

Health Canada Compares Occupants' Health in New R-2000 and Conventional Houses

Much has been said recently about healthy home environments. For many years anecdotal evidence has been collected about the improved health that residents in R-2000 homes have experienced. CMHC has been promoting healthy home environment ideas through their Healthy House initiative. But is there scientific evidence behind claims that R-2000 homes are healthier for their occupants?

Health Canada has been studying people's health before and after moving into new R-2000 houses and similar new conventional (non-R-2000) houses. The study was begun in 1996, and includes 312 people living in 105 houses in New Brunswick and Nova Scotia. The survey concentrated on New Brunswick and Nova Scotia due to the general concern with air quality problems in that region, and because of the large number of R-2000 houses being built there. The research team included medical and health professionals, specialists in data analysis, and building scientists.

Preliminary results show that people who moved into certified R-2000 houses found that their health improved more than those who moved into conventional houses.

The R-2000 Program certifies houses that meet strict criteria for energy efficiency, ventilation, and construction practices. Builders are specially trained and certified. The plans and construction of each house are evaluated and inspected by trained, licensed professionals. Houses are individually tested for airtightness, and must be certified to be R-2000 houses.

When the program began in 1982, it was mainly concerned with energy conservation, but has evolved to include requirements for materials and water conservation, indoor air quality, and a healthier, more comfortable living environment.

Features include:

- increased insulation and airtightness
- increased energy efficiency
- no spillage-susceptible combustion equipment
- fresh air (mechanical ventilation) to all rooms
- environmentally-friendly products, and
- healthy building materials and finishes.

These features are specifically intended to improve indoor air quality and health. Measurements of indoor pollutants such as formaldehyde and volatile organic compounds have shown that pollutant levels are lower in R-2000 houses as compared with similar conventional houses, but until now no direct study has compared the health of people in the two.

Health Canada administered a telephone questionnaire to one member of each household before they moved into their new house. The questionnaire asked about characteristics of the house they were moving from, including perceptions of its indoor air quality, the demographics, general level of health, medications taken by of each member of the household, and whether and to what extent each member of the household experienced each of thirteen symptoms. The symptoms selected were those with a known relationship to poor indoor air quality. These included headache, fatigue, dry or itchy skin, runny nose, blocked nose, sneezing, throat irritation, cough, wheeze, nausea, diarrhea, difficulty concentrating, and irritability, along with a couple of "control" symptoms not normally affected by air quality.

The number of people with allergies and chronic bronchitis are almost equal for both R-2000 and conventional houses. However, only half as many of the R-2000 people smoke, and there were about half as many R-2000 homeowners with asthma, or using regular medication for breathing problems or allergies. The numbers of smokers may suggest



For information on the R-2000 Program, contact your local program office, or call 1-800-387-2000

- ☛ 94% of R-2000 home occupants said the indoor air quality was better in their new homes compared with 77% in conventional houses.
- ☛ 56% of R-2000 home occupants reported health improvements, compared with only 32% in conventional houses (and 10% reported a deterioration in health).

a higher level of concern for health in people who moved into R-2000 houses, while the numbers for asthma and medication may show that they were healthier initially. Since the survey was looking at changes in health due to environment, the differences in initial health were not considered relevant.

One year after moving into the new house, the same respondent was contacted for a follow-up questionnaire. The follow-up repeated most of the questions in the original questionnaire.

For all thirteen symptoms, the improvement in R-2000 houses was greater than in the conventional ones. Twice as many occupants of conventional houses found them too dusty or too humid compared with R-2000 houses, and significantly more found their conventional houses too dry or drafty. When asked whether they felt that the indoor air quality was better in their new house than in their old one, 94% of R-2000 occupants said yes, compared with 77% in non-R-2000 houses. When asked whether their general health had improved or deteriorated since moving to their new houses, 32% of conventional house occupants reported improvement and 10% reported deterioration. In the R-2000 houses, 56% reported improvement and none reported deterioration.

This first direct study of the health effect of R-2000 houses provides a clear indication that the R-2000 Program's focus on improving indoor air quality does result in better occupant health. These results are preliminary. The sample size is small, and represents only one geographic region. But the results strongly show that people who moved into R-2000 houses found that their health improved more than those who moved into conventional ones. The results are also consistent with occupants' perceptions of their indoor air quality. The difference has been recognized as statistically significant.

A second phase of the study will include more houses. Ongoing work will also be looking at the air quality in twenty of the houses in the original survey.

R-2000 and conventional houses with the most significant improvement and deterioration in health are being looked at in more detail. The study will include measurements of air change rates, mould species and counts, allergens, for-

maldehyde, and volatile organic compounds. When the results are analyzed, they may provide specific information on why some houses are healthier than others. This should lead to more improvements in the health characteristics of both R-2000 and conventional houses.

Which are Better: Plastic or Copper Pipes?

Plastic-plumbing manufacturers have waged a public relations war against copper pipe claiming that "aggressive," (i.e., acidic) water, can corrode copper. Now the copper manufacturers have counterattacked by pointing to a study that claims copper pipes have much less biofilm (slime) than polybutylene plastic.

The report could be important because polybutylene pipes are widely used around the world. Biofilm harbours the infamous e-coli bacteria which can cause kidney disease and even death. However, it will only muddy the waters in North America, where biofilm-resistant chlorinated polyvinyl chloride (CPVC) is used.

The study (done in England) found that after being submerged in potable water for seven days at 50°F, virtually no biofilm appeared on the copper pipes, but 90% of the polybutylene surfaces and 80% of the steel surfaces were covered. E-coli concentrations on copper pipes were less than one-hundredth of those found on steel or polybutylene. Tests at other water temperatures, gave similar results.

While copper piping is still used in 80% of domestic water installations, CPVC pipes are gaining ground. Here's a look at the pros and cons of each.

Copper	CPVC
<p>Advantages</p> <ul style="list-style-type: none"> ♦ withstands high water pressure ♦ inhibits bacterial growth ♦ won't get brittle in cold temperatures ♦ unlikely to melt in a fire ♦ withstands wide temperature swings 	<p>Advantages</p> <ul style="list-style-type: none"> ♦ won't pit or corrode from acidic water ♦ quiet ♦ installs quickly
<p>Disadvantages</p> <ul style="list-style-type: none"> ♦ corrodes when subjected to acidic water 	<p>Disadvantages</p> <ul style="list-style-type: none"> ♦ subject to ultraviolet light deterioration if used outside ♦ has limitations on use at higher temperatures