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THE SATISFACTION OF NATURAL VENTILATION IN RESIDENTIAL BUILDING

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ABSTRACT

As people strive for a desired level of comfort in their homes, the quality of the indoor air in the home is under threat. Because of the high temperature and humidity, occupants use a mechanical cooling strategy to achieve this level of comfort. However, this level of comfort can be achieved through proper natural ventilation without risking indoor air quality (IAQ). Despite the fact that natural ventilation has been shown to be a superior alternative to mechanical cooling in terms of both thermal comfort and IAQ, air conditioner (AC) use is still common in the home, and occupants rarely use natural ventilation through window openings. Lots of studies on the use of natural ventilation in homes have been carried, but in-depth studies of natural ventilation provision and occupant satisfaction with the natural ventilation provided in their home have not been conducted. Therefore, this study aims to evaluate the occupants' satisfaction level on the natural ventilation performance in low-cost terrace houses. The objectives for this research are to identify the best number of windows provided for natural ventilation in selected low-cost terrace houses design and to evaluate the occupant's satisfaction level on natural ventilation in the low-cost terrace houses. The case studies chosen for this research are three residential areas in Bukit Kuang, Kemaman, which consist Jalan Cempaka Kanan, Jalan Cempaka, and Jalan Bistari. Each of these case studies has a different feature and number of windows. The 30 respondents which consist 10 respondents from each case studies completed the questionnaire through Google Form due to the limitation because of Covid-19 pandemic. All the data will be collected and analyzed using Microsoft Excel and will be analyzed through table or chart to make the it more easier to be read. The finding of this research is that the number or the windows and doors and ventilation block as natural ventilation can affect the level of satisfaction and comfortability of building occupants.

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TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 STUDY BACKGROUND

Mechanical cooling nowadays be one of important equipment in every building. Residents in hot-humid climate regions such as Malaysia have been reported to rely heavily on mechanical cooling technologies to achieve comfort for residential buildings (Kubota T. C., 2009). However, other ways to achieve thermal comfort and have a suitable range for indoor air quality in the buildings is by providing proper natural ventilation. It is because by using air-conditioning system, it will increase the energy used in this country. Study findings showed that 40 percent of energy usage in buildings is accounted for and included in the mechanical cooling system (Santamouris, 2005) . So, to reduce energy consumption in Malaysia, households needed to reduce the number and duration of operation using air-conditioning systems in their buildings. To minimize this energy consumption, all residential buildings need to be well constructed and built to be air-tight in order to avoid leakage and cooling through the building skin (Nielsen, 2010).

At the same time, it will provide good indoor air quality in residential buildings. Indoor air quality refers to the air quality of buildings and structures inside and around them, especially in terms of the health and comfort of building occupants (EPA, 2020) . The limited air tightness in the building can cause poor indoor air quality and it will affect occupant's health.

The reduction in ventilation rates in the worsening of the quality of indoor air can lead to numerous health-related problems such as sick building syndrome that can cause occupants of the buildings to have asthma and other respiratory diseases (Guo, 2008). It will automatically make the occupants in the buildings feel not comfortable with that situations. Therefore, natural ventilation is the best alternative to balance between energy efficiency, thermal comfort and indoor air quality. It is also a natural means of saving energy and an effective passive strategy to optimize indoor air quality in the buildings (Yusoff, 2010) . There are two methods for providing natural ventilation in the buildings which cross ventilation and stack ventilation. Good natural