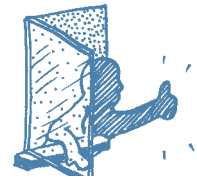


## Fact Sheet: Ventilation and TB Infection Control



### Why is ventilation important in the implementation of infection control ?

Tuberculosis is spread by airborne route. Infectious particles (droplet nuclei) are suspended in the air and infection with TB is acquired by inhalation of infectious particles. Breathing clean air (air free of TB particles) will not lead to TB infection; therefore keeping air clean is critically important. This can be achieved by ensuring good ventilation.

### What is 'ventilation'?

Ventilation refers to the removal of old, stale or 'diseased' air, and replacing it with new, fresh or 'clean' air. This has the effect of removing infectious particles, and diluting those that remain, so that the chances of inhaling infectious particles are kept to a minimum. Ventilation can also control the direction of air flow so that air flows from less contaminated to more contaminated areas.

### What is 'air mixing'?

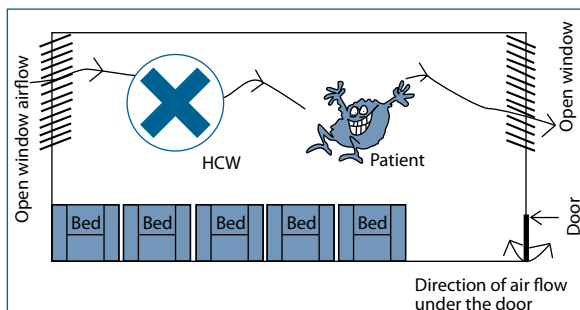
Air mixing refers to the mixing of existing air within an environment so that infectious particles are evenly mixed within an environment and pockets of air with high concentrations of infectious particles are evenly distributed. This will mean that all infectious particles have an equal chance of being removed or diluted by ventilation. Air mixing is essential if ventilation is to be effective. If air is not mixed properly, ventilation may not remove enough infectious particles.

### How can I mix the air?

Air can be mixed by using fans (standing fans or extraction fans) or by opening windows and taking advantage of wind or natural flow patterns of air within an environment.

### What is 'directional air flow' and how can I use this to keep health care workers safe?

Air should flow from low concentration of infectious particles, towards a high concentration. The HCW should always be 'upwind' of the patient – ie clean air should flow from behind the HCW towards the patient.



### How can I measure ventilation rates?

Ventilation rates are measured by 'air changes per hour' (ACH). This is calculated by dividing room ventilation rate ( $\text{m}^3/\text{hr}$ ) by the room volume (size, in  $\text{m}^3$ ). Ventilation rate for naturally ventilated spaces are difficult to calculate (refer National TB Infection Control Guidelines). However one can 'feel' if air is moving within the environment, and confirm this using the smoke test (refer to Section 4). Air-conditioners usually have fixed or variable settings which can be read on the unit. An air-conditioning technical specialist can assist.

### How does natural ventilation compare with mechanical ventilation (air conditioning)?

Natural ventilation is almost always more effective than mechanical ventilation. A study in Peru showed that natural ventilation achieved more than 17-40 air change per hour (ACH), while well functioning air conditioning in isolation rooms achieved 12 ACH.

### What are recommended ventilation rates for health care facilities?

The CDC recommends 12 air change per hour (ACH) for respiratory isolation rooms and areas where suspected TB patients are managed. In South Africa, we do not have resources for isolation rooms. When considering TB infection control issues, all persons attending health care facilities should be managed as TB suspects.

### If I cannot open windows, or if mechanical ventilation is used in my facility, how can I ensure that ventilation rates are adequate?

Consult an air conditioning technical expert and present the problem and the requirements.

Maintain air conditioning units regularly, according to a schedule

Ensure that air mixing is taking place in the facility and in high risk consulting rooms

Keep the direction of air flow correct to minimize risk to health care workers, especially in the consulting rooms.

**Did you know?**  
**Air MIXING is essential**  
**if ventilation is to be**  
**effective**