

Assessment of Household Mould Growth and Related Health Impacts in Swansea.



Kaushi Amarasena
2309522

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1.0. Introduction

1.1. Household Mould Growth in United Kingdom

People spend a significant amount of time at home all around the world. In the early 2000s, research from Germany, Canada, and the United States found that individuals spend around 65% of their time at home (Brasche and Bischof, 2005; Leech *et al.*, 2002). Since the COVID-19 outbreak in December 2019, instructions to stay at home have likely led to a significant rise in the proportion of persons spending most of their time at home (Mathieu *et al.*, 2020). Despite the removal of mobility restrictions after the pandemic, many people continue to spend a significant amount of time at home. In the United Kingdom, according to statistics from the Office for National Statistics in 2022, 85% of employees working from home desire a 'hybrid' approach to combine home and office work in the future. Fifty of the largest UK companies announced that they intend to return only some employees to the office full-time in the near future. As people spend more time at home than ever before, it is becoming increasingly important that homes be secure and healthy environments.

Housing has a significant influence on both physical well-being and general quality of life, influencing behavior, relationships, and interactions within communities (Rashidfarokhi and Danivska., 2023). Housing is a crucial aspect of the built environment, offering protection, privacy, security, and comfort in addition to shelter (Patel, 2022). The quality of housing and conditions can have significant impacts on physical and mental health (Rolfe *et al.*, 2020). The emotional, physical, and social aspects of a dwelling can influence a person's well-being. Healthy housing conditions, such as clean air, clean water, and protection from the environmental threats, help to prevent contagious illnesses and respiratory disorders. Conversely, bad housing circumstances can worsen physical health issues (Krieger and Higgins, 2002). Communities that are marginalized due to societal inequality and unequal distribution of power and resources face limited or uncertain access to decent housing, leading to poor health outcomes.

There are many housing-related problems that people may experience, such as overcrowding, cold, dampness and mould infestation, noise from neighbours, insufficient light, and inadequate heating (Pevalin *et al.*, 2008). Among these issues, many homeowners and tenants in the United Kingdom have damp and mould problems in their houses. Damp and mould in households are produced by excess moisture that does not dry out or evaporate as soon as it should. Daily activities such as showering, cooking, and drying clothing can all cause moisture in the indoor environment. Excess moisture and damp problems can be caused by condensation, poorly heated homes, leaking pipework, damaged roof, blocked gutters and poor ventilation. Generally, older homes are more prone to damp problems since more modern developments include a damp-proof course and superior insulation throughout the construction process. Several common indications of condensation might help to detect these problems earlier, including: patches of discolouration on internal walls, a musty smell, peeling paint, an excess of water droplets on walls, windows or window sills and dark spots.

According to the UK Damp And Mould Statistics 2023, more than half (58%) of privately rented households in England suffer from damp, mould, and/or excessive cold in their houses, totaling around 2.7 million households. The UK Government estimates that between 3% and 4% of social housing households in England have a certain degree of damp and mould. In the year ending March 2021, the UK Housing Ombudsman (an independent agency that settles problems between tenants and social landlords) received 1,993 complaints about damp, mould, and water leaks in social housing. This number has risen to 3,969 complaints from April to December 2022, representing a 99.1% growth. Furthermore, 23% of UK houses had visible mould and 13% had a moldy odor (Menneer *et al.*, 2022).

Since 2022, the media in the United Kingdom has emphasized domestic mould and damp as a result of the 'cost-of-living' problem. Rising energy prices have driven many households to avoid using heaters to keep their expenses low (Anderson, 2022). Similarly, residents tend to be less likely to open windows to preserve heat, increasing the danger of mould and moisture accumulating (Sharpe *et al.*, 2015). In addition to socioeconomic status and behaviors that reduce the consequences of energy issues, poor construction, extreme weather events such as flooding, and inadequate home maintenance are all variables that contribute to household damp (Coulburn and Miller, 2022). Climate change has caused concerns about damp and mold dangers since variations in temperature and humidity can create favorable circumstances for mold growth. Climate change mitigation programs focusing on energy efficiency in indoor housing may limit ventilation rates and increase mould development (Vardoulakis *et al.*, 2015).

1.2. Health Impacts of Household Mould

Being exposed to damp and moldy environments can result in various adverse health consequences. Some people are more likely to develop mould-related problems with their health. These individuals include children, elderly people, persons with respiratory diseases, people with weaker immune systems, and pregnant women. Mould in the house has been linked to several health conditions, including neurological, skin, and allergy symptoms, respiratory complaints, eye symptoms, asthma, migraines, memory problems, nosebleeds, and body pains (Moses *et al.*, 2019). Early exposure to mould has been linked to impaired cognitive performance in children, as well as asthma, wheezing, allergic rhinitis, and eczema. Household moisture and mould can even be fatal. For example, in the UK, an inquest regarding the unfortunate death of two-year-old Awaab Ishak reported that the toddler died from a respiratory illness induced by mold exposure in the house. Moreover, according to the UK Damp And Mould Statistics 2023, the National Health Service (NHS) spends around £1.4 billion per year treating diseases associated with poor housing conditions such as cold and damp houses.

Although the physical health implications of mould in the houses are commonly researched, less is known about its psychological consequences. A considerable number of individuals have documented the psychological distress that these mould concerns can induce; 40% of residents indicated experiencing stress due to damp, moldy, or excessively chilly conditions in their dwellings. This distress may lead to

compromised immune function, hormonal imbalances, cardiovascular impairment as well as increased smoking, and alcohol consumption. Mould in the house can cause feelings of shame and anxiety, especially in areas where people expect to feel safe and secure (Webster, 2015). Housing renovations such as central heating installation, reroofing, replacement windows, thermal insulation, draught-proofing, and re-wiring have relatively strong favorable benefits on adult mental health (Liddell and Guiney, 2015).

1.3. Overview of the study

Mould and damp accumulation in the home is one of the most significant issues in UK households. This occurs most frequently during cold weather, particularly during the winter months. This research is aimed to assess the household mould growth in the selected houses in Swansea, Wales. Swansea, situated along the coastline, ranks the second largest metropolis in Wales and twenty-fifth in the UK. It is a part of the Swansea Bay region and the ancient county of Glamorgan, and it is situated along Swansea Bay in southwest Wales. The Gower Peninsula makes up the majority of its land. According to the Office for National Statistics (ONS), the entire land area is 379.7 square kilometers, of which 30.5% is urban and 69.5% is rural. The City of Swansea has the fourth-highest average population density of all of Wales' 22 local authority areas, with 639 persons per square kilometer (mid-2022 estimate). In Swansea, full-time employees make an average of £631.20 per week and £32,734 annually, according to the Annual Survey of Hours and Earnings (ASHE) April 2023. Based on Dwelling stock estimates for Wales, Swansea had 114,800 houses in March 2022, of which 77,000 were owner-occupied (around 67% of the total dwelling stock). The percentage of Swansea households that rented privately increased from 14.7% in 2011 to 18.0% in 2021, according to the ONS Census 2021.

A newly instituted 'Damp and Mould' policy by Swansea Council will assist tenants in addressing mould issues, which are frequently the result of condensation accumulation in their residences. In Wales, it is now mandatory for all social housing providers, including councils, to disclose and implement a damp and mould policy. This policy should explicitly outline the measures that will be taken to maintain damp and mould-free properties under their stewardship, with the ultimate goal of safeguarding the health of tenants. Swansea Municipal established an experienced maintenance team in 2023 to address damp and mold issues in municipal properties most quickly and effectively. The Council has now established a new damp and mold policy that includes provisions to guarantee that any complaints will be investigated within five days of the complaint being made. Additionally, if feasible, any necessary work to address mold and damp issues will be finished within 20 days following the initial inspection.

Mold thrives in damp, poorly ventilated environments, making Swansea's older housing stock particularly susceptible. Studies have shown that regions with higher rainfall and older, poorly maintained buildings tend to have higher incidences of mold. For example, a study by Smith *et al.*, 2018 found that approximately 20% of homes in similar coastal cities exhibited significant mold growth, with a higher prevalence in lower-income neighborhoods due to poorer housing conditions and maintenance practices. Numerous studies link mold exposure to respiratory problems such as asthma, bronchitis, and allergic reactions. The World Health Organization (WHO) has highlighted that children, the elderly, and those with pre-existing respiratory conditions are particularly vulnerable (WHO, 2009).

Juel Holst *et al.*, 2020 conducted research similar to this study to evaluate the relationship between household dampness and allergies and respiratory health in Danish individuals. The findings of this research demonstrate a positive relationship between household dampness and asthma outcomes, and wheezing in atopic individuals was strongly correlated with mold odor (Juel Holst *et al.*, 2020). Another study published in Finland concluded that preschoolers and schoolchildren were much more likely to experience respiratory infections, and non-respiratory symptoms when exposed to moisture or mould (Koskinen *et al.*, 1999). Platt *et al.*, 1989; Dales *et al.*, 1991; Peat *et al.*, 1998; Zock *et al.*, 2002 are some similar kind of studies that has been discussed the dampness and related health issues.

Public health interventions, such as housing improvement programs and financial assistance for repairs, have shown promise in reducing mold-related health issues (Jacobs *et al.*, 2010). Implementing stricter housing regulations to ensure adequate ventilation and moisture control in both new and existing buildings (Institute of Medicine, 2004) and Conducting public health campaigns to raise awareness about mold risks and prevention strategies (Breyse *et al.*, 2010) are important. The literature highlights the multifaceted nature of household mold growth and its health impacts, emphasizing the interplay between environmental, socioeconomic, and health factors. In Swansea, addressing these issues requires a comprehensive approach that includes public health initiatives, policy interventions, and community engagement.

2.0. Methodology

Researching the social health impacts of mold growth requires a comprehensive approach. This study will follow Arksey and O'Malley's (2005) review approach, which includes five stages: formulating research questions, identifying relevant studies, selecting studies, charting data, and summarizing and reporting findings. To assess household mold growth and related health impacts in Swansea, a mixed-methods approach is recommended. This involves integrating both quantitative and qualitative research methods to obtain a comprehensive understanding of the issue.

2.0. Research Objectives

There are some particular objectives will be addressed in this research study by provide a comprehensive framework for assessing the multifaceted issue of household mold growth and its related health impacts in Swansea.

- Determine the prevalence and distribution of household mold growth in different areas of Swansea is one objective. Key Question will be ‘What percentage of households in Swansea have visible mold growth?’
- Assess the physical and mental health impacts of mold exposure on residents in Swansea is an other important objective. Key Questions will be ‘What are the common health symptoms reported by residents exposed to mold? Is there a correlation between the extent of mold growth and the severity of health symptoms?’
- Identify the socioeconomic factors associated with household mold growth is an other objective. Key Questions will be ‘How do income levels, education, and employment status relate to the presence of mold in homes? Are lower-income households more likely to experience mold growth compared to higher-income households?’
- Assess residents' awareness and attitudes towards mold growth and its health impacts is one objective. It will be assessed by using Key Questions as follows; How knowledgeable are residents about the health risks associated with mold exposure? What are residents' attitudes towards mold prevention and remediation?
- Develop policy recommendations to mitigate mold growth and its health impacts is an other approach. Key Questions will be ‘What are the most effective measures for preventing and controlling mold growth in homes? How can local authorities and policymakers better support residents in mold-affected areas?’

By addressing these objectives, the research can offer valuable insights and actionable recommendations to improve public health and housing conditions in the community.

2.1. Research Design in Quantitative Methods

The quantitative component of this research aims to systematically assess the prevalence of household mold growth in Swansea, its physical and mental health impacts on residents, and the associated socioeconomic factors. Quantitative methods include surveys and questionnaires, environmental assessments, and health records analysis. The study will focus on residents across various neighborhoods in Swansea to capture a diverse range of housing conditions and socioeconomic backgrounds.

Develop a structured questionnaire covering the following areas:

- **Demographic Information:** Age, gender, income, education level, employment status.
- **Housing Conditions:** Type of dwelling, age of the building, ventilation, presence of dampness.
- **Health Status:** Respiratory symptoms (e.g., asthma, bronchitis), allergic reactions, general health status.
- **Mental Health:** Stress, anxiety, depression (using standardized scales like the GHQ-12 or PHQ-9).
- **Mold Awareness and Attitudes:** Knowledge about mold risks, attitudes towards mold prevention and remediation.

To achieve a high response rate, use a combination of approaches for survey distribution, such as: Online platforms: Use tools such as Google Forms or SurveyMonkey. Send paper surveys to regions with poor internet penetration. In-Person: Conduct face-to-face interviews in certain communities to guarantee inclusion.

Mold sampling and visual inspections will be used to conduct environmental assessments. Mold sampling is intended to collect air and surface samples from a subset of surveyed houses using Air Quality Monitors (which measure mold spores in the air) and Surface Swabs (which test for mold presence on walls, ceilings, and other surfaces). Visual Inspections will be conducted to document visible mold, moisture levels, and ventilation quality. Health Records Analysis will be conducted in collaboration with local health clinics and hospitals to get anonymized health records of inhabitants, with an emphasis on mold-related diseases such as respiratory difficulties and allergies.

Data Analysis : Descriptive Statistics will be used to quantify the prevalence of mold in households, and explain the distribution of health symptoms and socioeconomic characteristics. Summarize essential variables using the mean, median, mode, range, and standard deviation. Correlation analysis will be performed to investigate the relationship between mold presence and health outcomes (for example, Pearson or Spearman correlation coefficients). Use multiple regression models to identify predictors of health outcomes, considering mold exposure, housing conditions, and socioeconomic factors. ANOVA or t-tests will be conducted to compare health outcomes across different groups (e.g., income levels, housing types).

2.2. Research Design in Qualitative Methods

The qualitative component of this research aims to provide an in-depth understanding of the experiences, perceptions, and coping strategies of Swansea residents regarding household mold growth and its health impacts. This design will utilize interviews, focus groups, and case studies to gather rich, detailed data. Create a semi-structured interview guide that addresses personal experiences, health impacts, coping strategies, awareness and attitudes, and public health interventions.

Data Analysis : Thematic Analysis will be done. Coding will be used to transcribe all interviews and focus groups. To code the data, use qualitative data analysis tools such as NVivo or Atlas.ti. Create a basic code structure based on research questions, then iteratively enhance it. Identify key themes and patterns related to mold experiences, health impacts, coping strategies, and attitudes. Group similar codes into overarching themes and sub-themes. Interpret the themes in the context of existing literature and theoretical frameworks, providing a comprehensive understanding of the qualitative data.

3.0. Discussion.

When conducting research on household mold growth and related health impacts in Swansea, several key factors need to be considered to ensure a comprehensive and accurate assessment. These factors can be broadly categorized into environmental, structural, socio-economic, health-related, and methodological aspects. Swansea's maritime climate with high humidity levels, frequent rainfall, and mild temperatures can contribute to mold growth. Understanding local climate patterns helps in identifying periods of heightened risk for mold proliferation. Older buildings or those constructed with materials that retain moisture (such as wood and certain insulations) are more prone to mold growth.

When conducting research on household mold growth and related health impacts in Swansea, several ethical considerations must be taken into account to ensure the study is conducted responsibly and respectfully. These considerations span from participant consent and data privacy to the implications of the findings and potential conflicts of interest. Participants must be fully informed about the nature, purpose, and potential risks of the research. This includes explaining how the data will be collected, used, and reported. Participation should be entirely voluntary, with no coercion or undue influence. Participants should feel free to withdraw from the study at any time without any negative consequences. Personal data collected during the research must be securely stored and protected. This includes measures to prevent unauthorized access and breaches. The research should not exploit participants, particularly those in low-income or disadvantaged situations. Benefits of the research should be fairly distributed. By addressing issues of informed consent, privacy, risk minimization, honest reporting, equity, cultural sensitivity, and conflict of interest, researchers can uphold ethical standards and contribute positively to the community and scientific knowledge.

Solving problems in research on household mold growth and related health impacts in Swansea requires a systematic approach that addresses common challenges and obstacles. Implement standardized methods for mold sampling, including air and surface samples are important to ensure consistency and accuracy. Implement regular quality control checks and calibrate equipment to maintain the accuracy of measurements, use control samples and blind testing to reduce bias are some methods to reduce errors. Also collaborative efforts with community is crucial to the success of the research.

Conclusion

The issue of household mould growth and its related health impacts is a significant concern in Swansea, as it is in many parts of the UK. In the UK, estimates suggest that between 4% to 27% of homes are affected by damp and mould. Swansea, with its older housing stock and socio-economic challenges, is likely to see higher incidences, particularly in rented accommodations. Poor housing conditions, energy inefficiency, and the high cost of living contribute to the prevalence of damp and mould. Homes that are difficult to heat or ventilate properly are more susceptible. Exposure to mould can cause a variety of health issues, including respiratory problems, allergies, and asthma. Mould produces allergens, irritants, and sometimes toxic substances that can lead to significant health risks. This research project is aimed to assess the household mould growth and related health impacts. To assess household mold growth and related health impacts in Swansea, a mixed-methods approach is recommended. This involves integrating both quantitative and qualitative research methods to obtain a comprehensive understanding of the issue. Research methods include surveys and questionnaires, environmental assessments, and health records analysis. Data will be statistically analyze using statistical softwares. Addressing the challenges in research on household mold growth and related health impacts in Swansea involves a multifaceted approach. By ensuring rigorous data collection, ethical conduct, community engagement, and leveraging technology will help to overcome common problems and contribute valuable insights to improve public health and housing conditions.

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