Discussion Brief: Infection Control in a Cold Climate without Electricity
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Ventilation plays a key role in tuberculosis infection control, and in resource-poor settings good ventilation is often achieved by opening windows and letting the wind move the air in and out of the building. However, in some climates it is too cold to keep windows open, and this presents a problem for infection control.

A member working with Médecins Sans Frontières in Lesotho in an HIV program where 80% of patients are also diagnosed with TB wondered how health facilities operating without electricity can reduce nosocomial TB infections in cold climates where the most common heat source is charcoal stoves. Practical recommendations to improve ventilation and other infection control measures were shared.

Key Points
- If engineering controls are lacking, the importance of prompt diagnosis and effective treatment to stop transmission is greater. Patients on effective treatment rapidly become non-infectious, including MDR-TB patients.
- Other administrative controls such as separate sleeping quarters for infectious patients and proper cough etiquette education.
- The use of personal protective equipment such as respirators by health care workers is recommended (WHO 2009).
- One member points out that cooking and heating with solid fuels, such as coal, on open fires or traditional stoves results in high levels of indoor air pollution. Indoor smoke contains a range of pollutants which are detrimental to patients with lung disease, and carbon monoxide (WHO 2005). Therefore, it is important to build proper stoves with chimneys to prevent carbon monoxide poisoning and other poor health outcomes.
- To improve temperature within the building, a verandah or porch which is enclosed by glass and faces north (for locations south of the equator) could be built. This glassed-in or "glazed" area serves as a buffer zone in which people can feel the warmth of the sun through the glass, and the sunlight can contribute to the die off of the tuberculosis bacteria (Kim et al.). Trying to heat these areas is difficult unless the glass is double-paned. If upper windows are opened slightly, the sun-warmed air will rise and create a natural draft and improve ventilation without making the occupants feel cold.
- A hybrid of passive solar heating and conventional fuel heating can create air movement. On sunny days, stone floors and walls facing north will heat up and radiate warmth, and the air that pass through this area will be warmed. By enclosing the fireplace and chimney with stone and burning coal or other fuel for warmth, the heat will be absorbed by the stone and radiated throughout the building. The rising hot air and stack effect can direct the air flow out of the building, which will prevent the prevalent wind (which is cold air) from blowing in.
- 'Whirly Birds' are wind-driven roof turbine ventilators that use the stack effect to allow air in and out of the building. One member has been investigating them in Khayelitsha, and the preliminary results are encouraging. They have measured 4-10 air-changes per hour (ACH) in various rooms, and they are now trying to look at the determinants of their effectiveness in more detail. Whirly birds may not work well in areas with light winds. It is important to have grills in doors or other apertures, because whirly birds do not work well against resistance.
- Although expensive, solar panels could be used for electric heating in the winter.

Key References

Enrich the GHDonline Knowledge Base
Please consider replying to this discussion with the following information
- Additional recommendations for improving natural ventilation
• Information on brands or models of whirly birds
• Information on solar panels or other alternative sources of energy
• Designs, images, or blueprints for glazed verandas

Recommendations
You may also be interested in the following content in GHDonline communities
• Air and Natural Ventilation Resource
• Natural Ventilation: Moderate Resource
• Natural Ventilation: Complex (High Tech) Resource
• Whirly Bird Ventilation Resource
• Infection Control At Home Discussion
• Discussion Brief: Using particulate respirators for TB Infection Control