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ENVIRONMENT**

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AWARENESS ON THE GOOD INDOOR AIR QUALITY (IAQ) AT ALAM PERDANA, SELANGOR DOUBLE STOREY TERRACE HOUSE

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ABSTRACT

This study examines the indoor air quality (IAQ) awareness among residential area occupants, aiming to identify the factors contributing to occupants' discomfort and their understanding of good IAQ characteristics. The research revealed that a significant majority of respondents experienced discomfort in their homes due to inadequate IAQ, attributed to insufficient temperature regulation, ventilation issues, and potential sick building syndrome, leading to various health-related symptoms. The results highlighted a concerning lack of knowledge about IAQ among the respondents, with a majority unaware of the factors influencing indoor air quality and the characteristics of good IAQ. Specifically, residents of Alam Perdana demonstrated limited familiarity with the distinguishing features of satisfactory IAQ, posing challenges in differentiating between acceptable and poor air quality within their living spaces. In conclusion, this research emphasized the importance of IAQ awareness among residential occupants, suggesting the need for educational initiatives to enhance understanding and improve indoor air quality conditions. By increasing IAQ awareness, residents can take proactive measures to create healthier living environments and elevate their overall well-being.

Keywords: indoor air quality, residential area

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INTRODUCTION

Indoor air quality (IAQ) encompasses the quality of air both inside and outside buildings, significantly influencing the health and comfort of occupants. A conducive interior environment fosters productivity and well-being, while poor IAQ can lead to discomfort and health issues. The importance of IAQ has garnered increasing attention from the scientific community, governments, and environmental bodies worldwide, as individuals spend approximately 90% of their time indoors. Vulnerable populations, like children, the elderly, and those with chronic illnesses, are especially susceptible to the adverse effects of indoor air pollution. Various sources contribute to indoor pollutants, including outdoor contaminants from industrial and vehicular activities, and indoor sources such as combustion products, building materials, cleaning agents, and occupants' behaviour. Sick building syndrome (SBS) describes unidentifiable acute health effects experienced by occupants in a building, often linked to poor indoor air quality. SBS symptoms encompass headaches, respiratory issues, allergies, and fatigue. Contributing factors to SBS include chemical and biological contaminants, inadequate ventilation, and molds growth. Addressing these factors is vital for improving indoor air quality and ensuring occupants' well-being.

LITERATURE REVIEW

Indoor Air Quality

Indoor Air Quality (IAQ) pertains to the air quality inside and outside buildings, significantly impacting the comfort, health, and productivity of occupants. Alarmingly, indoor air pollution has become the world's largest environmental health risk, leading to preventable deaths and posing a significant threat, especially to low-income nations reliant on solid fuel burning for cooking and heating. While spending nearly 90% of their time indoors, individuals are exposed to various indoor air pollutants, affecting their well-being. Recently, research has focused more on IAQ, highlighting the importance of addressing indoor air pollution to safeguard human health and productivity. The COVID-19 pandemic further emphasizes the need for good IAQ, as poorly ventilated indoor spaces increase transmission risks. Building owners are encouraged to prioritize IAQ in workplaces and homes to create healthier environments for occupants.

Time Spent Indoor Pattern

The amount of time spent indoors varies based on lifestyle, occupation, climate, and personal preferences. People predominantly spend their days indoors in diverse facilities, including homes, offices, schools, and restaurants, engaging in various activities. Work obligations often lead to significant indoor hours, while residential

living involves spending considerable time indoors for activities such as sleeping, eating, and family time. Presently, approximately 80 to 90 percent of individuals' time is spent indoors, whether at work or home. This pattern is reinforced by extreme weather conditions, limiting outdoor activities and encouraging indoor comfort. The increasing use of technology and digital media further contributes to prolonged indoor stays. Consequently, indoor air quality (IAQ) assumes paramount importance as it directly affects human health and well-being. Ensuring good IAQ in interior spaces, where people spend the majority of their time, is crucial to promote overall health and prevent adverse outcomes associated with poor air quality.

Sick Building Syndrome

Sick Building Syndrome (SBS) refers to health and comfort changes experienced by building occupants without a specific cause identified. Poor indoor air quality (IAQ) is related to SBS, leading to various symptoms in homes, offices, and schools. Symptoms range from allergies to severe illnesses like lung diseases and cancer. IAQ factors contributing to SBS include chemical and biological contaminants, inadequate ventilation, electromagnetic radiation, and high humidity. Cleaning products and solid fuel usage can exacerbate indoor pollution. Mold growth is a common concern indoors, with certain molds posing health risks. Prolonged indoor mold exposure may lead to coughing, wheezing, headaches, and sneezing, especially in energy-efficient homes. Preventative measures like identifying and eliminating mold-contaminated areas are essential to mitigating the health risks of mold exposure.

METHODOLOGY

The methodology for this research involves a case study conducted at the residential area of Alam Perdana, Puncak Alam, Selangor, focusing on a double storey terrace house. The motivation for this study stems from observations of residents' discomfort, primarily caused by pollution from nearby construction activities and potential flooding issues. The researcher will employ a mixed-method approach, using observation as the primary method to collect data on indoor air quality. Additionally, a questionnaire survey will be used to gather quantitative data, distributed through Google Form via WhatsApp. The survey aims to address the research questions and fulfill the study objectives, incorporating relevant and organized questions to ensure efficient data collection and analysis. The questionnaire survey is considered the most practical and effective means of obtaining necessary data, allowing for pattern identification and support of the research's goals.

FINDING AND ANALYSIS

To achieve objectives which is to measure the occupant's satisfaction of good indoor air quality in the building.



Figure 1: Did you find any discomfort due to poor indoor air quality in your house

The survey sought to understand whether respondents experienced any discomfort due to poor indoor air quality in their houses. The data obtained revealed that 59% of the respondents answered "Yes" to this question, indicating that a significant majority experienced discomfort in their homes as a result of poor indoor air quality. Several factors could contribute to this discomfort, including inadequate temperature control and poor ventilation, leading to conditions that are excessively hot, stuffy, or humid. Additionally, the occurrence of sick building syndrome might be a contributing factor, leading to symptoms such as headaches, fatigue, dizziness, and other related issues. On the other hand, 41% of the respondents answered "No" to the question, suggesting that they did not experience discomfort due to poor indoor air quality. There could be various reasons for this response. Some individuals may have higher tolerance levels and are less affected by the poor indoor air quality in their homes. Moreover, some respondents might spend only a short period indoors, making the impact of the poor air quality less noticeable to them.

In conclusion, the survey findings indicate that a significant majority of respondents (59%) experienced discomfort in their houses due to poor indoor air quality. This discomfort could arise from factors such as inadequate temperature control, poor ventilation, and potential sick building syndrome symptoms. On the other hand, 41% of the respondents did not report experiencing such discomfort, potentially due to individual tolerance levels or limited time spent indoors. This data sheds light on the

varying experiences and perceptions of indoor air quality-related discomfort among the surveyed population.

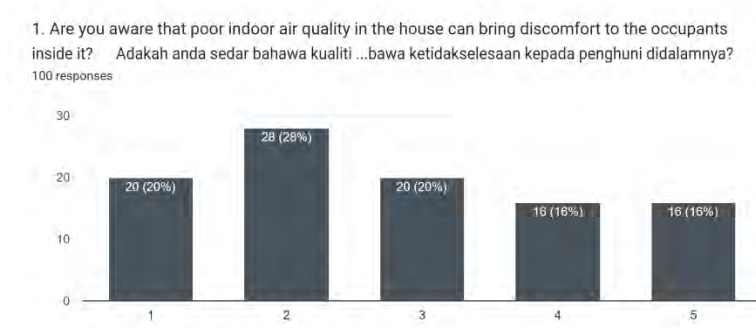


Figure 2: Are you aware that poor indoor air quality in the house can bring discomfort to the occupants inside it?

The survey aimed to determine the level of awareness among respondents regarding the impact of poor indoor air quality on human comfort. The data revealed the distribution of responses across different categories: "Totally Disagree" (20%), "Disagree" (28%), "Maybe" (20%), "Agree" (16%), and "Totally Agree" (16%).

The analysis shows that the highest percentage of respondents (28%) disagreed and were not aware of the fact that poor indoor air quality can bring discomfort to the occupants inside their homes. This lack of awareness is concerning, as poor indoor air quality can lead to various respiratory issues, such as asthma and allergies, as well as other discomforts like headaches, coughing, sneezing, and fatigue. The categories "Maybe" and "Totally Disagree" shared the same percentage (20%) of respondents. This indicates that a considerable portion of the participants (1 in 5) was unsure or strongly disagreed with the statement, showing further uncertainty or denial of the relationship between poor indoor air quality and discomfort.

On the other hand, 16% of the respondents agreed and were aware of the impact of poor indoor air quality on human comfort. Similarly, another 16% of the respondents "Totally Agreed" with the statement, showing a strong understanding of the issue. These individuals may have recognized the effects of poor indoor air quality due to short exposure periods indoors, as research indicates that indoor air can be more polluted than outdoor air.

In conclusion, the survey findings highlight the varying levels of awareness among respondents regarding the relationship between poor indoor air quality and human comfort. While a significant percentage disagreed or were uncertain, a notable portion of the respondents acknowledged the connection. It is crucial to raise awareness and educate the public about the potential health risks and discomforts associated with

poor indoor air quality to promote better living conditions and well-being for occupants inside their homes.

FINDING AND ANALYSIS

In conclusion, the survey findings reveal that a significant majority of respondents (59%) experienced discomfort in their houses due to poor indoor air quality, possibly stemming from factors like inadequate temperature control, poor ventilation, and potential sick building syndrome symptoms. On the other hand, 41% of the respondents did not report experiencing such discomfort, which could be attributed to individual tolerance levels or limited time spent indoors. Additionally, the data highlights varying levels of awareness among respondents regarding the relationship between poor indoor air quality and human comfort, with a notable portion acknowledging the connection. It underscores the importance of raising awareness and educating the public about potential health risks and discomforts associated with indoor air quality to enhance living conditions and occupants' well-being in their homes.

CONCLUSION AND RECOMMENDATION

The majority of the respondents in this residential area feel discomfort in their homes due to poor indoor air quality. This discomfort arises from issues like inadequate temperature control and ventilation, resulting in hot, stuffy, or humid conditions indoors. Some may even experience symptoms like headaches, fatigue, and dizziness, which could be linked to "sick building syndrome." The survey shows that most residents are unaware of these problems and lack knowledge about indoor air quality. The research also reveals that people in this area don't know what constitutes good indoor air quality.

This lack of awareness makes it difficult for them to distinguish between good and poor air quality in their homes. To address this issue, it's important to educate and inform residents about indoor air quality. In conclusion, this research highlights the need for increased awareness of indoor air quality in the residential area. By recognizing its importance and educating residents, we can help them improve their living conditions and gain a better understanding of this crucial aspect of their homes. There are a few recommendations to bring awareness to the residents:

Arrange Awareness Programs for Indoor Air Quality (IAQ)

This awareness campaign should target residents of two-story terrace houses, especially focusing on vulnerable groups like children, youth, the elderly, and those with chronic illnesses. The educational content should concentrate on indoor air quality, covering common pollutants, their health effects, pollution sources, and actionable steps to improve air quality. It's important to involve experts in environmental health and air quality to lead the program, offering valuable insights and addressing participant questions effectively.

Regular Building Inspection and Maintenance

Maintaining indoor air quality requires consistent building inspection and upkeep. This involves caring for the HVAC system, ventilation, air quality assessment, and moisture management. Essential HVAC maintenance includes inspecting and servicing heating, ventilation, and AC components, like cleaning filters, coils, and ducts. Adequate ventilation is vital for a constant flow of fresh air and addressing exhaust fans, intake vents, and mechanical systems. Regular air quality tests measure pollutants like VOCs, dust, CO₂, and humidity. To prevent mold and uphold air quality, regular checks for leaks and moisture are crucial. Swift action avoids harming air quality.

Website and mobile application development

Create a dedicated website or app offering a wealth of indoor air quality resources, articles, and tools. This platform will provide real-time air quality monitoring, expert advice, and alerts for potential pollution events. It includes a comprehensive resource library with articles and educational content about indoor pollutants, their sources, health effects, and improvement strategies. The app will also integrate reliable air quality monitors to show real-time data on VOCs, particles, CO₂, and humidity. Expert-curated tips on ventilation, humidity control, air purifiers, and low-emission products will guide users. By inputting specific details like occupancy and habits, the app offers personalized insights and tailored suggestions for optimizing indoor air quality.

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Tarikh : 20 Januari 2023

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Sekian, terima kasih.

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Timbalan Ketua Pustakawan

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