

INDOOR AND OUTDOOR AIR POLLUTANTS  
RELATIONSHIP AT PRIMARY SCHOOLS  
IN KUALA TERENGGANU

NUR ZAFIRAH BINTI MOHD SOFIAN

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PERPUSTAKAAN SULTANAH NUR ZAHIRAH  
UNIVERSITI MALAYSIA TERENGGANU (UMT)  
21030 KUALA TERENGGANU

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HAK MILIK  
PERPUSTAKAAN SULTANAH NUR ZAHIRAH UMT

**INDOOR AND OUTDOOR AIR POLLUTANTS RELATIONSHIP AT  
PRIMARY SCHOOLS IN KUALA TERENGGANU**

**NUR ZAFIRAH BINTI MOHD SOFIAN**

**Thesis Submitted in Fulfillment of the Requirement for the  
Degree of Master of Science in the Faculty of Science and Technology  
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## DEDICATION

This dissertation is dedicated to my family and friends who provided untiring support and encouragement. In particular, my parents, Mohd Sofian bin Azirun and Munirah binti Abdullah Bajanuddin, who afforded me the necessary time and financial support. Special thanks, to Azrin binti Suroto who has helped me a lot to undergo many ups and downs and Mohd Adi Firdaus bin Zaidi for being an understanding partner.

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Master of Technology and Management.

**INDOOR AND OUTDOOR AIR POLLUTANTS RELATIONSHIP AT  
PRIMARY SCHOOLS IN KUALA TERENGGANU**

**NUR ZAFIRAH BINTI MOHD SOFIAN**

**February 2011**

**Chairperson : Marzuki bin Ismail, Ph.D.**

**Member : Mohd Zamri bin Ibrahim, Ph.D.**

**Faculty : Science and Technology**

Studies have found that indoor air quality affects human especially children and the elderly more compared to ambient air. This study aims to determine the concentration of respirable suspended particulate matter, carbon monoxide and carbon dioxide in selected primary schools with different surrounding human activities; assess the measured concentrations compliance with existing IAQ guidelines and standards; and to establish statistical relationships between indoor and outdoor air pollutant concentrations in each selected schools in Kuala Terengganu. Failure to identify and establish indoor air pollution status can increase health problems and degrade learning environment of students. All parameters in seven primary schools were monitored from November 2008 until Mac 2009 during school hours inside and outside classrooms, and a complete walkthrough survey was done. Results show a statistically significant difference in all parameters in all schools at the 95% confidence level. Indoor concentration levels were mainly affected by outdoor concentration levels, since there are strong relationships between indoor and outdoor concentration in all schools except for control school. Indoor and outdoor concentration of all parameters showed a significant positive correlation. We

conclude our findings by confirming the important influence of surrounding human activities on indoor concentrations of pollutants at primary schools in Kuala Terengganu.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Master Teknologi dan Pengurusan.

**HUBUNGAN BAHAN-BAHAN PENCEMAR UDARA DALAMAN DAN  
LUARAN DI SEKOLAH-SEKOLAH RENDAH DALAM KUALA  
TERENGGANU**

**NUR ZAFIRAH BINTI MOHD SOFIAN**

**Febuari 2011**

**Pengerusi : Marzuki bin Ismail, Ph.D.**

**Ahli : Mohd Zamri bin Ibrahim, Ph.D.**

**Fakulti : Sains dan Teknologi**

Kajian telah mendapati bahawa kualiti udara dalam bangunan mempengaruhi manusia terutamanya kanak-kanak dan warga emas berbanding dengan udara luar. Tujuan kajian ini adalah untuk menentukan kepekatan bahan terampai, karbon monoksida dan karbon dioksida di sekolah rendah yang terpilih berdasarkan perbezaan aktiviti persekitaran; menilai kepekatan-kepekatan yang telah diukur dengan pelaksanaan garis-garis panduan dan piawaian yang sedia ada; dan mewujudkan hubungan statistik kepekatan bahan pencemar udara dalaman dan luaran di setiap sekolah yang terpilih di Kuala Terengganu. Kegagalan untuk mengenalpasti status pencemaran udara dalaman boleh meningkatkan masalah kesihatan dan suasana pembelajaran para pelajar. Semua parameter telah diukur dan dibuat tinjauan di dalam dan luar kelas sewaktu pembelajaran dijalankan di tujuh buah sekolah rendah dari November 2008 hingga Mac 2009. Keputusan menunjukkan signifikan statistik yang berbeza dalam semua parameter di semua sekolah pada 95% tahap keyakinan. Tahap kepekatan dalaman sangat dipengaruhi oleh tahap kepekatan luaran. Ini adalah kerana terdapatnya hubungan yang sangat kuat antara kepekatan dalaman dan luaran di semua sekolah kecuali sekolah kawalan.

Kepekatan dalaman dan luaran kesemua parameter menunjukkan korelasi positif yang signifikan. Kesimpulannya, kajian ini mengesahkan betapa pentingnya pengaruh aktiviti persekitaran terhadap kepekatan bahan-bahan pencemar dalaman di sekolah rendah di Kuala Terengganu.