

# The hermeneutic application of indoor air quality surveys to examine the health of courthouse occupants exposed to fungi

- Stooke, Troy

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## Abstract

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**THE UNIVERSITY OF CALGARY**

**The Hermeneutic Application of Indoor Air Quality Surveys to Examine the  
Health of Courthouse Occupants Exposed to Fungi**

**By**

**Troy Stooke**

**A MASTER'S DEGREE PROJECT**

**SUBMITTED TO THE FACULTY OF ENVIRONMENTAL DESIGN**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE**

**DEGREE OF MASTER'S OF ENVIRONMENTAL DESIGN**

**ENVIRONMENTAL SCIENCE**

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## **Abstract**

This study examined the health perceptions of courthouse workers considered occupationally exposed to fungi with a hermeneutic approach. This method focussed analysis on the expected susceptible and hypersusceptible populations and identified transdisciplinary literature surrounding health effects of exposure to fungi.

Fungi were speciated from indoor air samples in the Court of Queen's Bench (CQB) building. Four hundred and ninety occupants received the MiniRQLQ and a "hybridized" survey.

Results indicate that more full-time CQB occupants than expected in a hypersusceptible population reported more severe respiratory and fatigue symptoms than did occasional occupants (MiniRQLQ: RR = 2.12 and Hybridized Survey RR = 3.05). Symptoms occurred Monday to Friday during respondents' workdays, however the timing data beyond that was inconclusive.

Occupants and building owners may wish to adopt a hermeneutic method to examine health risks when understandings of levels of exposure to fungi are unclear or when exposure analysis is unavailable.

**Key words:** courthouse occupants; fungi; health-related quality of life; hermeneutic; hybridized survey; indoor air quality; respiratory symptoms; rhinoconjunctivitis, Calgary, Canada.

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## **5.0 Chapter Five: Summary**

### ***5.1 Discussion***

Asking about sensory discomfort is critical to the collection of adequate indoor air quality data to determine risks to occupants exposed to bioaerosols such as fungi. Indoor air quality is primarily a construct of comfort (Cain 2002) but a construct with significant public health implications and effects on occupational productivity. This study utilized the analysis of six symptom matrices, drawn from public health and indoor air quality research to examine the experience of courthouse occupants' health using a hermeneutic examination. Information from a variety of sources assisted in understanding the similarities and differences of occupants' health issues working regularly or occasionally at the CQB building.

More occupants with health symptoms and chronic health conditions responded than would be expected if the surveys returned were drawn at random from all occupants. Since the survey self-selected respondents due to the nature of the design, the use of the internal control group and timing factors is critical to the analysis. Increased respiratory effects of CQB occupants may be due to exposure to fungi indoors, and the irritative/allergic effects that fungi can induce. There was insufficient evidence to comment about possible exposures to mycotoxins from the results of this study. Of the 36 full-time CQB occupants responding, ten people reported at least one chronic respiratory health condition.

Using a targeted, hermeneutic approach was also critical in capturing the concerns of those susceptible and hypersusceptible persons who are most at risk from indoor air pollutants such as fungi. Building assessments by external experts, or voluntary health interviews alone cannot capture the complexity of human diversity, experiences and exposures within their work environments. Each component of those investigations however is significant, but more as a set of pixels, that contributes to an understanding of an entire image.

The occupant interviews provided additional information; namely that the timing of some symptoms occurs at 8:00 a.m. and noon, and comments were received about car exhaust odours being drawn in from the parkade. This information was not as evident from the questionnaire data alone. An indoor air quality investigation that queries only one contaminant and its effects is unwise. It is reassuring that mitigation measures at the CQB building did start, in response to identified health concerns of many occupants.

This survey described the respondents' perception of risk to their quality of life and their understanding and reactions to the reporting of findings of fungi in their workplace.

Implementation of a hermeneutic method for susceptible and hypersusceptible groups of office workers can be recommended as a way to capture both qualitative and quantitative data for this population. These overlapping themes acknowledge the inequities and real relationships in which people co-exist. A hermeneutic approach allows for incorporation of different horizons of opinion, and can more accurately reflect the imperfect structures that people actually live within - families, communities, workplaces, and governments.



## ***5.2 Conclusions***

Indoor air quality investigation at the CQB building identified fungi as a contaminant of interest and concern. Exposure to occupants would not be limited to the identified basement areas where fungi were speciated from air samples, but would also include other building locations due to migration of spores through ventilation, book and file materials transport or from other amplification sources that may have been present during 2001-2002. Full-time CQB occupants would have *similar* exposures regardless of their primary work location within the building.

Overall, courthouse respondents from all locations rating their symptoms as “Somewhat (or more) troubling” (2+) responded to the entire questionnaire in greater detail, rated air quality and ventilation less positively, and were experiencing more than one symptom, Monday to Friday. This is evidence that the survey reflects primarily those occupants who are feeling sick.

Due to the self-selective nature of this research, it is likely that all of the hypersusceptible courthouse occupants who occupy the Court of Queen’s Bench building have responded, as well as many of the susceptible occupants and likely all hypersusceptible occupants of the six other court buildings. This study found that the relative risk of rhinoconjunctivitis is 2.12 times greater for full-time respondents from the Court of Queen’s Bench than for occasional occupants of the building. The relative risk of sick building symptoms from the

hybridized survey responses was 3.05 times greater for CQB respondents than for occasional occupants of the building. Fatigue, respiratory illness, rhinoconjunctivitis and headache were predominant symptoms / groupings for CQB respondents. Higher respiratory, rhinoconjunctivitis and dermal symptoms were reported by CQB respondents as compared with the internal control group. Fungi's known allergic and irritative effects on the respiratory system could provoke such symptoms for occupants exposed chronically to this bioaerosol indoors.

However, other symptom patterns also appear to be present. Based on the timing data, the indoor air is likely contributing to occupants' distress but the timing of respondents' symptoms was not clear enough to determine if fungi alone, or in combination with other contaminants or factors is causing this.

These time indicators could also be suggestive that allergic or irritative mechanisms alone are occurring, rather than immediate toxic effects from the inhalation of fungi.

Respondents had difficulty affixing a time of onset for symptoms they perceived as only "somewhat" or "moderately" troubling. It would follow that we have trouble remembering what does not bother us.

Proactive IAQ management and design practices that incorporate the needs of susceptible and hypersusceptible office workers would likely prevent health-related complaints.

Inclusion of occupant participation through surveys is essential and contributes critical

information to guide integrated indoor air quality management systems. A hermeneutic approach assisted in the application of evidence-based research from many points of view in order to examine the risks from fungi indoors and the experiences of susceptible and hypersusceptible people. Poor indoor air quality most adversely affects this large (30%) group of office workers.

A hermeneutic indoor air quality survey method can be recommended to help occupants and building owners or managers understand health risks when our understanding of levels of exposure to fungi are unclear or while direct exposure analysis is unavailable.

### ***5.3 Recommendations for Further Study***

Inclusion of occupant participation through surveys and interviews is critical in guiding integrated indoor air quality assessments. Seeking regular discomfort information using IAQ complaint forms, interviews and survey screening methods from wellness and public health perspectives is recommended for occupants of courthouses, and would be beneficial for occupants of any office building. Occupants are able to provide information critical to their own, and future occupants' health and quality of life. Application of a hermeneutic analysis to examine the indoor air quality of public office buildings requires a champion and further study is required to effectively operationalize this in light of competing priorities. Alberta's *Clean Air Strategic Alliance* (CASA 2004), *Climate Change Central* (C3 2004) and the *Canadian Healthy Indoors Partnership* (Robinson 2003) are effective partnering models to consider.

The MiniRQLQ was a sensitive instrument that demonstrated more value for individual building locations, rather than for grouped overall means across buildings, where it lost some sensitivity in identifying trends. Confirmation of this could be administration of the MiniRQLQ paired with another similar health-related quality of life instrument designed and validated specifically for indoor air quality purposes. For determination of exposures to fungi, the MiniRQLQ deserves consideration as a paired instrument with a brief

occupant complaint form (possibly within a computerized IAQ management system) or as an adjunct to a hybridized survey when no IAQ management system exists.

Further deconstruction of the components and elements of sick building syndrome is required. This study presented only one researchers “re-clustering” of those elements through utilization of a hermeneutic approach. Opportunity exists to increase our understanding of “sick building syndrome” symptoms, and to proactively protect the health of courthouse and other office workers. Medically familiar (i.e., genetically caused) autoimmune diseases may continue to drive the publicly funded research, however the public health benefits of continued research in areas such as toxicant induced losses of tolerance and sick building syndrome are encouraged.

Further use of a hermeneutic approach is highly recommended as a way of focussing scarce and valuable research efforts on the needs of those people most directly affected by widespread public health issues such as indoor air quality.

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