 sq.ft



70-90 sq.ft



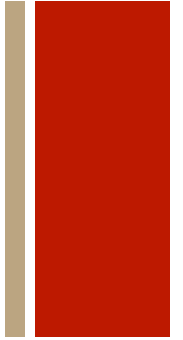
90-110 sq.ft



>110 sq.ft



+ Overcrowding



Sex separation criterion-above the age of 9 years of opposite sex, not husband and wife, are obliged to sleep in the same room

+ Housing Recommendations

Site

- **Elevated, not subject to flooding, away from vector breeding places and nuisance. Subsoil water should be below 10 feet.**

+ Housing Recommendations

Setback

- as open space around house with no obstruction to lighting and ventilation

+ Housing Recommendations

Floor

- pucca, impermeable, easily washable, smooth and free of cracks and crevices and damp-proof.

+ Housing Recommendations

Walls

- reasonably strong, low heat capacity, not easily damaged and should not harbour rats or vermin

+ Housing Recommendations

Roof

- height not less than 10 feet with low heat transmittance coefficient

+ Housing Recommendations

Rooms

- at least two with the number increasing according to family size

+ Housing Recommendations

Floor space

- should be 100 sq. ft for one person and at least 120 sq ft for more than one person

+ Housing Recommendations

Cubic space

- at least 500 c.ft per capita; optimum is 1000 c.ft.

+ Housing Recommendations

Cubic space

- at least 2 windows per room if no artificial ventilation & lighting; window area should be 1/5th of floor area.

+ Housing Recommendations

Kitchen

- separate, protected against dust and smoke, with storage space, water supply, drainage and adequately lighted.

+ Housing Recommendations

Sanitary Privy

- in every house and readily accessible

+ Housing Recommendations

Garbage

- **should be removed daily and sanitarily disposed.**

+ Housing Recommendations

Water supply

- **safe and adequate**

+ Rural Housing Standards

Atleast two living rooms

Ample verandah space

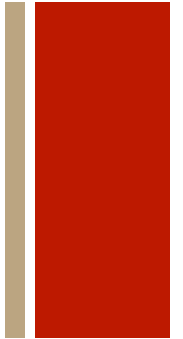
Separate Kitchen and latrine

Built up area should not exceed one-third total area

Sanitary well within $\frac{1}{2}$ km

Cattle shed at least 25 feet

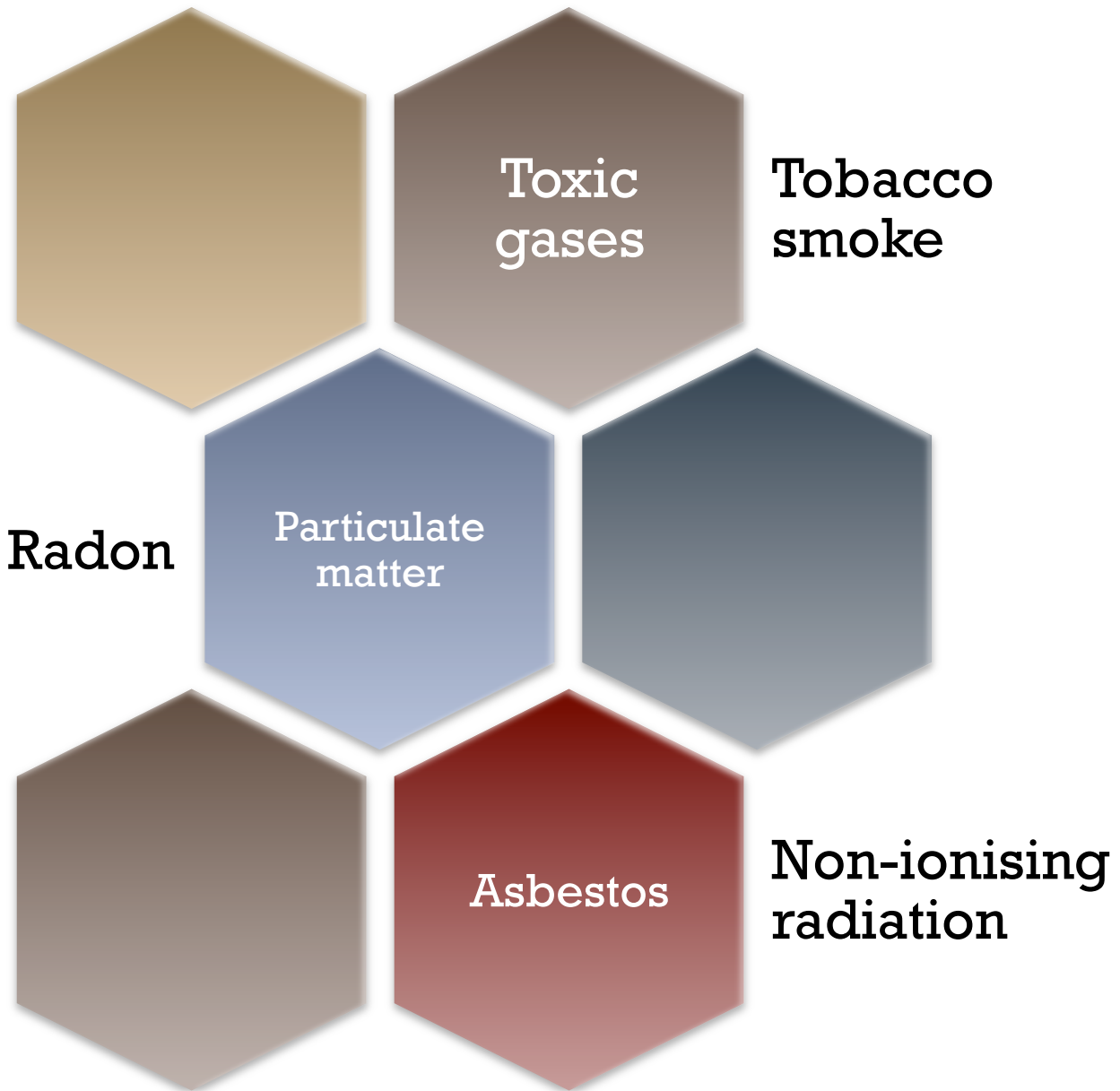
**Adequate arrangement for disposal of waste
water, refuse and garbage**





+ Physical hazards in Indoor
environment

+ Indoor environment- physical hazards

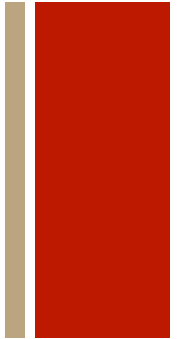


+ Indoor environment- physical hazards

- developing countries
- fumes from cooking fires

biomass fuel combustion

- respiratory irritants COPD
- carcinogens



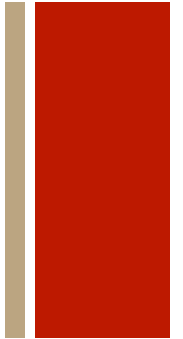


Indoor environment- physical hazards

- invisible, radioactive atomic gas from decay of radium
- in rock formations under buildings and building materials

Radon

- Lung cancer
- mitigation – sealing floors, basement foundations, water drainage systems or by increasing ventilation



+ Indoor environment- physical hazards

- often the greatest health hazard
- Second hand smoke/third hand smoke

Tobacco Smoke

- respiratory infections, chronic respiratory illnesses, tobacco-related respiratory cancers
- 20–25% of deaths in domestic fires are a result of smoking.

+ Indoor environment- physical hazards

- Acutely toxic contaminant
- Byproduct of incomplete combustion of fossil fuels

Carbon Monoxide

- Deprives the brain of oxygen
- Nausea, unconsciousness and death

+ Indoor environment- physical hazards

- VOCs are emitted as gases from certain solids or liquids.
- they react with other elements to produce ozone, which causes air pollution

Volatile Organic Compounds

- Concentrations higher indoors (upto 10X) than outdoors
- Sensory irritation symptoms, allergies and asthma, neurological and liver toxicity, and cancer

+ Indoor environment- physical hazards

- Perfluorooctanoic acid
- Decomposition at high temperatures

Non-stick cookware

- Flu-like symptoms-Polymer fume fever
- Potentially carcinogenic

+ Indoor environment- physical hazards

- Tetrachloroethylene

Dry Cleaning fluid

- Potential carcinogen
- Central nervous system depressant
- Increases risk of Parkinsons

+ Indoor environment- physical hazards

- Phthalates

Air fresheners

- Potential carcinogen
- Affects fertility
- Developmental abnormalities



+ Biological hazards in Indoor
environment

+ Indoor environment- biological hazards

Mycobacterium tuberculosis

- dark and dusty corners.

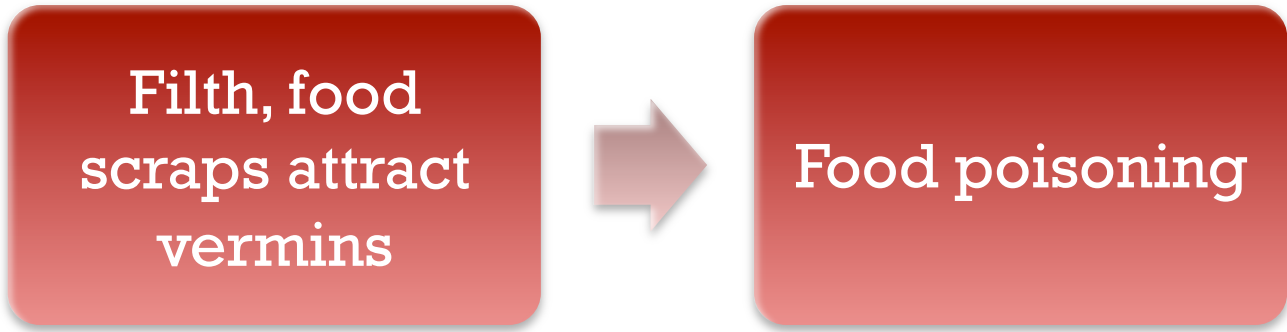
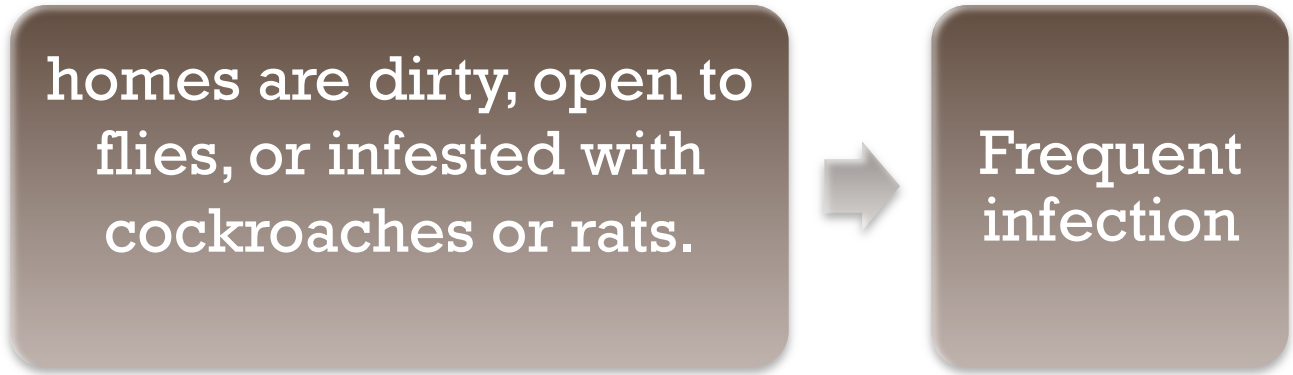
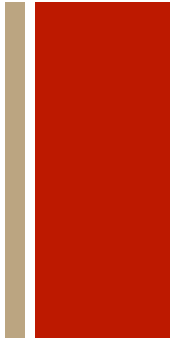
Legionella

- water-cooled air-conditioning systems, stagnant water pipes, and shower stalls, especially in warm moist environments.

Mites

- live on mattresses, cushions, and infrequently swept floors cause asthma, as may many organic dusts and pollens.

+ Indoor environment- biological hazards





Indoor environment- biological hazards

Mold

Moisture problems - water leaks and/or condensation due to humidity levels.

growth can be inhibited by keeping humidity levels below 50%.

allergenic properties of the spore cell wall

triggers episodes in persons that already have asthma

+ Question Time



- Which of these is a potentially carcinogenic indoor gas
- Radon
- Tata Photon
- Murphy's Radio

+ Question Time



■ Toxic substance present in most paints is-

■ VOC

■ ABC

■ XYZ

+ Question Time



- Per capita floor space should be at least-
- 100 square feet
- 100 square acres
- 100 square hectares



+

ANY QUESTIONS ?