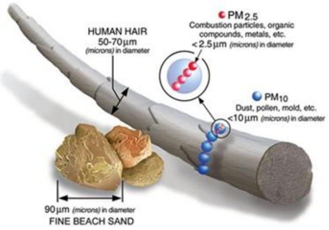

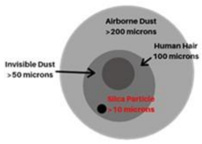

[The Residents, Clients & Construction Excellence Toolkit (ReACT)]

Paul Dockerill Award - Research Project on Professional Practice of Control of Silica Dust Exposure

Qualitative Research Report

July 2026

The Chartered Institute of Building

This report is funded through the Paul Dockerill Award of The Chartered Institute of Building

CONTRIBUTIONS

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This document has been written and prepared by members of Pvotal Consultancy Ltd.'s research and knowledge management team.

ACKNOWLEDGEMENTS

This research surrounding occupational health and safety practice for control of silica dust exposure was funded by The Chartered Institute of Building (CIOB) and supported by the convened CIOB Project Leadership team: Antonia Lanyiova and Rosalind Thorpe.

We would like to acknowledge the work of the CIOB Project Leadership team and their invaluable contributions who, by recognising the risks posed to the housing sector's workforce (management and operatives), were responsible for facilitating access to key stakeholders (senior leadership and management) within the UK's housing sector.

We would like to thank the UK's housing sector (senior leadership and management) for their participation and contribution to the research survey and interviews, and in permitting the use of data and other extracts within this report.

Finally, the author would like to thank everyone who contributed to this report and at the same time underline that any errors are that of the author.

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Executive Summary

Respirable Crystalline Silica (RCS) are dust particles that are small enough to penetrate the body and can cause various respiratory, cardiovascular, autoimmune and cancer risks. Yet, despite the plethora of key legislation, HSE and industry guidance documents, there appears to be an increase in the number of occupational and non-occupational diagnosed diseases linked to working with RCS. The high amount of silica within common construction materials, such as plaster, brick, cement, concrete, plasterboard, grout, mortar, natural and engineered stone, sand, asphalt and tile indicates that there is a very high risk to all stakeholders exposed to RCS of developing debilitating long-term diseases. Hence, globally, there is a growing concern about the gap between guidance and practice.

In recognition of this growing industry concern, and in alignment with the ethos of The Chartered Institute of Building's (CIOB) *Paul Dockerill Award*. The award celebrates and seeks to fuel safety and building regulation innovation, skills development, and resident engagement. The main aim of the research report was to investigate the current RCS management situation within the UK Housing sector and the main difficulties and problems faced by stakeholders. The key objectives were to determine current awareness/ understanding/ knowledge/ perception of the occupational and non-occupational risks posed by silica dust exposure at a client, senior leadership and mid-management level; and seek to collect information concerning not only the key challenges, barriers and drivers facing but also to provide potential opportunities and recommendations for enhancing existing silica dust exposure and control practice within the UK housing sector.

The report had a threefold intention: (1) gather data about practice (management & on-site), to gain a view of the overall state of play in relation to the health and safety practices that determine risk reduction practice for controlling exposure to silica dust; (2) support and feed into the goal to develop a UK housing sector targeted toolkit; and (3) not only to aid advancing practice but also to support those who are having construction work done, whether that be commercially or privately.

The multi-method qualitative research was carried out between October 2024 and June 2025, comprising of the following methodology:

Desktop study research, to inform the study as a whole, (i.e. literature review of industry intelligence reports and academic articles)

Online survey of 150 UK housing management staff **(middle management) – 64 respondents** completed the questionnaire **– 43% return rate**

8 senior leadership interviews (directors) (6 online and 2 face-to-face)

Consultation with various CIOB stakeholders

Key Findings - Desktop study research

Plethora of industrial intelligence reports, academic studies and commentaries investigating the silica dust related construction health and safety risks, and the associated occupational health and wellbeing dangers.

Lack of specific construction sector research data concerning non-occupational RCS exposure (health, environmental, economic impacts etc.) when construction works are undertaken.

Lack of specific housing sector (i.e. repair, maintenance, retrofitting, etc.) RCS focused research studies (quantification of works, occupational/non-occupational RCS exposure, health, environmental, economic impacts etc.).

Key Findings – Housing Sector Silica Dust Questionnaire

100% perceived education and training as fundamental.

75% unaware of several key air quality frameworks.

62.5% unaware silica dust can cause cardiovascular, autoimmune and cancer risks.

87.5% aware of the common sources of silica dust generation.

100% perceived their organisation as not fully equipped to deal with silica dust.

75% indicated they do not use a project silica exposure plan nor undertake consistent inspection of safe practices.

67.5% unaware there 3 modes of silica dust transmission.

62.5% use RAMS and employing the hierarchy of control framework (COSHH, 2002).

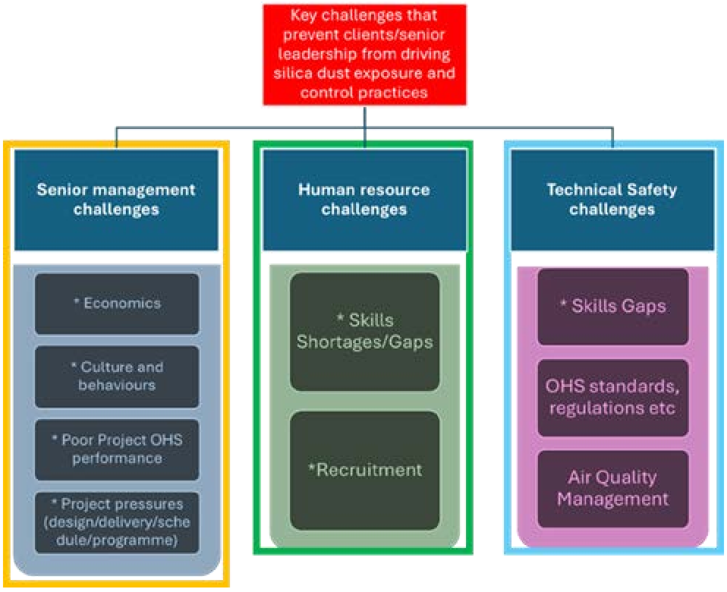
75% unaware of the current UK Workplace Exposure Limit (WEL) of 0.1 mg/m³.

87.5% agreed the need a transparent and open culture, without fear of reprisals when reporting issues.

The overall picture concerning the UK's housing sector management's awareness of the current health and safety silica dust approach, and its methods and tools, is a divergent one. As the consensus derived from the survey data suggests, the current awareness of "strategic, tactical, and operational" approaches is, in essence, effective. Yet based on the qualitative thematic analysis of the questionnaire data outputs, the findings indicated and highlighted several issues, challenges, improvement areas, and potential actions, as mirrored in the literature, covering **three key themes: 1) senior management; 2) human resources; and 3) technical safety (competence)**.

Overwhelmingly, it was felt an organisational-wide standardised approach should be adopted, and it centred on ensuring adoption of best practice, enhancing culture (transparency/ openness/safety), and engaging with silica-specific training, as opposed to being driven by economics and logistics.

Key Findings – Housing Sector Senior Leadership Silica Dust Interviews

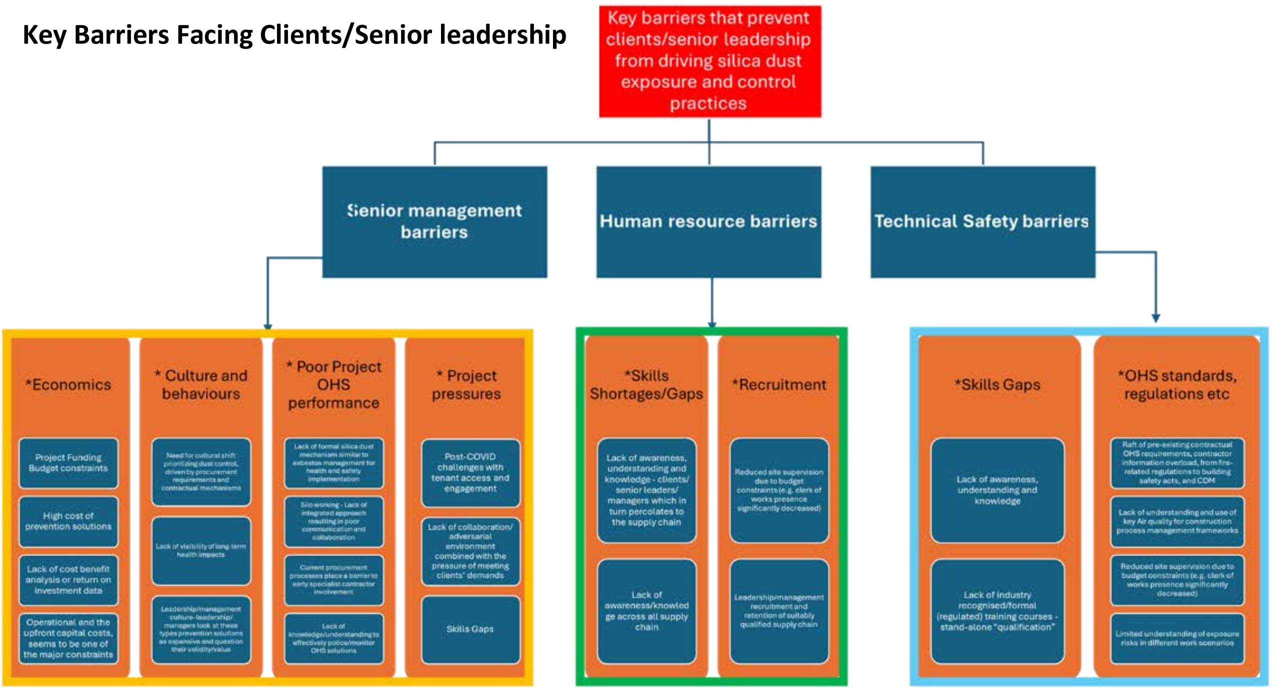


3 key themes: 1) senior management; 2) human resources; and 3) technical safety (competence)

9 key challenges, barriers and drivers: 1) economics; 2) culture and behaviours; 3) poor project OHS performance; 4) project pressures; 5) skills shortages/gaps; 6) Recruitment;
7) skills gaps; 8) OHS standards, regulations etc.; 9) air quality

Within these three key themes, all 8 respondents highlighted numerous areas that required addressing, ranging from: the need for cultural shift prioritising dust control, driven by procurement requirements and contractual mechanisms, to cost pressures driving down investment in controls - operational and the upfront capital costs to lack of clients/ senior leaders/ managers' awareness, understanding and knowledge - which in turn percolates to the supply chain. These will be gone through in more detail in the following figures.

Key Barriers Facing Clients/Senior leadership



Senior management barriers:

Economics
- Project Funding Budget constraints
- High cost of prevention solutions
- Lack of cost benefit analysis or return on investment data
- Operational and the upfront capital costs, seems to be one of the major constraints

Culture and behaviours
- Need for cultural shift prioritizing dust control, driven by procurement requirements and contractual mechanisms
- Lack of visibility of long-term health impacts
- Leadership/management culture- leadership/ managers look at these types prevention solutions as expensive and question their validity/value

Poor Project OHS performance
- Lack of formal silica dust mechanism similar to asbestos management for health and safety implementation
- Silo working - Lack of integrated approach resulting in poor communication and collaboration
- Current procurement processes place a barrier to early specialist contractor involvement
- Lack of knowledge/understanding to effectively police/monitor OHS solutions

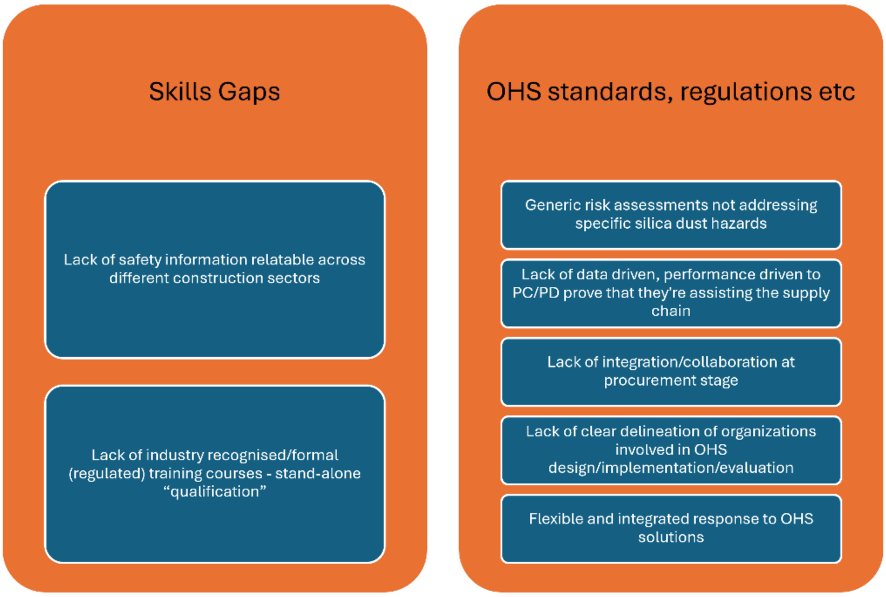
Project pressures
- Post-COVID challenges with tenant access and engagement
- Lack of collaboration/ adversarial environment combined with the pressure of meeting clients' demands
- Skills Gaps

Human resource barriers:

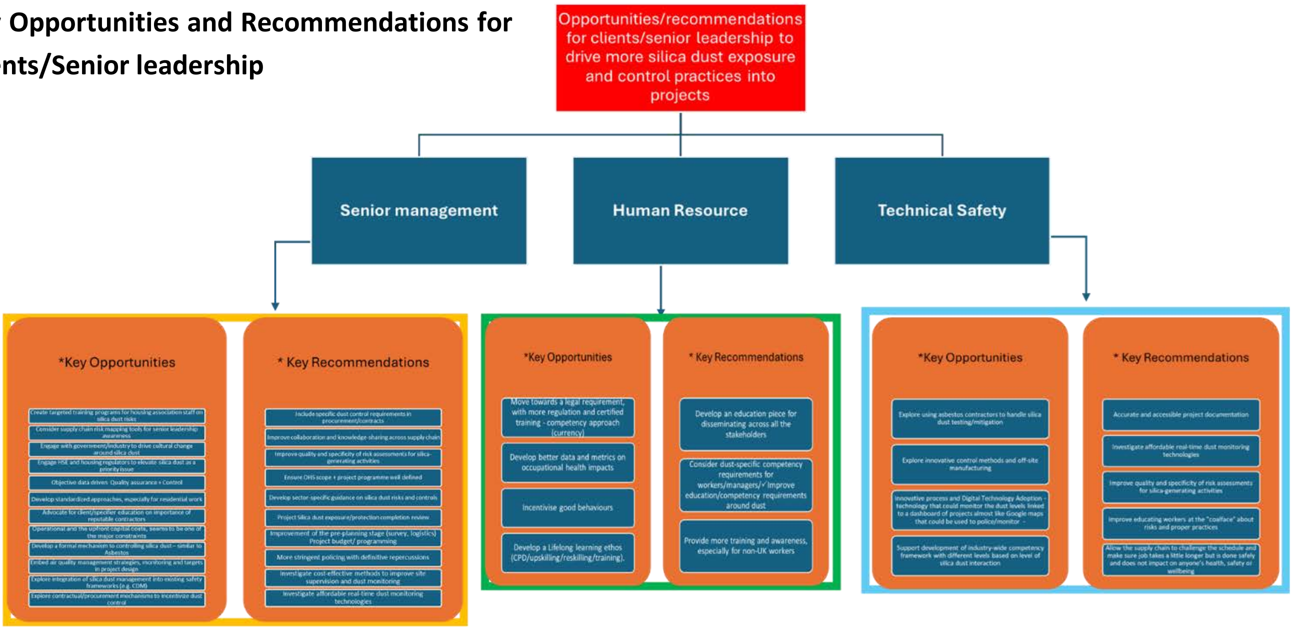
Skills Shortages/Gaps
- Lack of awareness, understanding and knowledge - clients/ senior leaders/ managers which in turn percolates to the supply chain
- Lack of awareness/knowledge across all supply chain

Recruitment
- Reduced site supervision due to budget constraints (e.g. clerk of works presence significantly decreased)
- Leadership/management recruitment and retention of suitably qualified supply chain

Technical safety barriers:



Key Opportunities and Recommendations for Clients/Senior leadership



Senior management:

*Key Opportunities

- Create targeted training programs for housing association staff on silica dust risks
- Consider supply chain risk mapping tools for senior leadership awareness
- Engage with government/industry to drive cultural change around silica dust
- Engage HSE and housing regulators to elevate silica dust as a priority issue
- Objective data driven Quality assurance + Control
- Develop standardized approaches, especially for residential work
- Advocate for client/specifier education on importance of reputable contractors
- Operational and the upfront capital costs, seems to be one of the major constraints
- Develop a formal mechanism to controlling silica dust – similar to Asbestos
- Embed air quality management strategies, monitoring and targets in project design
- Explore integration of silica dust management into existing safety frameworks (e.g. CDM)
- Explore contractual/procurement mechanisms to incentivize dust control

* Key Recommendations

- Include specific dust control requirements in procurement/contracts
- Improve collaboration and knowledge-sharing across supply chain
- Improve quality and specificity of risk assessments for silica-generating activities
- Ensure OHS scope + project programme well defined
- Develop sector-specific guidance on silica dust risks and controls
- Project Silica dust exposure/protection completion review
- Improvement of the pre-planning stage (survey, logistics) Project budget/ programming
- More stringent policing with definitive repercussions
- Investigate cost-effective methods to improve site supervision and dust monitoring
- Investigate affordable real-time dust monitoring technologies

Human resources:

*Key Opportunities

- Move towards a legal requirement, with more regulation and certified training - competency approach (currency)
- Develop better data and metrics on occupational health impacts
- Incentivise good behaviours
- Develop a Lifelong learning ethos (CPD/upskilling/reskilling/training).

* Key Recommendations

- Develop an education piece for disseminating across all the stakeholders
- Consider dust-specific competency requirements for workers/managers/✓Improve education/competency requirements around dust
- Provide more training and awareness, especially for non-UK workers

Technical Safety:

In addition, the respondents offered a plethora of sector-wide senior leadership and project level key recommendations and opportunities (e.g. move towards a legal requirement, with more regulation and certified training - competency approach (currency)) which are inextricably linked, very much like the complex, multi-disciplinary and bespoke characteristics and nature of UK Housing Sector repair, maintenance and improvement (RMI) projects.

Hence, the overall picture concerning the UK's housing sector senior leadership awareness/ understanding/knowledge/perception of the occupational and non-occupational risks posed by silica dust exposure appears somewhat inconsistent, with some senior leaders being more aware than others. Although in general, there was a lack of awareness/understanding/knowledge/ perception that silica dust poses similar risks to asbestos, suggesting that the current "strategic, tactical, and operational" silica dust approaches are, in essence, tokenism towards OHS approach, implementation and performance, and not factored into procurement decisions or risk mitigation strategies. Hence, the respondents were in full agreement that there needed to be a formal mechanism developed for health and safety implementation when it comes to controlling silica dust – similar in approach to asbestos management and control, particularly given there appeared to be a lack of understanding/experience/knowledge that current Construction H&S Process Management Frameworks (CDM, CEMP, CPPs etc.) do not sufficiently address silica dust (in fact, they do not sufficiently address all construction dust).

Recommendations

Government

Work with industry stakeholders to develop and implement a set of control of silica dust regulations in a similar vein to the current asbestos regulations.

Develop metrics for measuring the effectiveness of such an RCS/silica dust initiative to ensure good outcomes.

Produce targets that can be measured on an annual basis.

Assess the implementation costs of these recommendations and commit funding to implement this work.

Raise public awareness of RCS/silica dust risks and hazards.

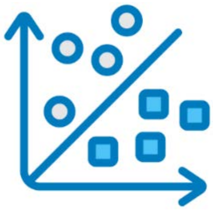
Industry

Silica dust approach, systems, and tools

Develop a set of competencies needed when working in a high-risk silica environment to allow the development of a formalised industry and awarding body recognised qualification (akin to P405 – Management of Asbestos in Buildings).

Develop an up-to-date technical handbook/guide tailored for silica dust exposure and control – offering a structured roadmap approach to the silica dust management process and the harnessing of all relevant construction process management frameworks.

Undertake detailed research and information to develop effective strategic, tactical, and operational Housing RMI sector specific indicators, to encourage greater inclusion at the design and procurement stages to ensure projects are deliverable without having negative consequences on people's health and wellbeing.



Explore the feasibility of undertaking the quantification of RCS exposure (exposure assessments) of the Housing RMI sector common silica dust related work processes, practices, activities, and tasks to provide a deeper understanding of project specific RCS issues and implemented control measures.

Implement mandatory RCS training and skills development (trainee/up-skilling/reskilling), to support the best practice approach to safeguarding the workforce and the public when involved in various work processes, practices, activities, and tasks.

Use the tendering process to reward organisations, contractors and developers who are taking proactive approaches to improving silica dust control within their workplace.

Project Level

Employ existing approved code of practice and guidance for asbestos as a guiding best practice framework/methodology to follow when dealing with RCS dust control and exposure.

Embark on thorough occupational health preventive and protective measures (e.g. bespoke risk assessment, integrated health surveillance and development of enhanced exposure limit guidance and training) that reduce the risk of longer-term impact from working in a silica dust exposed environment.

Explore the potential to develop a series of Housing RMI sector best practice demonstration projects to showcase the benefits of employing such a framework - offering the findings as a benchmark but also raise the awareness and highlighting the ROI and CBA potentials.

Sustain future progress by adopting a continuous improvement approach (e.g. safety excellence competence), built on optimal utilisation of current/future training capacity, to support enhanced skills development competence.

1.0 Introduction

1.1 Background

1.1.1 Air Pollution and Construction

Air pollution is a major global health issue, contributing to approximately 8 million deaths annually (4.2 million from outdoor air pollution, whilst 3.8 million dice from indoor air pollution), including over 700,000 children under the age of five (Manisalidis *et al.*, 2020). This makes it the leading environmental risk to human health worldwide. However, clean air is basic human right and fundamental to public health.

The construction industry contributes significantly to air pollution (both indoor and outdoor), particularly in urban areas. The World Green Building Council (WGBC) working in partnership with the Climate and Clean Air Coalition (CCAC) and in conjunction with the BreatheLife2030 campaign, aims to increase awareness, develop understanding and kickstart actions from a global audience to mobilise businesses and organisations to capture and share real-time data on air pollution in and outside of buildings. Furthermore, over the past decade, Chronic Respiratory Diseases (CRDs) have silently claimed millions of lives, placing an immense strain on health systems worldwide. As the third leading cause of death globally, conditions like COPD and silicosis continue to escalate significantly, driven by the evolving landscape of construction dust generation, resulting in a lack of quality air consumption (occupationally and non-occupationally).

Yet despite such initiatives, while other major sources of air pollution – like the transport sector – have rapidly decreased their polluting emissions, according to the Centre for Low Emission Construction (CLEC), the construction industry has increased its overall share of polluting emissions in recent decades (Figure 1).

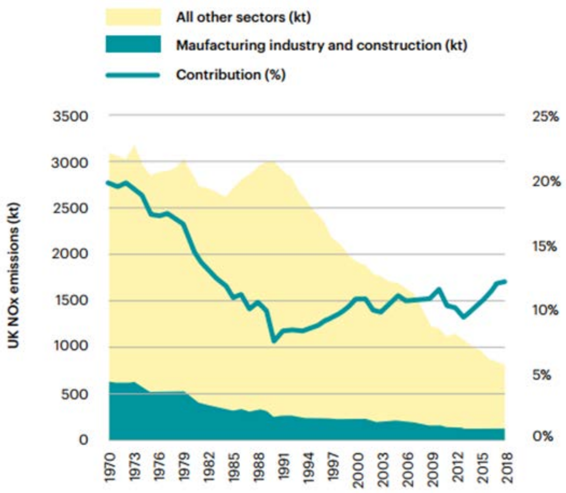


Figure 1: Overview of construction share of polluting emissions (Centre for Low Emission Construction (CLEC), 2020).

For example, the construction industry is estimated to contribute 30% of particulate matter (PM_{10}) emissions along with 8% of fine particulate matter ($PM_{2.5}$) which in turn compromises air quality (London Atmospheric Emissions Inventory (LAEI), 2019). Any particulate matter below PM_{10} (10μm

(microns (1/1000mm)) is classified as respirable fraction (i.e. the portion of inhaled airborne particles that penetrate beyond the larynx and reach the unciliated airways (no hairs on the surface)). $PM_{2.5}$ is equivalent to about
one-thirtieth of the width of a human hair. These particles are small enough to penetrate deep into the lungs and even enter the bloodstream, posing significant health risks (Figure 2). Exposure to $PM_{2.5}$ has been linked to a range of chronic respiratory issues; autoimmune, cardiovascular and renal diseases; and cancer dangers, resulting in reduced life expectancy, not only to occupationally but also non-occupationally exposed individuals.

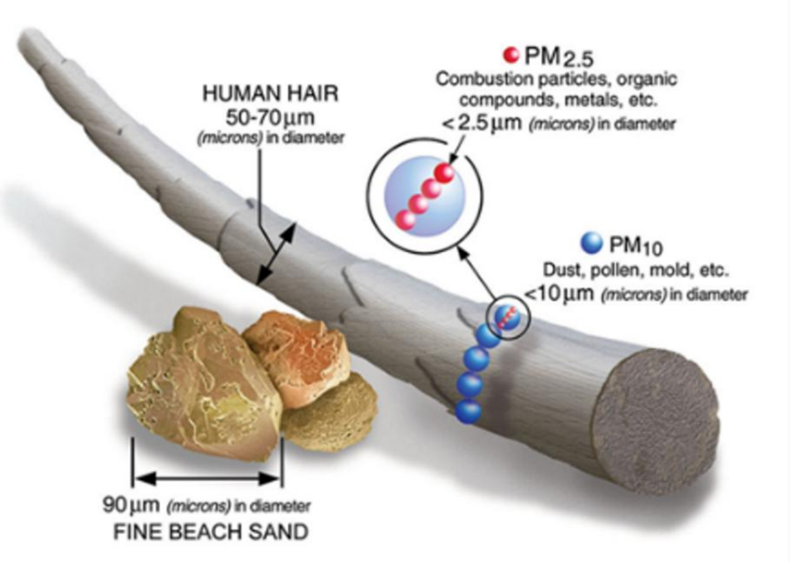


Figure 2: RCS $PM_{2.5}$ Comparison (Source: Dmochowska, A., (2018). Author adapted)

There are several types of harmful construction dust, each posing distinct health risks occupationally and non-occupationally. The three main categories include: silica dust, wood dust and non-silica dust (materials that contain very little or no silica). However, the focus of this research is on silica dust, particularly Respirable Crystalline Silica (RCS), as many common construction materials contain high amounts of silica such as plaster, brick, cement, concrete, plasterboard, grout, mortar, natural and engineered stone, sand, asphalt and tile etc. (Table 1).

Types of common construction mineral-based materials	Crystalline silica content (% w/w)
Silica containing composites, e.g. manufactured stone	**Up to 95%**
Sandstone, gritstone, quartzite	**70% - 90%**
Aggregates, mortar, concrete	**25 - 70%**
Engineered stone	**45 - 95%**
Autoclaved aerated concrete	**20 - 40%**
Brick	**Typically less than 20%**
Slate	**20 - 40%**
Ceramic/ porcelain tiles	**5 - 45%**
Joint compounds	**5 - 10%**
Fibre cement	**20 - 60%**
Plaster/Plasterboard	**4 - 6%**
Paint	**1 - 6%**

Table 1. Silica concentration in different types of construction products *(Source: HSE https://www.hse.gov.uk/pubns/books/hsg201.htm).*

1.1.2 Silica Dust – A Global Construction Issue

Numerous studies globally have shown that the potential daily exposure of construction workers within RCS based environments and fine dust exposure exceeds that of almost 6 million worldwide (3 million in the European Union, 1.7 million in the US, 587,000 in Australia and 350,000 in Canada (Keramydas *et al.*, 2020)). Recent research on RCS, by a growing body of worldwide occupational health and safety bodies such as World Health Organisation (WHO) suggest workplace exposure to RCS particulates, leads to approximately 386,000 deaths annually with around 48,000 deaths caused by exposure to silica dust on construction site worldwide (WHO, 2025). The Institution of Occupational Safety and Health (IOSH) estimated that in Europe 81% of those exposed were employed in construction or in manufacturing construction products (Jacobs, Zisook, & Tarpey, 2024). Hence, despite efforts to prevent silica dust exposure and to mitigate its impacts, numerous public health, governmental and industry organisations report it is quickly turning into an emerging global health crisis (occupationally and in terms of wider environmental health).

Silica dust, specifically RCS (particles below 10µm (microns) in diameter) are too fine to see in daylight or with normal lighting (see Figure 3) (Anlimah *et al.*, 2023). Therefore, RCS is particularly hazardous as it can penetrate deep into the lungs, causing severe, sometimes fatal, irreversible long-term damage over time, leading to serious respiratory diseases such as pneumoconiosis (including silicosis), chronic obstructive pulmonary disease (COPD), bronchitis and asthma; along with, a range of autoimmune, cardiovascular and renal diseases (Nicol *et al.*, 2015). Furthermore, the International Agency for Research on Cancer (IARC) found in 1997 that there is sufficient evidence to conclude that RCS from occupational sources is carcinogenic (IARC, 1997), although it was not until 2019 when the EU reclassified RCS as a carcinogen, which can lead to various types of cancer (bladder, lung, larynx, head, neck, nasal, leukaemia, lymphopoietic, etc.).

Take the current global perspectives on silicosis – a growing body of worldwide occupational health and safety bodies – e.g. the Institute of Medicine (IOM) and The Institution of Occupational Safety and Health (IOSH) – suggest the risk of silicosis remains one of the most relevant and fundamental worldwide construction industry health problems (Figure 3) (Hoy *et al.*, 2022).

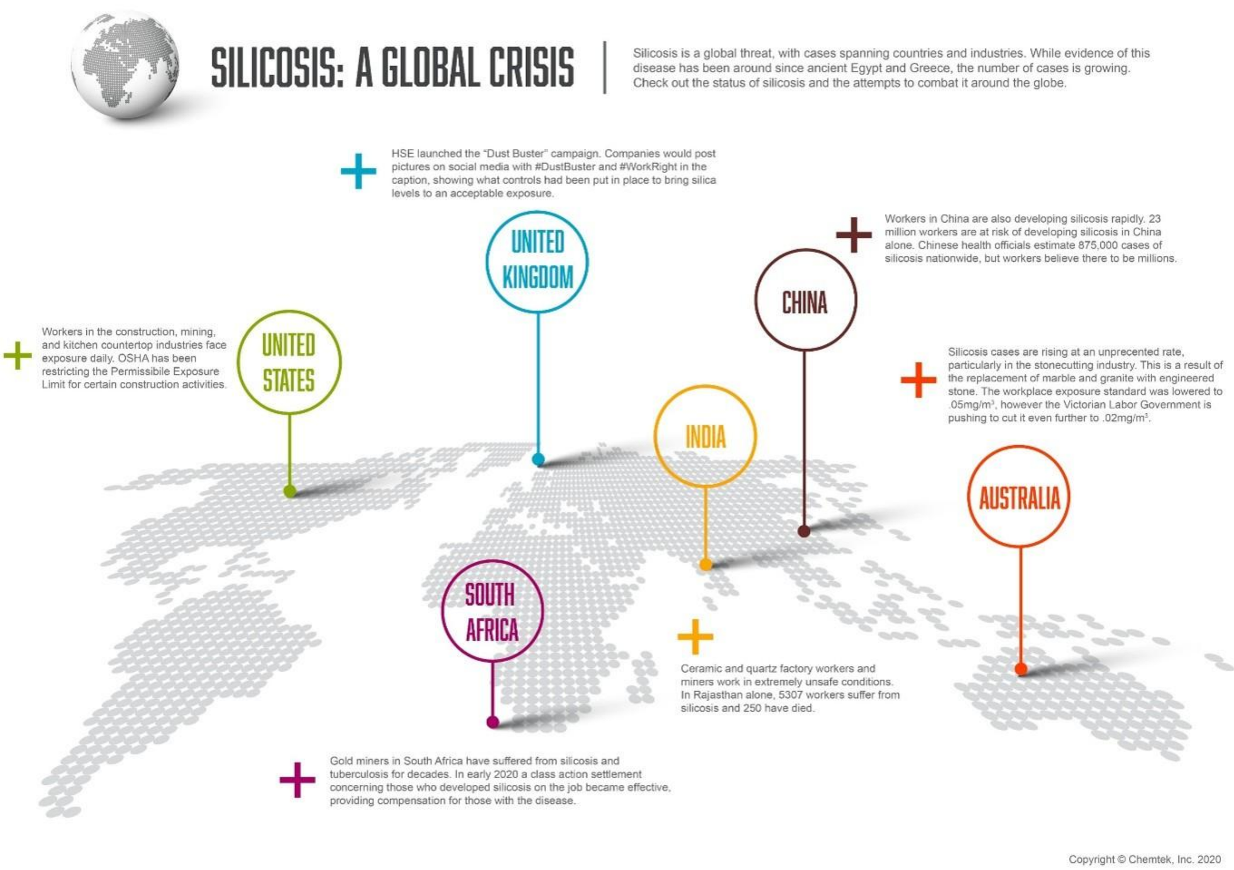


Figure 3: Global Overview of Silicosis issue *(Source: Chemtek USA, 2020 https://www.nosilicadust.com/silicosis-a-global-crisis/)*.

This is despite it being recognised as far back as Hippocratic times (c460BCE - 370BCE), making it potentially the most ancient known air pollutant (Hoy & Chambers, 2020). Globally, there is a concern about the gap between guidance and practice which may emanate from a lack of standardised training for control measures of silica dust on- and off-site, as well as the continual need for enforcing effective exposure control and comprehensive surveillance programmes.

For example, Australia has seen an emerging epidemic of silicosis in stonemasons, prompting the South Australian and Victorian governments to implement free health assessment programmes for workers (Newbigin *et al.*, 2019) and as a result, there has been a significant increase in accepted workers compensation claims (from 28 in 2018 to 123 in 2019) for silica-related diseases (Cronin *et al.*, 2020). A group of MPs and Lords supported by a growing body of research, published reports on silicosis (APPG 2020, 2023) providing invaluable insights and recommendations into the current

Occupational Health and Safety (OHS) landscape of control and exposure to silica dust and its associated OHS issues. They suggested the UK appears to be lagging in terms of RCS Workplace Exposure Limits (WELs) in comparison internationally.

1.1.3 Silica Dust – A UK Construction Issue

According to Construction Industry Training Board (CITB) recent 2025 forecast on UK [Construction Workforce needs] (Labour Market Intelligence Report 2025–2029), UK construction output in 2024 totalled £215.7bn. Yet, despite this significant annual economic power of the industry, there is a risk that construction sites place the most emphasis on safety and often neglect measures to protect health.

Silica dust remains one of the most underestimated risks on UK construction sites, with the UK British Occupational Hygiene Society (BOHS) stating it is "the biggest risk to construction workers after asbestos". It is estimated that over 600,000 workers in the UK are estimated to be exposed to silica dust daily; more than 600+ silica related deaths a year occur – over 10 a week; and it is linked to an estimated 4,000 deaths a year from COPD and 40% of construction workers are exposed to cancer-causing
levels of RCS dust exposure (British Occupational Hygiene Society (BOHS), 2022). However, it is believed 75,000 cases could easily be prevented, if action was taken.

Additional HSE data investigating silicosis further cements the danger and risk to health, reporting that "Dust from stone, cement, brick or concrete" contributed to 19% of estimated cases of breathing and lung problems, with stonemasons (and bricklayers) accounting for 26% of actual reported cases of silicosis (HSE, 2005). In addition, around one in six of all silicosis cases affected workers
under the age of 46 years, although there was no clear trend in age of diagnosis with time. In terms of individual UK regions, Scotland has the highest age-standardised rate of silicosis in the UK, being twice that of England and Wales and five times greater than Northern Ireland (Donaldson *et al.*, 2017).

Furthermore, occupational exposure can lead to other various life-threatening respiratory conditions, normally classified as interstitial lung diseases (ILD). These diseases range across a spectrum of a group of 100 or so chronic lung disorders that cause inflammation and scarring. The fine particles lodge deep in the lungs, causing irreversible damage over time. These conditions do not just affect the workforce but also family members. Hence the finer the silica dust, the deeper it can penetrate into your lungs - causing severe and sometimes fatal and irreversible long-term damage. Whilst inhalation is the recognised transmission route, there are two other key distribution modes: either systemic absorption or ingestion. Whereby, these fine dusts can infiltrate the body, either by inadvertently being swallowed or where it penetrates the skin and remains below the surface of the skin and the residue is expelled later, leaving silica dust remnants to be absorbed by the body.

Adding to the social and environmental impact of silica dust exposure, in economic terms, RCS exposure in the UK construction sector imposes a significant economic burden due to its link to numerous occupational diseases. However, there is a distinct lack of data relating to the direct burden of RCS related diseases, in terms of business, compensation, loss of life and quality of life costs. Nonetheless, recently, several substantial injury compensation cases have been awarded and reported on: (i) Scottish government awards £3.5m, to a stonemason diagnosed with various respiratory diseases; and (ii) private school in the UK fined £100,000 plus over £30,000 in costs after one of its maintenance staff was diagnosed with silicosis from secondary exposure and then made redundant as a result.

However, without explicit data relating to the direct and indirect burden of RCS exposure issues, it is hard to estimate the true cost of the risk being realised. As such, BOHS (2022) called for more economic modelling to be undertaken to consider the potential long-term savings of RCS control and the options for incentivisation, investment and better enforcement to support RCS risk reduction. Especially given, the broader construction sector faces rising economic pressures, including shrinking profit margins, and increasing financial burdens from rising labour costs due to escalating skills shortages, debt rollover risks, decarbonization efforts. Despite these challenges, strategic investments in safety (e.g. RCS exposure controls) and efficient construction methods (e.g. RCS composite systems) can mitigate long-term economic and health-related costs.

1.1.4 Silica Dust Within the UK Housing Sector

With 44% (approx. £105 billion) coming from repair, maintenance and improvement (RMI) (CITB, 2025), UK housing RMI output is almost 18% of the total sector's output and equates to approximately £21 billion from all activities. As we move rapidly into a world of climate change, Net Zero and the need to be sustainable and environmentally energy friendly. Resulting in the need for wholesale retrofitting, and adaptations to the existing housing stock at scale, particularly within the social housing sector.

The UK intends to spend a substantial and growing amount on fitting, renovating, adapting, and maintaining its residential building stock – reflecting both public investment and private home-owner activity. However, upgrading insulation and building fabric coupled with installation of low-carbon heating systems (e.g. heat pumps, solar thermal) along with the various renovations, adaptations, and maintenance construction works will generate substantial silica dust producing construction works, resulting in significant RCS and fine dust exposure (directly or indirectly).

Several studies (Halvorsen *et al.*, 2024 a&b; Tian *et al.*, 2023; Gharpure, Heim, & Wal, 2021; McLean *et al.*, 2017) focus on assessing workers' exposure to construction dust (inhalable, thoracic, respirable, and RCS) when undertaking such adaptations. They stressed such activities and tasks pose significant health risks from RCS dust, intimating workers not only involved in the works but also those working in proximity could be affected; as well as indirectly exposed individuals within the public population, suggesting they were exposed to considerable amounts of RCS daily.

Hence, non-occupational exposure is extremely concerning, as dust spreads beyond worksites (externally and internally), affecting homeowners, residents, neighbours, and bystanders who may unknowingly inhale it. For example, the public population are constantly exposed to RCS dust generated during indoor and outdoor demolition, repair and renovation works, especially in urban or densely populated areas. Non-occupational populations, especially those living near dust-generating sites, are at risk of significant health effects from RCS exposure. The evidence supports the need for stricter ambient air quality standards and further research to protect public health. This presents a very perturbing picture given the long latency period of many of the health issues associated with RCS dust exposure (e.g. silicosis can take up to 60 years, between the time when exposure occurs to when clinical appearance of the disease begins). Although, in rare cases after prolonged exposure, extremely high levels of RCS dust inhaled over a short period can cause a myriad of potential health issues, and disease can appear within weeks or months and can be rapidly life-threatening.

This growing concern regarding non-occupational or ambient exposure is compounded by the lack of available information on non-occupational exposures and non-occupational silica dust standards and guidelines. Further intensified by a lack of monitoring and reporting of non-occupational exposures and non-occupational RCS dust generated diseases. Therefore, an increased focus on retrofitting, renovating and maintaining the existing building stock as an integral part of the circular economy and the drive towards Net Zero will result in an increase in the already significant air pollution from silica dust (both indoor and outdoor). Hence, RCS dust in housing RMI construction projects – whether large-scale or home-based – will result in the need for an increased stringent approach to managing and controlling of silica dust exposure for both the construction workforce and the public.

Unsurprisingly, numerous medical studies and reports have highlighted the increasing level of risk of contracting various occupational and non-occupational diseases within poorly controlled silica dust environments. For example, the recent **Bradford Institute for Health Research** *Healthy Homes* study, which monitored over 400 social housing properties to understand how energy efficiency retrofits actually impact indoor air quality and residents' health found there was an increase in $PM_{2.5}$ concentrations, which potentially could have devasting impacts for both the occupational and non-occupational population, during the upgrades as well as any other future adaptations, suggesting the need to systematically monitor what is happening to air quality once households move back in. These conclusions intimate the sector could be inadvertently creating high risk RCS environments and potentially exposing the public to significant impacts and dangers.

Unsurprising, given the dangers of asbestos are well known by both the industrial sector and the public, the same could not be said for the awareness, understanding and knowledge of the dangers and impacts of silica dust exposure.

With public money on the table, performance verification and accountability will undoubtedly need to rise. However, despite clear evidence linking RCS exposure to life-changing diseases like silicosis and lung cancer, too many individuals (occupational and non-occupational) are still exposed due to ineffective monitoring, or poor control measures or lack of awareness, understanding and knowledge or a combination of all three. Hence, it is paramount to ensure that current and future repair practices are carried out to the highest quality, providing value for money whilst conforming to the highest standards of occupational and non-occupational health and safety.

Therefore, the research has a triple purpose, firstly to review the UK housing sector's level of awareness/understanding/knowledge/perception of the occupational and non-occupational risks posed by silica dust exposure, as well as gaining a snapshot insight into the sector's culture, practice and procedures for silica dust control and exposure within field operations (management and workforce). Secondly, the research carried out is designed to support informing sustainable improvement to the current and future direction of a UK Housing sector's senior leadership RCS dust approach. Thirdly, the data outputs support the development and creation of a Resident, Client & Construction Professional silica dust toolkit (ReACT), which comprises of the following:

- **SaFE (Silica Awareness for Construction Excellence) toolbox** for clients and residents - providing resident, client and construction professional stakeholder groups with up to date information, advice and guidance.
- **RiSK (RCS skills training needs analysis) playbook for professionals** - providing the instruments (e.g. checklists, assessment rubrics, guidelines) needed to conduct a construction professional's RCS-focused training needs analysis.

This is the first UK housing sector-focused study to investigate existing perspectives on silica dust culture, practice and procedures, and skills/knowledge levels, among its senior leadership and management workforce. It is also an attempt to initiate a UK housing sector best practice model/guidelines for RCS dust exposure and control measures, and so to consider any association at a more strategic level, as well as at tactical and operational levels. However, a key consideration was to ensure that the toolkit was appropriate for use in the wider construction sector, as well as the UK housing sector.

2 Project Methodology

The research methodology implemented consisted of primary and secondary research, employing an overarching coherent multi-method qualitative methodology. The study was carried out in two phases: 1) development – which comprised of a literature review; 2) questionnaire survey and Semi-structured interviews – during which the data was collected concurrently. These criterions were selected for several reasons:

First, the data collection method was important because of the study design. Participants were recruited from across the UK and given a relatively short data collection window; for pragmatic reasons the measures considered had to be restricted to questionnaire and interview-based tools that could be applied remotely. Whilst the small research team would be able to visit senior leadership based across Scotland, for the rest of the UK these discussions were held remotely.

Second, it was important that the exposure and control tools considered for inclusion in the study had been validated and widely used.

Finally, participating practitioners were to be drawn from management professionals.

2.1. Data collection

2.1.1 Phase 1 – Development

The development phase comprised of a literature review using a replicable and transparent process for the literature search and analyses. Hence, where applicable, elements of the widely recognised and used Preferred Reporting Items for Systematic reviews and Meta-Analysis Protocols (PRISMA-P 2015) were employed (Moher *et al.*, 2015).

2.1.1.1 Literature review

The project needed to examine three factors or key concepts: 1) control and exposure RCS dust in the UK housing sector when undertaking construction works; 2) existing construction industry RCS exposure and control issues, practice and procedures; and 3) social, health and environmental concerns and impacts to the general public regarding non-occupational or ambient exposure to RCS dust when undertaking retrofitting, renovating and maintenance works towards the existing building stock.

To achieve this, the work began with a literature review to identify existing sector RCS intelligence reports, academic research articles and best practice guidance to support examining these three key concepts. This was designed to inform the selection of the most appropriate recommendation measures for the study.

The literature review was carried out between November 2024 and September 2025. As Table 2 shows, the study employed several academic search engines and, where possible, searches were limited to the previous ten years (i.e. 2015–2025) whereby the results were scanned and selected before downloading. The date range was used for practical reasons; it is of course possible that older but relevant material was missed as a result.

Following these searches, the material identified was checked, and duplicate articles and any articles not directly relevant to the aims of the literature review, were removed. The remaining material was read in detail, with any further articles identified during reading added to the final article set. Each of the articles in this final set was studied, identified, and considered against the following three criterion: 1) data collection method – questionnaire and interview-based; 2) validation and use – validated and widely used; and 3) industry – appropriate for housing construction sector, with particular focus on housing retrofitting, renovating and maintenance works.

Databases	Search terms	Refined by core subject area (CORE)
PubMed Google Scholar Ingenta Web of Knowledge TandFonline	Housing OR repair, renovating, retrofitting AND silica AND OHS AND management AND exposure OR control OR monitoring OR health surveillance OR training OR emerging tools	Search within topic; housing construction practices Respirable Crystalline Silica (RCS) exposure management needs (control, monitoring, training); control/monitoring needs (training, tools, practice) and abstract

Table 2: Overview of databases and the search queries performed for this report.

2.1.2 Phase 2 – Survey

The literature review informed the development of the study's questionnaire. The questionnaire was designed to measure one of the study's key concepts: housing sector silica dust culture, practice and procedures, among its professional management workforce. The questionnaire also included measures of demographic factors, work characteristics and skills and knowledge factors. The questionnaire and other materials are available from the author on request.

2.1.2.1 Online Questionnaire

A qualitative silica questionnaire employing an online survey tool (SmartSurvey) (Figure 4) was sent out to 150 Housing sector management staff (middle management - Construction or Project Manager/ Property Surveyor/ Estate Services Manager/ Service Manager – Repairs/ Asset & Compliance Manager/ Repairs/Building Surveyor/ Asset Manager/ Housing Manager / Health and Safety Manager /Quantity surveyor or cost manager) in April 2025, with a completion date of the end of June 2025. A total of 64 Housing sector management staff undertook the survey. The questionnaire aimed at assessing the overall perceptions and attitudes towards silica dust safety and individual awareness, knowledge and skills.

It comprised of four sections covering 21 questions surrounding: 1) equality and diversity and general background information; 2) housing tenure; 3) current knowledge/attitude/behaviours towards silica dust; and 4) opportunities for enhancing practice.

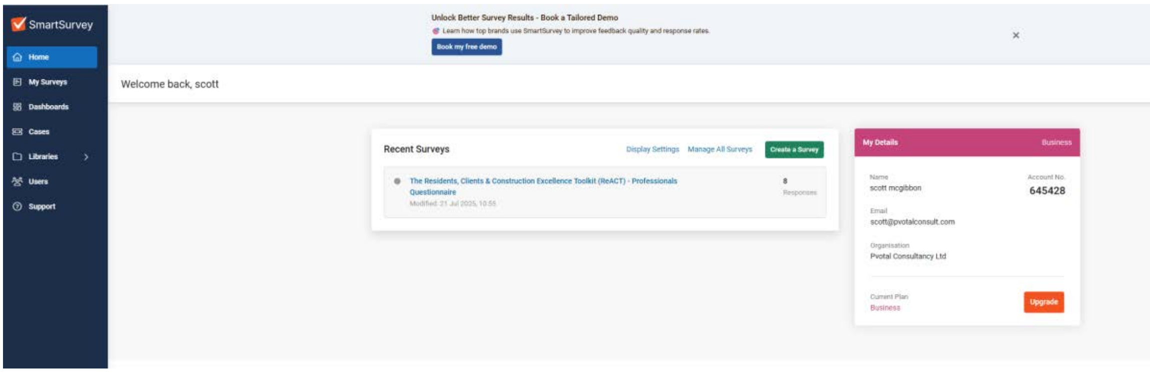


Figure 4. Screenshot of SmartSurvey platform used for online questionnaire

For the questionnaire survey data analysis, a combination of both the process of descriptive statistics, and thematic analysis was employed to discover the patterns within the sampled data, to draw conclusions (or 'make inferences') (Denscombe, 2014). Although, in the main, the analysis process (questionnaire and interview analysis) employed the adoption of a combination of Braun and Clarke's (2006) and Maguire and Delahunt (2017) procedural guidelines and processes whereby a six-step process was engaged:

Step 1: Become familiar with the data

Step 2: Generate initial codes

Step 3: Search for themes

Step 4: Review themes

Step 5: Define themes

Step 6: Write-up

2.1.3 Phase 2 – Semi-structured Interviews

In parallel to the methodological literature review and the survey questionnaire, a series of specific semi-structured interviews (8) with senior leadership members (directors) (6 online and 2 face-to-face) across the UK housing sector were undertaken focusing on their own perceptions, understanding and organisational exposure and control measures of silica dust within management and field operations (i.e. current approaches, systems, and tools). The supplementary value of adopting such an approach allowed exploring in more detail, the effective and specific information that was obtained from the specialised senior leadership population about their individual perspectives, values, practices, and environment. In addition, with due diligence towards good practice, the interviews were limited to 60 minutes in length and were digitally recorded.

As such, Pvotal organised the 8 interview sessions which were implemented between April 2025 and end of July 2025 (see Figure 2). The interviews' questions correlated with the questionnaire to allow comparison with field management opinions (i.e. challenges/ barriers/ drivers; awareness/ knowledge/ perception; and opportunities/ recommendations). These interactive interviews gave the project researchers an opportunity to discover the opinions of key senior leaders, not just present to them. This valuable two-way dialogue during the research encouraged cross-project learning and helped support the development and creation of a Resident, Client & Construction Professional silica dust toolkit (ReACT).

2.1.3.1 Online Interviews

The 6 senior leadership operation management online interviews took place, remotely, utilising an industry recognised best practice online discussion platform (Microsoft Teams) coupled with the use of an artificial intelligence notetaker (Fathom) to allow creation of notes, as well as the ability to move notes/comments around, and communicate through embedded online chats (see Figure 3).

2.1.3.2 Direct Interviews

The two direct senior leadership interviews took place in prior reserved board meeting rooms (one in Glasgow and one in Edinburgh).

2.2 Limitations

The study had several limitations, mostly relating to four key areas.

First, some limitations arose because decisions had to be taken before practitioners could be recruited. For example, the questions selected for use in the questionnaire were chosen to be appropriate for the Housing repair, retrofitting, and renovating workforce (field management).

Second, all the study data were cross-sectional. This meant that the study could not make any assessment of causality about the relationships it was considering. The data were also all self-reported, introducing potential problems of bias at individual level.

Third, individual participation in the study was voluntary raising the possibility of participating practitioners representing only the best end of their practice in terms of RCS dust spectrum.

Finally, practitioners working in housing organisations are, necessarily, part of and subject to their own individual organisation's OHS culture. Out of the scope of this report is the examination of an individual organisation's health and safety policies and regulations. Further research would be necessary to consider these areas in more detail.

3.0 Literature Review

This section is not intended as a comprehensive review of RCS, housing construction works (i.e. retrofitting, renovating and maintenance work practices), and non-occupational concerns and impacts literature. There are already several recent intelligence reports, publications and guidance sources from the UK HSE, UK Government, UK Construction Dust partnership, and key international organisations such as National Library of Medicine, The Occupational Safety and Health Administration (OSHA) (USA), Safe Work Australia, Centre for Disease Control (CDC) and EU publications linked to best practice and innovation in the OHS and construction sector, which provide an excellent overview of the area. Rather, the intention here is to set the current research in context, in relation to UK housing RMI works, while supporting and foreseeing new and emerging management, monitoring, and controlling approaches, systems, and tools within the UK housing sector.

3.1 Respirable Crystalline Silica (RCS) Control tools, Regulatory requirements, and Guidance

Exposure and control tools, methods, and frameworks range from controlling the dust being released into the workplace environment to simply protecting the worker in an uncontrolled dusty environment. In all cases, the primary exposure and control goals are to minimise the exposure to silica and to ensure exposure is not greater than the workplace exposure standard (WES) (i.e. existing Work Exposure Limits (WEL) of 0.1mg /m^3).

Indeed, best practice exposure and control strategies are unswervingly based on the following industry recognised OHS control tools suitable for RCS: elimination; substitution; engineering controls (containment, ventilation, suppression); administrative controls; and respiratory protection. These strategies are entrenched in key legislation (e.g. *The Health and Safety at Work Act 1974; the Control of Substances Hazardous to Health Regulations 2002 (COSHH); The Environmental Protection Act 1990; National Air Quality Strategy 2019*) and to some extent *The Building Safety Act 2022*, which empowers residents and homeowners with more rights regarding building safety. For example, due to the properties found in RCS dust, the COSHH Regulations 2002 stipulate that a risk assessment must be completed detailing how the risk from the hazardous substance will be prevented or controlled and what measures are in place before the work commences.

While *National Air Quality Strategy* (2019) sets out to meet legally binding targets to reduce emissions of five key pollutants – for this study, the relevance is towards only one of the five – fine particulate matter ($PM_{2.5}$) – and secure significant public health benefits associated with necessary remedial work. Hence, several construction environmental and air quality management plans exist (i.e. Construction Environmental Management Plan (CEMP) or the Construction Indoor Air Quality (IAQ) Management Plan), to address regulatory requirements and demonstrate commitment to environmental sustainability, with the overall goal to reduce the level of $PM_{2.5}$ in ambient air. These plans provide clear frameworks for contractors and managers to follow during the construction phases of a project; for example, they must include an assessment of dust from demolition and construction in line with the Institute of Air Quality Management (IAQM) guidance, as well as provide a dust mitigation strategy. With increasing awareness of environmental sustainability and stricter air quality requirements, the importance of integrating such tools into construction projects cannot be overstated.

Moreover, CDM Regulations 2015 stipulates all projects must have workers with the right skills, knowledge, training and experience, along with the provision of appropriate supervision, instruction and information (e.g. principal designer, principal contractor, a health and safety file, a written construction phase plan (CPP)). Yet, from both a regulatory and competency perspective the 2023 All-Party Parliamentary Group (APPG) for Respiratory Health report on silicosis, found a lack of regulatory reporting and industry knowledge, highlighting for the past decade the development of silicosis and its related diseases have neither been reportable under Reporting of Injuries, Diseases & Dangerous Occurrences Regulations 2013 (RIDDOR), nor classified as a notifiable disease under the Health Protection (Notification) Regulations 2010. Adding to this the report found there was a lack of training components within all Further Education and Higher Education built environment and construction related courses, programmes and modules, as well as in apprenticeship schemes. Moreover, the study provided several straightforward recommendations housed under the themes of clinical and regulatory – ranging from recognising silica dust related diseases as notifiable to seeking to reduce the silica WEL from 0.1mg/m^3 to 0.05mg/m^3 to the need to research innovative technologies for real time monitoring, to support future regulation in industry.

Hence, given the RCS risks and dangers, along with the need to ensure best practice is adopted, various UK initiatives (e.g. Institution of Occupational Safety and Health's (IOSH) *No Time to Lose* campaign, Construction Dust Partnership (CDP), a 30 strong industry collaboration including the CITB, HSE, and various UK Safety Groups) have been initiated over the last decade or so. Whilst highly commendable, one might argue they only provide a starting point, and there is a real need for harmonised protection standards, training and ongoing research to improve RCS risk efficiency, in a similar vein the way government, industry, leadership, management and individuals guide, inform, train and regulate asbestos.

Perhaps, the goal should be to adopt a systems-thinking approach to enable development and application of continuous improvement standards at three management levels: "strategic, tactical, and operational"; to provide more objective, predictive, and recorded RCS safety measurement data. Hence, the fundamental desire should be to achieve detailed safety excellence intelligence and increase the current and future effectiveness of RCS management, monitoring and controlling strategies; coupled with the need to reveal the routes towards unlocking full potential across the value chain with respect to protecting the health of both the workforce (in work and homelife), and the public. Such steps will support achieving and potentially improving RCS dust management maturity as it is only possible if the sector is proactively seeking to improve RCS dust control standards.

3.2 Respirable Crystalline Silica (RCS) Control and Exposure in the Housing RMI Sector

Currently there is a distinct lack of studies that have investigated the potential occupational health and safety risks, and their associated workforce diseases from undertaking housing-based RMI works (i.e. repair, maintenance, adaptations etc). However, as we move rapidly into a world of climate change, Net Zero and the need to be sustainable and environmentally energy friendly, the need for wholesale retrofitting and adaptations to the existing housing stock at scale, particularly within the social housing sector, becomes the result.

Although not directly targeted towards housing RMI works, several studies (Halvorsen *et al.*, 2024 a&b; Jacobs, Zisook, & Tarpey 2024; Tian *et al.*, 2023; Mmereki, and Brouwer, 2022; Gharpure, Heim, & Wal, 2021; Park, Hwang, & Yoon (2019); Baldwin *et al.* (2019); McLean *et al.*, 2017) have investigated the potential exposure levels and risks when undertaking closely-related housing-focused construction processes, such as indoor demolition, renovation, brick and stone working, concrete finishing, and the application of innovative materials, products, and methods (IMMs) within green buildings (GBs), focusing mainly on assessing workers' RCS exposure levels and the potential interventions needed to reduce emission during construction works. They all intimated RCS exposures levels during these construction tasks can be highly variable, even when the same material, task, energy applied, equipment used, and control method is employed, suggesting RCS exposure and control is highly task and intervention specific. They also concurred that despite RCS being such an inherent and established risk, poor levels of on and off-site RCS control measures at an operative and management level are continuing. They intimated to support: effective interventions, the need for stringent enforcement and adherence to RCS control measures, combined with changes in work equipment, procedures and practices, supported by thorough occupational health preventive and protective measures (e.g. WHO advocates all workers exposed to RCS should undergo lifelong health surveillance), underpinned by appropriate training and education at all levels (i.e. leadership, management, and operative).

Interestingly, they also recommended the urgent need to include the implementation of low-cost engineering controls to reduce the risk of RCS exposure. However, this may not indeed be appropriate given the studies intimated non-occupational populations can be significantly affected by silica dust exposure, especially in communities near dust-generating activities, whether located in urban or rural environments. The findings from the various studies indicate that the various types of housing-focused construction process interventions pose significant health risks from RCS dust, not only to workers but also to indirectly exposed individuals, as evidence gathered from these studies suggests that bystanders and the public may also be at risk, especially near active construction sites.

Furthermore, two studies (Barber *et al.*, 2019; Newbigin *et al.*,2019), which explore the quantification of RCS exposure of stonemasons involved in conservation repair maintenance (CRM) activities and tasks found using modern power tools, disturbingly resulted in average exposures of **between 32 and 150 times** the exposure measurements recorded for the task of traditional hand tool approaches to masonry fabric RMI. They also concluded occupational RCS exposure and control practices are not in keeping with those advised by regulatory bodies; more worryingly, Baldwin *et al.*, (2019) suggested that 68% continually fail to abide by any RCS hazard controls.

Overall, the review of recent research relevant to the UK housing sector highlights significant risks and dangers from RCS exposure, the effectiveness and limitations of current control measures, the need for improved monitoring and intervention, and fundamentally the need for appropriate training and education at all workforce levels. Suggesting the UK housing RMI sector is facing a paradigm - it cannot simultaneously be working to best practice while suffering from lack of specific data and insights.

3.3 Public Social, Health and Environmental concerns and impacts regarding non-occupational or ambient RCS dust exposure

Growing efforts to retrofit and renovate existing buildings for sustainability and Net Zero goals have increased concerns about non-occupational or ambient RCS dust impacts. Unlike occupational RCS exposures, the association between non-occupational silica exposures and adverse health effects are not well researched, though available evidence points to significant risks to the public (Stacey *et al.*, 2018). Several international studies (Wardyn *et al.*, 2023; Singh *et al.*, 2022; Andraos, Utembe & Gulumian, 2018; Bhagia, 2012) focusing on communities close to dust-generating sources when undertaking gold (South Africa), and coal mining (India) activities, as well as the impact of occupational driven RCS exposure in the French general population, have provided valuable evidence of the health impacts in non-occupational populations.

Andraos, Utembe & Gulumian (2018) assessed the need for non-occupational RCS limits for South Africa - finding that community exposure and health risks are prevalent within communities living near gold mine tailings storage facilities are exposed to ambient RCS levels that exceed international safety limits, indicating a clear health risk for non-occupational populations in proximity to such sources. Singh *et al.*, (2022) investigating RCS dust exposure within the Jharia coalfields region (approx. 393km^2) in India, found the percentage of silica in $PM_{2.5}$ risk level in the mining activities gets magnified due to the addition of finer dust generated when the coal is transported; and demonstrated that ambient RCS dust in non-occupational settings contains significantly high levels of silica, emphasising the need for prescribed standards for RCS dust exposure and control within these environments. While Bhagia (2012) carried out comprehensive review of non-occupational silica exposure across several Indian industries, such as sand quarries, slate pencil industry, and the agate industry, highlighting that non-occupational exposure can occur from both industrial and non-industrial sources and called for better assessment methods and standards to protect the public. Wardyn *et al.* (2023) emphasised the importance of spirometry-based monitoring in workers exposed to more than 1mg/m^3 of RCS dust a year, while also indicating that non-occupational exposure is more frequent in northern France than in the rest of the country, particularly in Dunkirk which is a highly industrialised city area.

As non-occupational populations, especially those living near dust-generating sites, are at risk of significant health effects from silica dust exposure, the evidence from these studies supports the need for stricter ambient air quality standards and further research to protect public health. However, from both a UK and global perspective many countries lack enforceable ambient silica limits for residential and commercial areas, increasing the risk for nearby populations. Whilst, from a UK housing sector perspective, the potential non-occupational health and safety risks, and the associated RCS related diseases from undertaking housing-based construction works (i.e. repair, maintenance, adaptations etc) presents an additional paradigm – effective silica dust control (inhalable, thoracic, respirable) and ongoing education are critical, yet regulatory and surveillance gaps persist, highlighting the need for improved RCS public health strategies. Therefore, it is safe to assume, the importance of the risk of disease from silica dust exposure has been underestimated as a non-occupational social, environmental and economic burden.

3.4 Summary

Overall, this literature review revealed a range of the potential silica dust occupational and non-occupational health and safety risks, given the vast array of potentially associated life-threatening diseases, facing the UK housing sector, not only at a project level but also at strategic, tactical and operational level. Although these studies varied significantly in terms of the current landscape, they have provided fundamental insights, much of which is highly relevant to this research. Overwhelmingly, the studies suggest there is a concern about the gap between guidance and practice which may emanate from a lack of apparent RCS control measures, along with the need for enhancement of current work equipment, procedures, practices, health surveillance, and standardised training. Coupled with stressing RCS exposure is substantial and often underestimated, increasing health risks, this warrants improved controls.

Task-specific monitoring and harmonised data reporting are crucial for effective RCS control in construction works. Yet, the consensus indicates that it is the intensity rather than the duration of silica exposure that is the major risk factor. They harmonised the fundamental need to ensure the adoption of stringent enforcement and adherence to dust control measures allied to imbuing comprehensive surveillance programmes integrated into organisational OHS strategies for both the workforce and the public. However, a key shortcoming of many of the studies and reports, in terms of relevance to this study, is the tendency to not be directed towards the UK housing sector and its associated construction works.

The limited recent research underscores that RCS exposure remains a significant hazard in the UK housing sector during construction works, with current controls often insufficient. Comprehensive, layered interventions and ongoing monitoring are essential to protect worker health, suggesting effective dust control and ongoing education are critical, but regulatory and surveillance gaps persist, highlighting the need for improved public focused health strategies. For example, deficiencies in both non-occupational and occupational RCS health and safety data relevance, granularity, precision, and interpretation of national statistical evidence, result in a lack of organisational requirement to report cases which, in turn, provides a lack of support to make claims for compensation easier. Therefore, it is safe to assume the importance of the risk of disease from silica dust exposure has been underestimated as a non-occupational social, environmental and economic burden.

The distinct lack of studies exploring such investigations of the UK housing sector is indeed a cause for concern. Nonetheless, one might argue they provide a starting point in which to guide and inform future UK housing sector silica dust exposure controls and approaches needed to help support opportunities to increase workforce and public protection, enhance individual and organisational work practices, as well as identify RCS areas for upskilling, re-skilling and modernisation. However, the review did not provide suggestions on how to define innovative or emerging silica dust training programmes, tools or methodologies. Nonetheless, the analysis does provide information which might offer suitable areas to explore, such as development of enhanced training surrounding: RCS exposure limits, standards and control measures; bespoke risk assessments; health surveillance guidance; and best practice to achieve a suitably up-skilled workforce and a more informed public population. Furthermore, the analysis provides three areas of information which might offer suitable indicators for determining the need for the UK housing RMI sector to increase appropriate RCS control measures implementation:

1) Strategic long-term planning of RCS preventive and protective resources, tools and frameworks to support the need for continued investment in stringent enforcement and adherence to RCS control measures, given the economic, societal, and environmental importance of ensuring an effective approach to RCS exposure control at an individual, project and organisational level.
2) Train, upskill and re-skill of workforce across all levels (leadership, field-based and management operatives) as well as the non-occupational population. The review and analysis provide direction towards which knowledge areas may be suitable, such as: RCS exposure limits, standards and control measures, best practice, risk assessments, health surveillance guidance, and skills gap analysis, to achieve a suitably upskilled workforce.
3) Undertake a thorough RCS exposure assessment approach to gain a deeper assessment and understanding of project specific RCS issues and their required control measures as well as explore the quantification of RCS exposure of housing construction works. This is especially needed given such exposure assessments could contribute to selecting appropriate exposure controls, as well as provide a deeper understanding of project specific RCS issues and to preventing occupational diseases within the sector.

4.0 Housing Sector Field Management Workforce Survey – Results and Analysis

4.1 Introduction

This chapter examines the results from the completed qualitative silica questionnaire. A total of 64 respondents within the UK Housing management sector (middle management - construction or project manager/ property surveyor/ estate services manager/ service manager – repairs/ asset & compliance manager/ repairs/building surveyor/ asset manager/ housing manager/ health and safety manager /quantity surveyor or cost manager) out of 150 respondents approached, undertook the survey. The following sub-sections present each section of the questionnaire: a) equality and diversity; b) general background information; c) current professional awareness and knowledge level surrounding silica dust exposure - its health effects and risks and mitigation tools; d) current professional attitudes and behaviour level surrounding silica dust exposure; and e) opportunities for enhancing practice.

The figures within each sub-section presents the results from the mix of open and closed questions, surrounding the overall knowledge, attitudes, and behaviour of current middle-management to the exposure and control of silica dust in field operations. To provide result clarity, based on the questionnaire scoring frequency, the percentage scores for each question were calculated and are illustrated by using three separate chart styles (pie chart, radar, and clustered column) denoting the relevant respondent numbers and percentage scores.

The following sections provide the key analytical findings emerging from the housing sector field management silica dust questionnaire. (For expanded findings - the survey is available from the author on request).

4.2 Survey Respondent and Housing Demographic

This section focuses on the workforce demographic and examines the main characteristics of the UK Housing management workforce. The gathering of such information reflects the research's strategic goal to reduce barriers and give everyone a voice on issues that affect them regardless of their backgrounds, perspectives, and needs. It was intended to allow individual respondents describe their own demographic, giving a snapshot of their underlying knowledge and experience.

Demographic

Most of the management workforce surveyed were the following: male (75%), female (25%); identified as white ethnicities (90%); had a mean age of 55 years old (although there was an even spread across 3 age categories: 36-45 (28.6%), 46-55 (28.6%), 56-65 (28.6%) (Figure 5); worked directly for either a consulting organisation (50%) or housing authority/association (37.5%) or a housing developer (12.5%), undertaking management of most on-site activities surrounding housing sector construction works (i.e. repair, maintenance, retrofitting, etc.) on-site practices (90%); and located (50%) in Scotland with an even spread across England and Wales, with a distinct lack of input from Northern Ireland (0%).

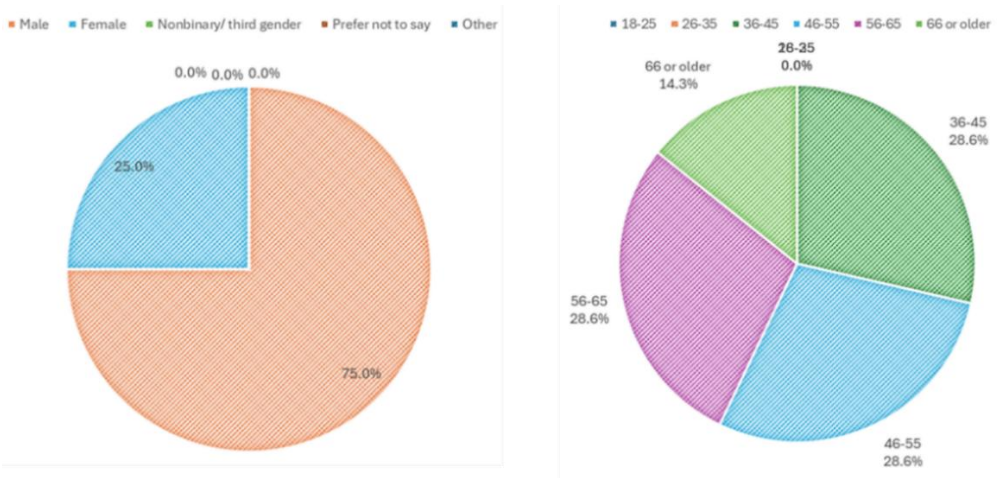


Figure 5: Housing Sector Demographic (Gender and Age)

Most had worked directly as a quantity surveyor or a cost manager (25%), while there was an even spread (12.5%) of the following occupations: construction works (delivery) manager; architect/ designer; repairs/building surveyor; senior/maintenance manager/officer; technical services manager/officer; and health and safety manager/officer. Most had 10+ years' experience and knowledge within housing sector (70%); were educated to Master's level (25%) or had completed a professional degree (25%) or educated to Scottish Vocational Qualification (SVQ) Level 4 or higher (50%) (Figure 6).

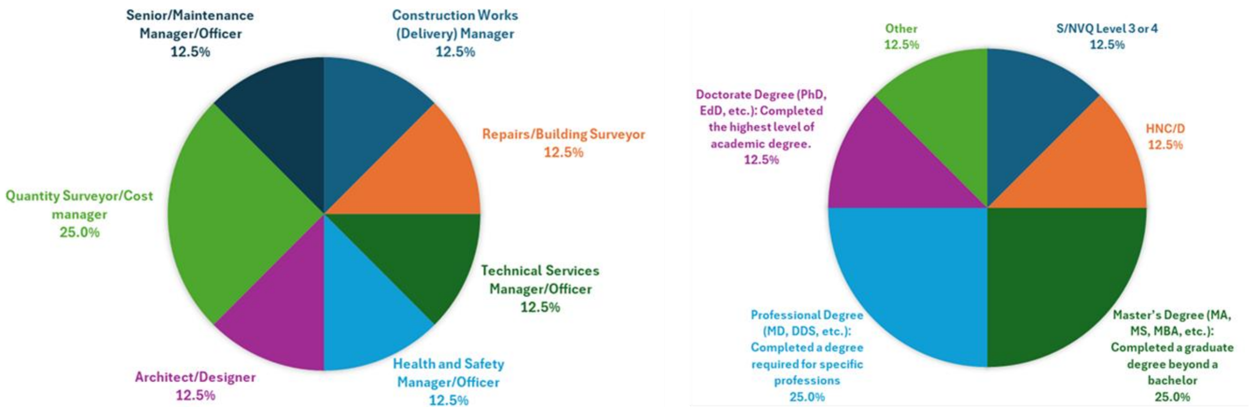


Figure 6: Housing Sector Demographic (Occupation and Qualifications)

When asked about the types of on-site and off-site management activities they undertook, there was an equivalent spread of activities centred on project management work tasks (72%), whilst the on-site activities ranged across several areas such as: planning (19%); design (10%); supervision (17%); programming (14%); and specification (12%). While the respondents offered both on-site and off-site activities, they all indicated their management role bridged both on-site and off-site activities, dependent on the project scale and complexity (e.g. inspection, surveying, analysis, documentation).

Housing Tenure (On and Off-site)

The survey respondents were posed a series of questions surrounding the housing tenure that is managed by their organisation, focusing on housing localities, type, age and construction they deal with daily, which are summarised in Figures 7 and 8.

Most of the housing stock RMI services were delivered towards mixed (urban/suburban/rural) localities (37.5%), while the remainder were spread across urban only (25%); suburban only (25%) and rural only (12.5%). With the housing tenure mix within these localities, they provide services for encompassed mostly a mix of houses (terraced, detached, semi-detached, bungalow, cottage) and flat (apartment/tenement/maisonette) (62.5%); with the remainder (37.5%) servicing only terraced, detached, semi-detached properties. In terms of the age categories of the housing tenure – 37.5% of respondent indicated their organisation covered all housing construction age groups (pre-1919; 1919 – 1945; 1945 – 1964; 1965 – 1981; 1982 – 2008; Post 2009). While 25% covered only properties within urban - within a densely populated city/town and 25% covered only properties within suburban - in a suburb of a city/town.

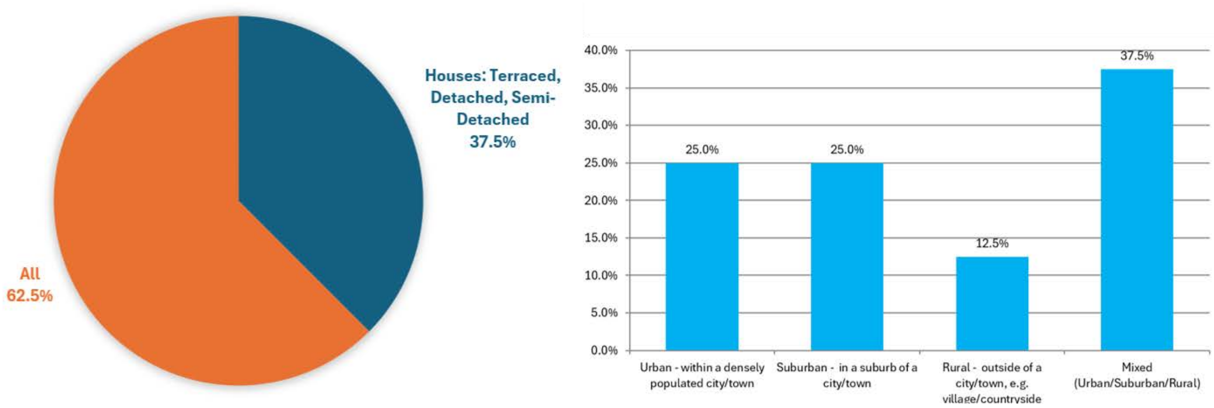


Figure 7: Housing Sector Tenure (locale, and house type)

When posed questions surrounding these areas, most of the housing stock in an organisation's portfolio was a mix of traditional (stone, brick and block) & non-traditional types (timber kit, pre-cast and in-situ concrete etc.) (75%) and a mix of all housing ages (75%) (pre-1919; 1919 – 1945; 1945 – 1964; 1965 – 1981; 1982 – 2008; post 2009). However, interestingly between 25 -37.5% indicated they only tend to deal with one housing age when involved in management of on- and off-site activities.

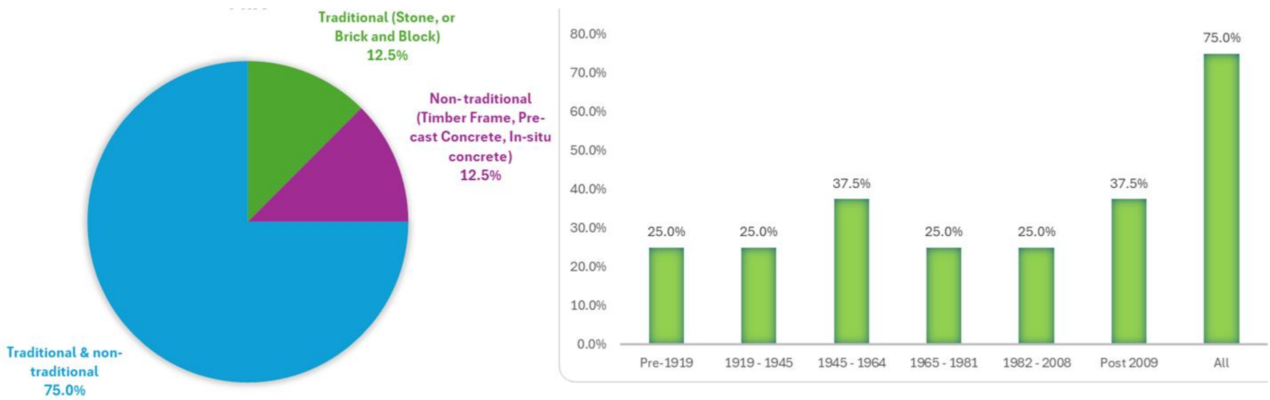


Figure 8: Housing Sector Tenure (construction type and age)

4.3 Current Awareness and Knowledge level surrounding Silica Dust Exposure & Control

This section of the online survey sought to understand and provide a baseline of where the respondents are in terms of the current skills and knowledge level surrounding silica dust exposure particularly its health effects and risks and mitigation tools.

The findings are explained in the following sections.

4.3.1 Health Effects and Risks

In terms of the level of awareness on the health effects and serious health risks of silica dust that exposure contributes to:

Half (50%) were very aware of the respiratory issues (effects/risks) such as shortness of breath and the risks of COPD and silicosis. However, quite concerningly, some (37.5%) were not aware of these effects and risks, while almost 65% of respondents were unaware of the risk of contracting autoimmune/renal diseases and varying types of cancers (e.g. lung, leukaemia) (see Figure 9). In addition, 1 in 2 (50%) were either unaware or slightly aware that normal cardiovascular flu-like symptoms (i.e. sneezing, coughing, fever, fatigue, weight loss, etc.) were typical effects of RCS dust exposure, both in the short term and long term.

With regards to the level of awareness on the modes of transmission of silica dust, the respondents, in the majority (87.5%), identified inhalation as their recognised transmission route, based on their current awareness and knowledge (Figure 10). Although this demarcated across very aware, aware and moderately aware. Yet, worryingly, 8 respondents (12.5%) were only slightly aware of this transmission mode, while 24 respondents (37.5%) identified either systemic absorption or ingestion as the two other key modes of transmission.

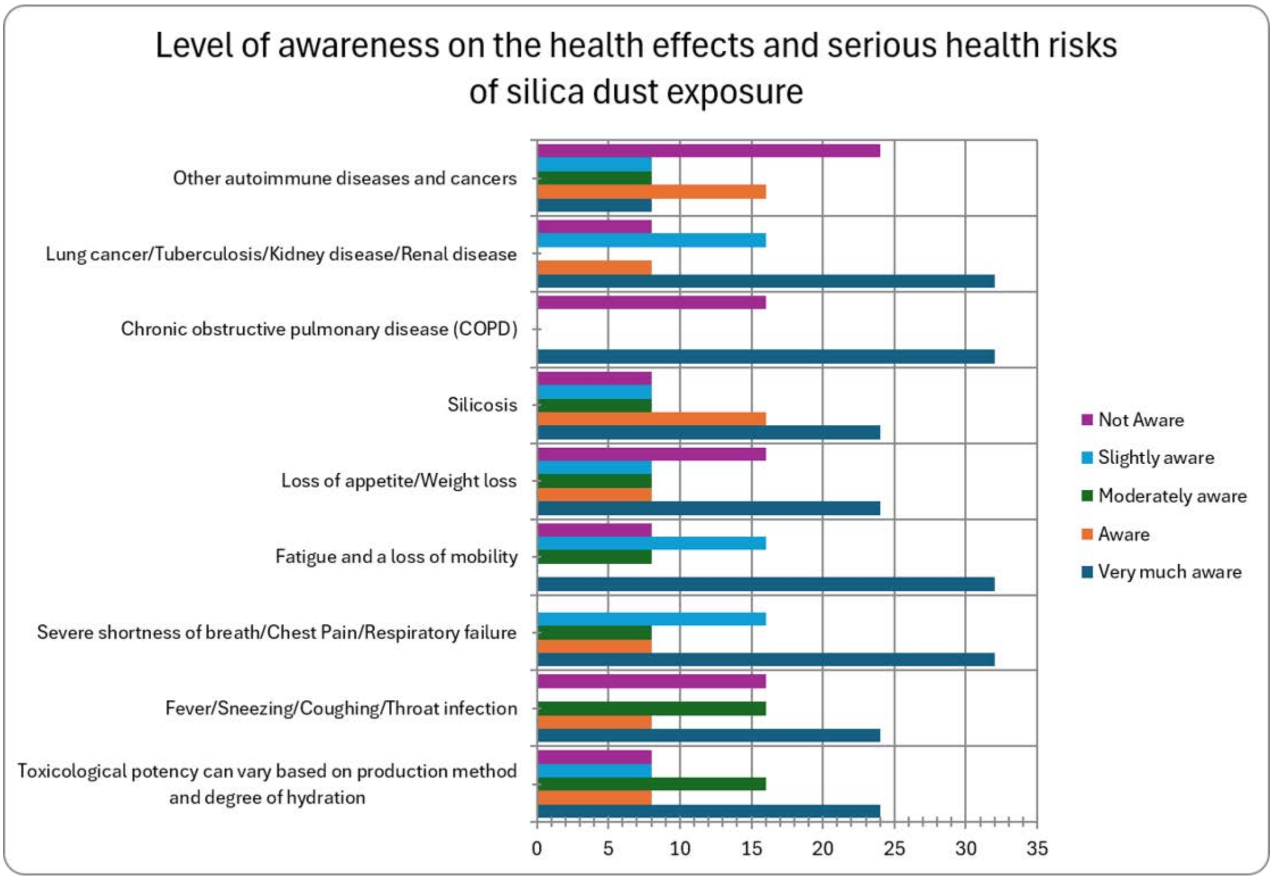


Figure 9: Level of Awareness on the Health Effects and Serious Health Risks

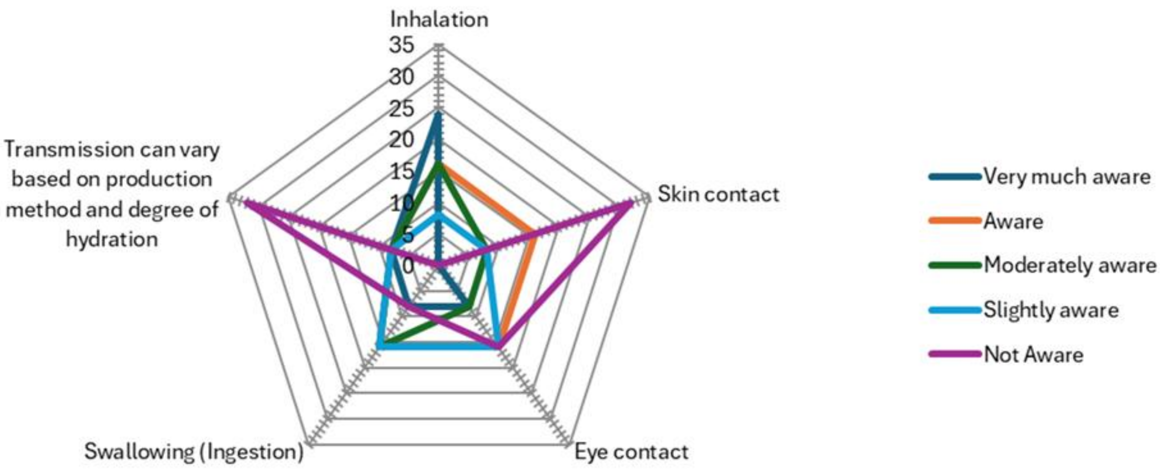


Figure 10: Level of Awareness on the Modes of Silica Dust Transmission

When investigating the level of awareness on the sources of silica dust during house repair, maintenance/retrofitting, 87.5% were aware of the common sources of silica dust generation (drilling/ cutting/ sanding/ chiselling/ demolition/ mixing/ handling/ sweeping/ shovelling dry materials) (Figure 11).

The respondents identified being very much aware of 3 key sources of RCS dust generation, namely: masonry cutting or chiselling/ demolition/ drilling or sanding silica-containing material. However, disconcertingly, 8 respondents (12.5%) were unaware that drilling holes in existing walls/ceilings produce high levels of RCS exposure. Yet paradoxically, 37.5% (24 respondents) were either moderately or slightly aware silica dust is generated when handling, sweeping or shovelling dry materials debris from such tasks. In addition, 50% were not aware silica dust is generated when plastering (25%) or plaster boarding (25%). Moreover, there appears to be a distinct lack of awareness and knowledge of RCS dust generation when undertaking other common tasks – e.g. plastering activities (e.g. sanding/mixing) (25% -16 respondents); mixing/using cement (25% - 16 respondents); within cleaning materials, particularly in abrasive products (37.5% - 24 respondents).

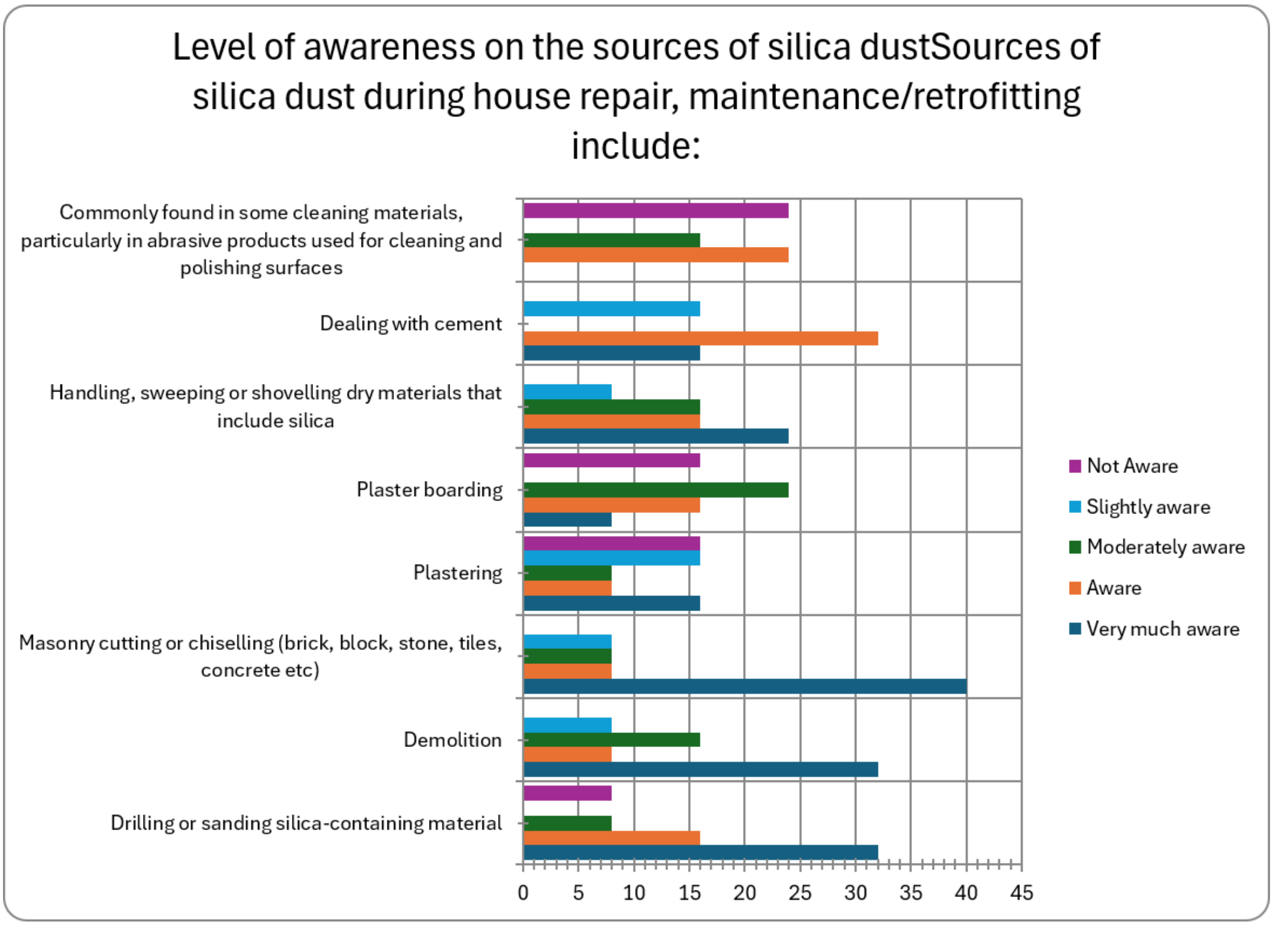


Figure 11: Level of Awareness on the sources of silica dust during house construction works

The data collected surrounding the level of awareness on the health effects and serious health risks of RCS dust suggests, despite the raft of construction industry guidance, there was still a significant portion of management who are tasked with managing RCS risk that are unaware of all the 3 fundamental transmission pathways. An important understanding particularly when designing, planning, specifying and managing exposure and control methods. Furthermore, while in general, there was an understanding of the respiratory issues (effects/risks), concerningly there was a lack of awareness of cardiovascular, autoimmune and cancer dangers.

4.3.2 Silica Dust Exposure & Control Mitigation Tools

This series of questions of the survey sought to understand and provide a baseline of where the respondents are in terms of their current level of awareness on silica dust mitigation tools, and control measures, to give a snapshot measure of the underlying safety culture within the UK housing sector. However, it also provided the opportunity to consider any associations between perceptions of, and attitudes towards, formal management control measures (e.g. RAMS; hierarchy of control; training etc.). As well as awareness of current structured construction health and safety process management frameworks (e.g. COSHH, 2002; CDM, 2015; Construction Indoor Air Quality (IAQ) Management Plan, etc.), that could be potentially employed to support silica dust management.

The main findings are discussed below.

4.3.2.1 Level of awareness on silica dust mitigation tools, and control measures

In terms of housing management awareness of current approaches, systems, and tools, the resounding output from these set of questions was the consistent response of very aware or aware, which ranged between 50% and 65%, across seven tools (e.g. RAMS, hierarchy of control, ensure workers are following and understanding procedures and safe systems of work, etc.) (Figure 12).

This is understandable as these tools are utilised across health and safety management in the construction sector. Moreover, with RAMS being the primary formal management tool that respondents were very aware of, it was dependant on individual management areas and occupational expertise.

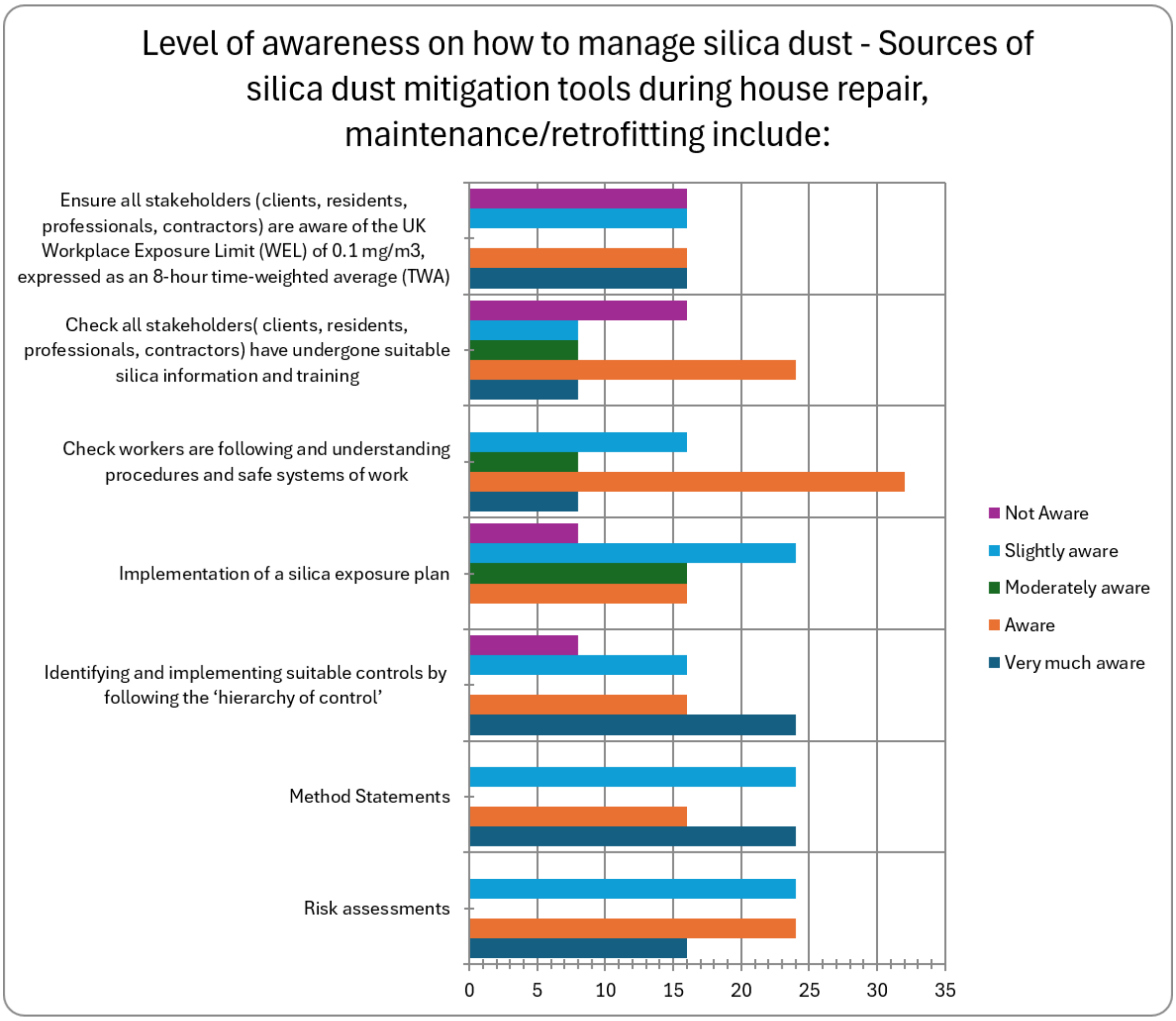


Figure 12: Level of Awareness on the sources of silica dust mitigation tools, and control measures

However, paradoxically between 12.5% and 37.5% of respondents (8 – 24) stated they were only slightly aware or not aware of any of the seven tools they were asked to comment on. Worryingly, 37.5% (24) reported they were slightly aware of RAMS, with another 37.5% (24) slightly aware of the implementation of a project silica exposure plan.

Even more disturbing is 16 respondents (25%) were not aware of either checking all stakeholders (clients, residents, professionals, contractors) have undergone suitable silica information and training; nor aware of the current UK Workplace Exposure Limit (WEL) of 0.1mg/m^3, a key measure for controlling the exposure to RCS dust. While 8 (12.5%) conceded they were not aware at all in terms of identifying and implementing the regulated hierarchy of control. The primary tool, based on the data outputs, identified was ensuring that workers are following and understanding procedures and safe systems of work.

4.3.2.2 Level of awareness on structured construction health and safety process management frameworks suitable for Silica Dust

In terms of awareness of current structured construction health and safety process management frameworks that could be potentially employed to support silica dust management, all (100%) were either very aware or aware of CDM, 2015 and COSHH, 2002 Regulations (Figure 13).

Regarding the other three identified management frameworks: again 100% of respondents were either very aware (50%) or aware (37.5%) of a Construction Phase Plan (CPP), highlighting this is a recognised framework. However, it is slightly concerning 8 (12.5%) management staff are only slightly aware of a construction phase plan (CPP). Yet this is a legally required document for all construction
projects in the UK, regardless of size, duration, or complexity, under the Construction (Design and Management) Regulations 2015 (CDM 2015). It is a vital health and safety management document that outlines the risks associated with a specific construction project and details the procedures and arrangements in place to minimise or eliminate those risks.

With regards the remaining two options: Construction Environmental Management Plan (CEMP) – 50% (32) were either moderately or slightly or not aware; while for the Construction Indoor Air Quality (IAQ) Management Plan – 62.5% (40) acknowledged they were slightly (16 - 25%) or not aware (8 - 12.5%)

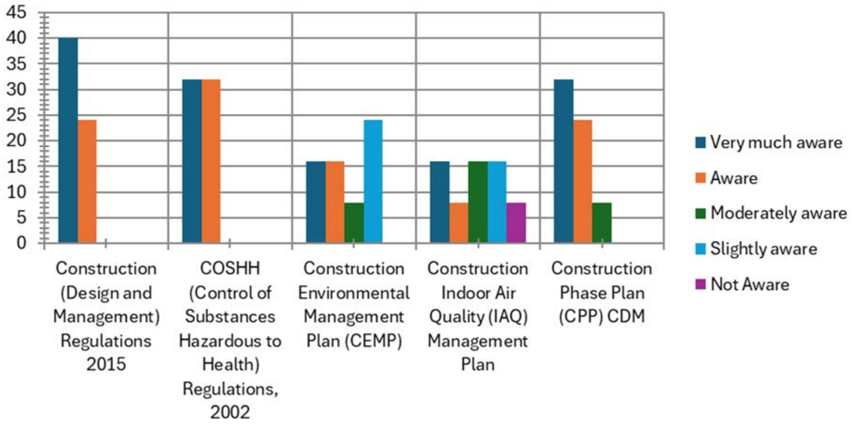


Figure 13: Level of Awareness on structured construction health and safety process management frameworks

4.3.2.3 Barriers and Opportunities for Enhancing Practice

This section of the survey sought to understand and provide a baseline in terms of barriers and opportunities for enhancing practice. However, it also provided the opportunity to consider any associations between perceptions of, and attitudes towards, the strengths and weaknesses of their own individual thoughts on the issue of RCS dust exposure. Six questions in total were posed to respondents within this section of the survey.

Initially as a precursor to delving into the respondents' perspectives surrounding barriers and opportunities, they were posed a series of statements with regards their thoughts on the issue of RCS dust exposure and current perception of their organisation's silica dust control and exposure educational readiness.

From an individual perspective, 75% (48) considered they were not at risk of getting exposed to silica dust, while opposingly 25% (16) believed there was a strong possibility. All (100%) agreed that there are multiple options available for limiting or even stopping silica dust exposure and that everyone (leadership, management, contractors, clients and residents) need to take responsibility for managing silica dust exposure responsibly. Hence, 62.5% (40) felt silica dust campaigns are a key activity in raising awareness, while 25% (16) disagreed and thought they were nothing more than large-scale science propaganda activities. From the responses, in terms of silica dust control and exposure educational readiness, an average of 48% (31) perceived management within their own organisations were already sufficiently qualified and 44% (30) felt that their senior managers/ executives were similarly already sufficiently qualified.

Barriers

- All of the workforce surveyed offered several potential barriers, surrounding the implementation of silica dust control and exposure standards and the required knowledge needed: the top three being – education/training (62.5%) (e.g. lack of readily available accredited training specific for the sector); culture/behaviours (50%) (e.g. some respondents suggested a lack of ownership from clients/senior leaders as they may assume that this is the contractors and their workforce problem and not their issue to mitigate); and economics (50%) (e.g. high investment and running cost of extraction, protection and monitoring resources).
- The remaining responses citied several technical barriers - primarily related to the implementation and maintenance of effective engineering and administrative controls - although this was further segmented, e.g. several respondents offered the physical limitation of applying dust control measures in confined or complex work environments as a significant barrier, while other respondents suggested monitoring and managing exposure: unsurprising given this process is complex and requires specialised equipment and expertise.

Opportunities

- Respondents were asked how much they agree on three key opportunities for action. In terms of formal management measures, all (100% - 64) respondents, regardless of role and occupation, felt education/training to be the key opportunity individually, organisationally and sector-wise, offering an indication on potential areas, such as silica dust hazards/ risks/ dangers, control measures, and proper PPE/RPE use to workers. While not posing outright possible opportunities, over a third (36%) of respondents remarked they are not consulted in the development of RAMS. Hence, perhaps an additional opportunity is to address this apparent siloed approach, and provide greater transparency, communication, and collaboration.

- Many (75% - 48) agreed that to promote silica dust awareness, prevention, and mitigation strategies, it was critical to get community and sector engagement by participating in community initiatives and advocacy efforts to raise awareness. Finally, most (82.75% - 56) agreed that all stakeholders (clients, residents, professionals, contractors) need to take ownership by policing implemented silica dust exposure and control tools e.g. reporting concerns – if they suspected or witnessed silica dust exposure or inadequate controls to housing organisations or HSE or the local authority. (Figure 14)

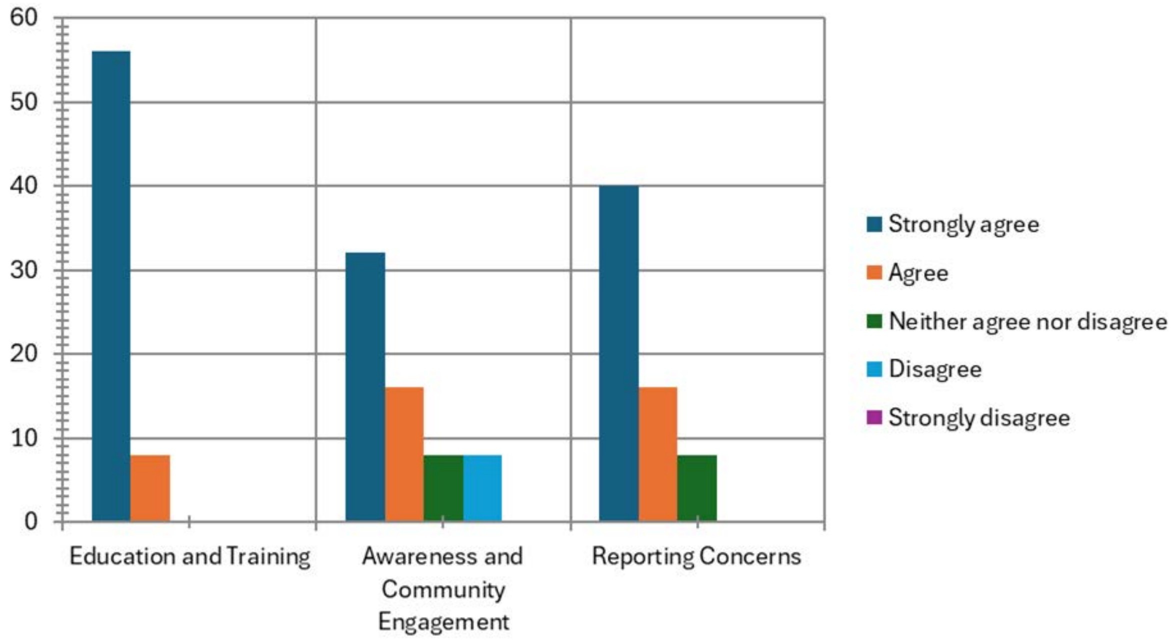


Figure 14: Level of Agreement on three key opportunities for action

- Returning to education/training, all (100%) felt all workforce levels (leadership, management, operatives) would benefit from various modes of training (see Figure 15). However, the leading mode identified was videos (87.5% - 56), closely followed (75% - 48) by easily accessible guides; case studies; and online access in a self-learning mode, with face-to-face training; and demonstrations (62.5% - 32) respectively.

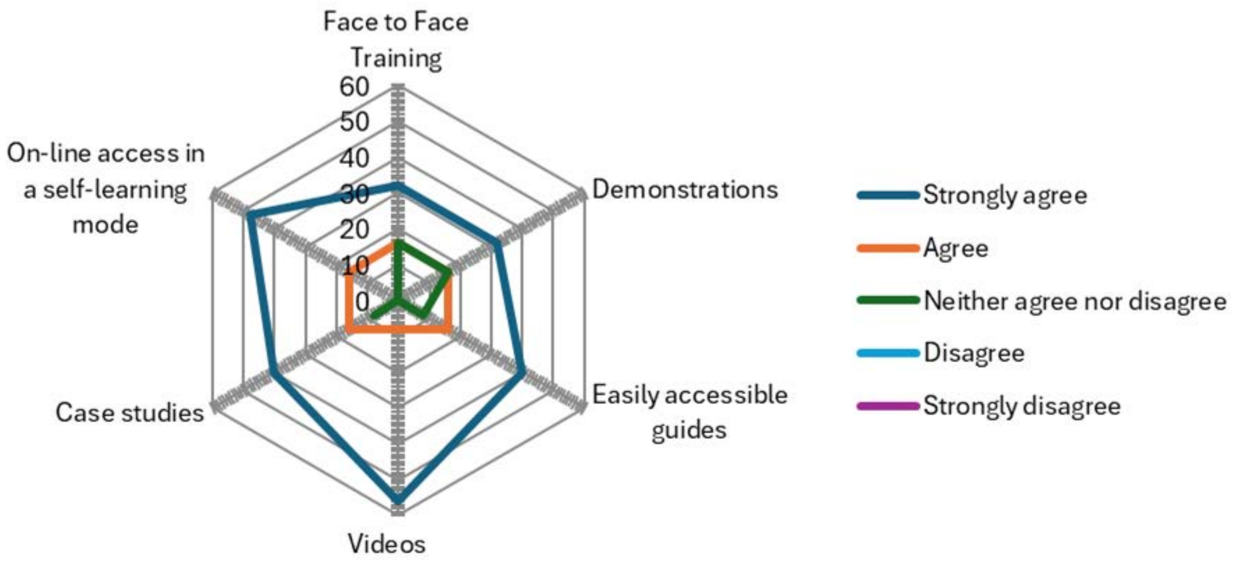


Figure 15: Level of Agreement on modes of training

- When posed questions about what training and education content would help them address the problem of exposure to silica dust, most (87.5% - 56) strongly agreed on the need for content and resources to focus on preventive measures and safe work practices. Although, from the data outputs, this was closely followed by understanding silica dust materials (65% - 40), then regulatory compliance procedures/ processes and emergency procedures in case of overexposure (50% - 32) (Figure 16). Looking deeper into the data, there was no disagreement of the training topics offered, simply a differentiation in perception driven by their own individual occupation, role and organisation.

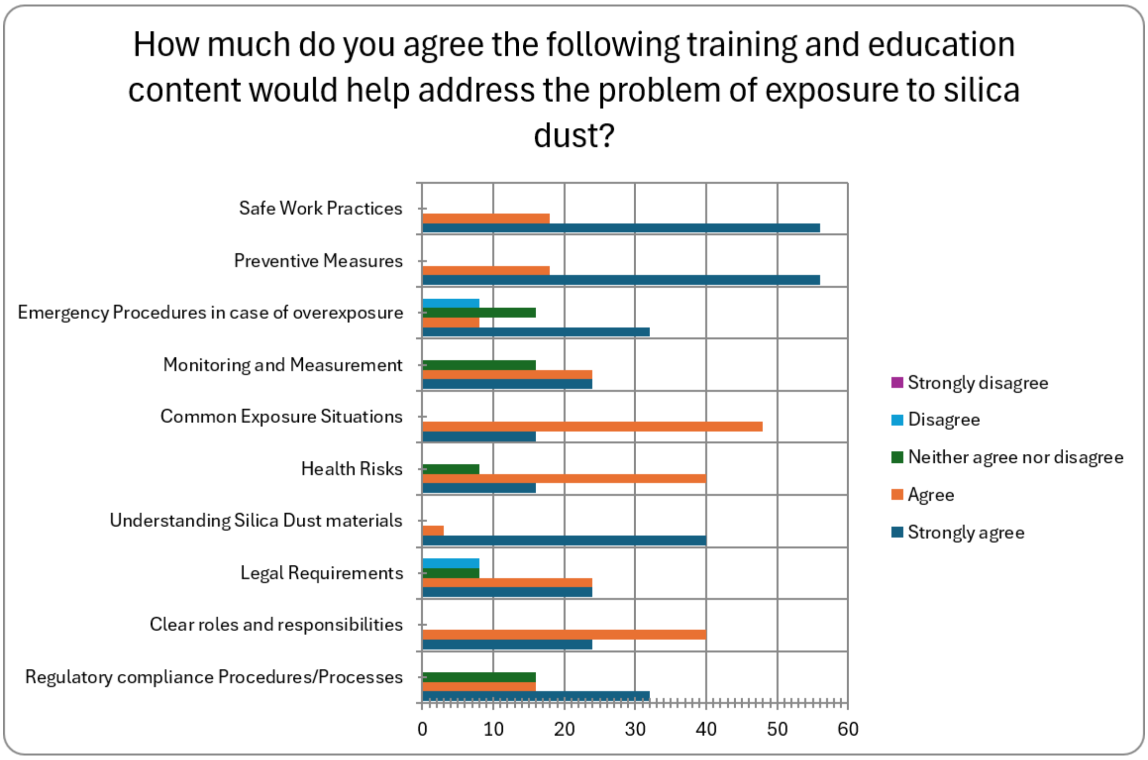


Figure 16: Level of Agreement on training content

4.4 Summary

From the data collected, in terms of the respondent and housing demographic, there was a wide and varied range of professional occupations, coupled with much of the housing stock RMI services delivered towards mixed locations (urban/ suburban/ rural), while the housing stock they deal with daily was a mix of traditional & non-traditional types spread across a range of housing ages. Add to this that their management role bridged both on-site and off-site activities and was highly dependent on the project scale, complexity and requirements. Hence, understanding the property's location, age and construction (technology) the respondents deal with daily, added to identifying a level of comprehension into their roles and responsibilities within field operation management provides insights into potential "strategic, tactical and operational" RCS dust safety weaknesses, and threats, which could impact the ability, accessibility and clarity of project specified housing RMI RCS dust exposure and control protocols given RCS literature emphasises RCS dust exposure and control being highly task-specific.

In terms of the respondents' current RCS awareness and knowledge level of the risks, health issues, work practice RCS generation, mitigation tools, control measures and health and safety process management frameworks, the data analysis intimates there appears to be no standardised approach across housing organisations in relation to specific on-site RMI practices silica dust exposure and control measures, with a heavy reliance on managing and the assessment of the workforce in terms of following and understanding procedures and safe systems of work, in line with regulatory and contractual arrangements. Yet, the data collected surrounding the level of awareness on the health effects and serious health risks of RCS dust suggests despite the raft of construction industry guidance there was still a significant portion of management who are unaware of all the three fundamental transmission pathways (i.e. inhalation, systemic absorption and ingestion) and their associated health risks and effects (understanding of the respiratory issues, but a lack of awareness of cardiovascular, autoimmune and cancer dangers). Yet these are important understandings particularly when designing, planning, specifying and managing exposure and control methods. This was reiterated from the literature data captured, (secondary thematic analysis), despite the sporadic Housing sector silica dust focused studies. Moreover, to enable the management workforce's ability to raise and enhance current skill sets, the data highlights areas of opportunity such as ensuring that management have the necessary competencies to specify, monitor and assess appropriately suitable RCS safety interventions, especially as the literature reiterates for the potential best practice management is to integrate monitoring, recording and verification of management compliance with optimal utilisation of the experience and knowledge of the workforce, to create an integrated, accessible and readily available knowledge transfer network bolstered by the adoption of a holistic integrated health surveillance programme.

In relation to both barriers and opportunities for improvement to the current approach, based on the data, two key emergent themes appeared: management; and education/training. Again, suggesting that while current "strategic, tactical, and operational" approaches to management, may be viewed as a threat, the belief is it is more of an opportunity to support continuous improvement, whilst also maintaining and sustaining an organisation's reputation through best practice adoption. Such practices include incorporating silica awareness into technical guidance to quantifying risk to demonstrating a high level of health and safety practices when involved with the management of contractors works and dealing with residents; allowing for more integrated, and standardised "strategic, tactical, and operational" approaches as opposed to the current various siloed management exposure and control processes; as well as considering the need to deliberate secondary exposure, from resident impact to storage and disposal of waste to site- specific RAMS to recording/monitoring of activities and tasks.

5.0 Qualitative Results and Analysis of Senior Leadership Interviews

5.1 Introduction

This section presents the qualitative data analysis findings from the 8 semi-structured interviews, conducted with senior leaders within various housing organisations. To enable relevant themes and emerging concepts to materialise during the interview process, an interview guide was produced which provided a roadmap of questions surrounding four main areas of discussion: (1) key challenges, and barriers that prevent clients/senior leadership from driving silica dust exposure and control practices; (2) awareness, understanding and knowledge of clients/senior leadership surrounding silica dust exposure and control; (3) awareness, understanding and perception of key construction health and safety process management frameworks applicable to silica dust; and (4) opportunities and recommendations to drive more silica dust exposure and control practices into projects.

Taking into consideration social housing is serviced by both public and private sector entities and recognised as fundamental components within the housing RMI ecosystem, it was decided to focus on providing a combination of these senior leaders (Table 3).

Respondent	***Interviewee Position***	***Role***	***Experience***	***Industry***	***Area of practice***
RA	Director	Asset Management	25+ Yrs (RIBA)	Private sector	Social housing and re-generation consultancy services
RB	Senior Technical Services Manager	Senior Clerk of Works	25 Yrs (ICWCI)	Public sector	Social housing – client/owner
RC	Senior Health and Safety Manager	Health, Safety, Environment and Quality	25+ Yrs (NEBOSH)	Public sector	Social housing developers and main contractors
RD	COO	HA Supplier	25+ Yrs NVQ	Private sector	Construction products
RF	Senior Compliance Director	Health, Safety, Environment and Quality	35+ Yrs (FCIOB)	Public sector	Social housing – client/owner
RG	Senior Compliance Director	Health, Safety, Environment and Quality	25+ Yrs (RICS)	Public sector	Social housing developers and main contractors
RH	Director	Social Housing and regeneration	25+ Yrs (CIAT)	Public sector	Social housing – client/owner
RJ	Director	Asset Management	25+ Yrs (RICS)	Private/ Public sector	Social housing and regeneration consultancy services

Table 3: Background and Profile of Interviewees

The main aim is twofold, to validate the literature review and based on the middle management survey, and to construct more robust evidence, as to whether (1) the challenges and barriers identified were perceived to be the same by senior leaders; and (2) to identify and explore senior leaders' current awareness, understanding and perception of silica dust exposure and control, particularly construction process management frameworks (CPMF) and their applicability, as well as relevancy to procuring/managing/undertaking housing sector construction works (i.e. repair, maintenance, retrofitting, etc.), in particular within social housing.

Based on the interview data, the thematic analysis provided three key themes: (1) technical safety (competence) - which impacts the sector's knowledge, skills and abilities, and the aim to deliver high quality works; (2) human resources - which impacts housing RMI practice and managements aim to deliver high quality works; and (3) senior management - which impacts leaders and management in their aim to help meet their business and project objectives (Figure 17).

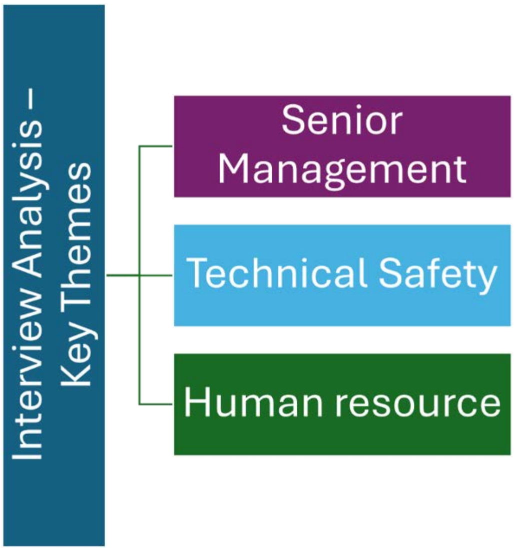


Figure 17: Key Themes Emerging from Senior Leadership Interview Data

5.2 Key Challenges and Barriers

The interviewees were initially posed the following open-ended question:

"In your opinion, what are the key challenges and barriers that prevent clients/senior leadership from driving silica dust exposure and control practices?"

In total, **9 key challenges:** 1) economics; 2) culture and behaviours; 3) poor project OHS performance; 4) project pressures; 5) skills shortages/gaps; 6) recruitment; 7) skills gaps; 8) OHS standards, regulations etc; 9) air quality management - classified under the **three key themes** (deemed the broader cross-cutting strategic sector and project level challenges): 1) senior management; 2) human resources; and 3) technical safety (competence), were identified, as illustrated in Figure 18.

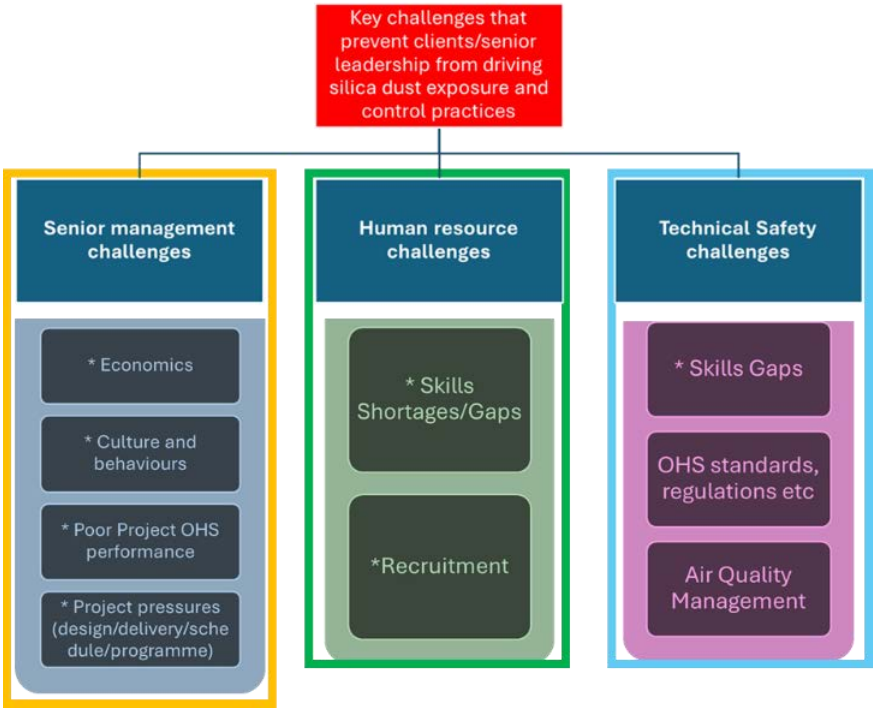


Figure 18: Themes of Key Challenges that Prevent Clients/Senior leadership from Driving Silica Dust Exposure and Control Practices

The replies from the respondents suggest that they had a consistent idea amongst their own group of the key challenges facing silica dust exposure and control practices within the housing RMI sector and were homogeneous in their view that 9 key challenges were major issues (see Figure 18). Yet, the importance of each challenge seems to have been driven by the respondent's current role and background. However, the number of key challenges offered by respondents indicates the recurring mantra that, at an industry-wide and project-specific level, these challenges are not only inextricably linked, but also multi-faceted and technical. When viewed within the context of housing RMI practice, and silica dust exposure and control being highly task specific, it is easy to appreciate why the subject is considered a complex, unique, and bespoke landscape despite RCS being such an inherent and established risk.

Hence, in essence, the replies resonated with the literature (Halvorsen *et al.*, 2024 a&b; Jacobs, Zisook, & Tarpey 2024; Tian *et al.*, 2023; Mmereki, and Brouwer, 2022; Gharpure, Heim, & Wal, 2021; Park, Hwang, & Yoon (2019); Baldwin *et al.* (2019); McLean *et al.*, 2017), as they surrounded the topics of: education and training, recruitment, economics, technology, sustainability, modernisation, process improvement and performance measurement. Within each theme, the relevant sub-category challenge was then analysed based on the number of respondents who voiced each barrier, to allow the key barriers to be identified, as illustrated in Figure 19. Hence, the following sub-sections presents and discusses the key challenges and barriers identified, whilst providing brief examples of responses.

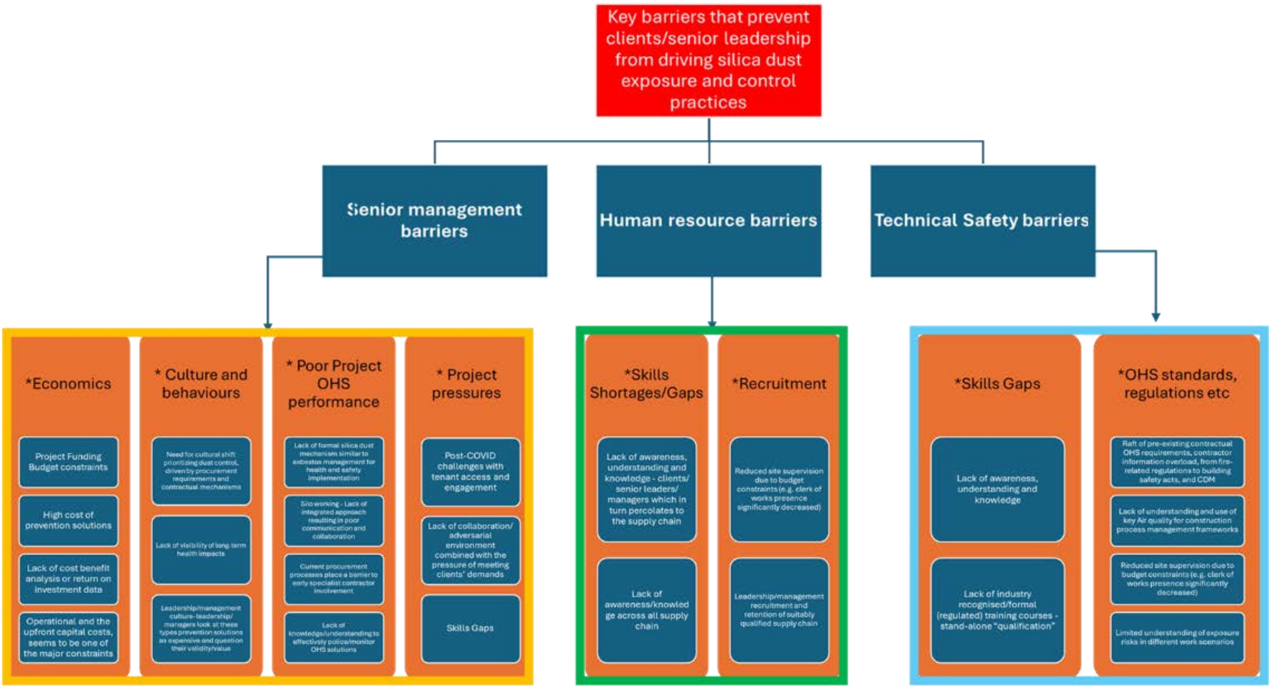


Figure 19: Themes of Key Barriers Facing Clients/Senior leadership – see pages 11-14 for more details

5.2.1 Theme 1: Senior Management Challenges and Barriers

In the first theme, respondents discussed a range of senior management challenges facing housing RMI, echoing the literature. Four key senior management challenges were identified: economics, culture and behaviours, poor project OHS performance, and project pressures. However, there were two key fundamental challenges, in one form or another, which consistently scored unanimously, during both the interview session with the respondents and during the thematic analysis process, namely economics and management culture/behaviour, as illustrated in Figure 20.

Consistently, they all stressed the challenge of management culture was inextricably linked to the key challenge of economics and, from their perspective, both were of equal standing. On reflection, the consensus was that they were not only connected and similar – but also associated in terms of business growth as well as delivering improvements in project works quality, efficiency and value.

All eight respondents muted that the key challenge of economics and its associated strategic barriers (e.g. project funding, budget constraints, high cost of prevention solutions, lack of cost benefit analysis or return on investment data and operational and the upfront capital costs), was a continual issue within housing RMI projects. For example, respondent RF, based on 35 years' worth of project management experience remarked, "there is a tendency to apportion insufficient monies to the project"; commenting further, this was "very typical when dealing with health and safety". This brings into question if there is enough funding to support the health & safety activities when undertaking housing RMI. Yet, when investigated further on this issue, most respondents conceded it was not the amount of project funding needed.

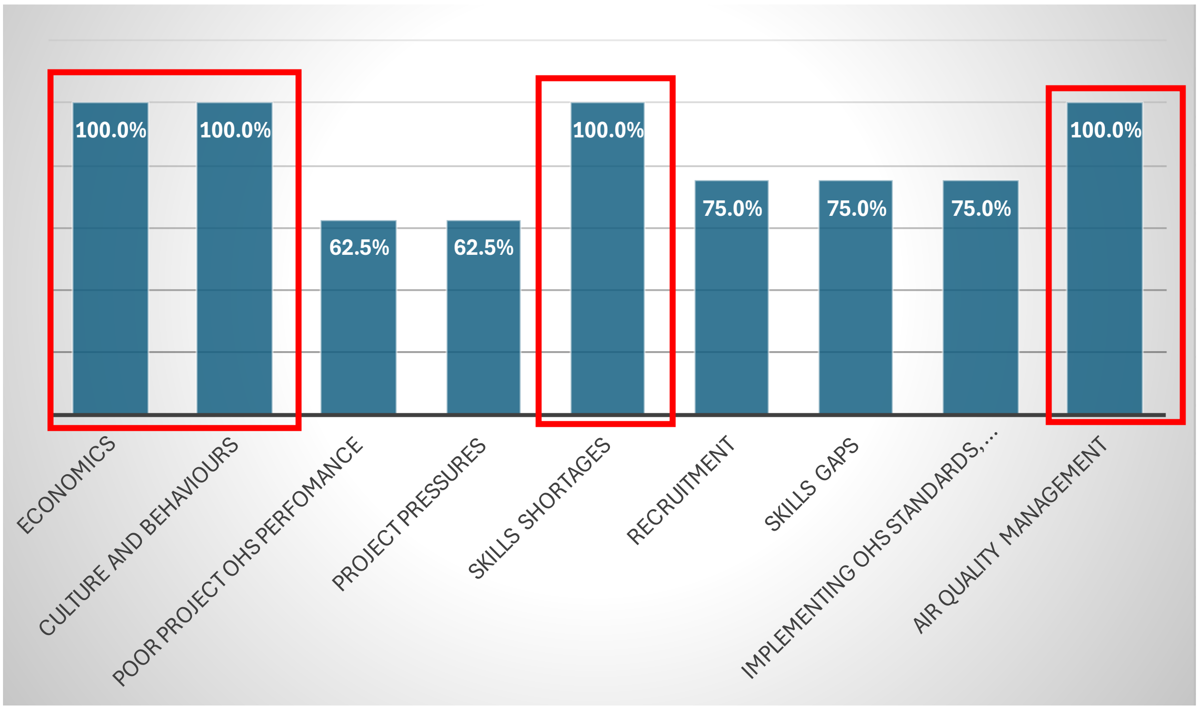


Figure 20: Percentage of Interviewees - Key Challenges Identified Within Senior Management

Unsurprisingly, as all respondents underscored this perspective, explaining it from a business capacity, RF provided a succinct commentary, remarking "even an increase in project funding, the issues of RCS exposure and control surrounding RMI work and the lack of availability of the appropriate skill set at contractor and professional level will continue, much like the continuing constraints provided by existing tendering approaches, leading to the perpetuation of not only a lack of a multi-disciplinary approach but also a lack of structured and collaborative approach will result in a continuation of poor project delivery and performance resulting in inadequate RCS management approaches."

Respondents RA and RJ both suggested it was a need to have, "more effective use of funds, derived from the private and public sector"; and that "part of an effective use of funds, was the need to evenly spread the project share costs of health & safety". When asked what they meant by this, they proposed that there was a need to observe, "an increase in senior leaders putting silica in the same risk category as asbestos and the other big six safety areas (fire, gas, electrical, damp, mould, legionella) across all projects, particularly when undertaking fabric intervention - as opposed to a heavy focus in the main on asbestos where, as part of the pre-construction information, you know, we'll have asbestos registers, or should I say the association should have asbestos registers, surveys, management and monitoring plans etc."

Such comments highlight the economic challenge, and the subsequent barriers, seems to be one of the major constraints requiring the issue to be approached holistically. Although, when investigated further regarding their understanding of the current funding frameworks and who was responsible for ensuring sufficient funding is available, the feelings surrounding this problem were highly emotive, with several leaders (RB, RC, RD) raising the interconnected project barrier of budgetary constraints, candidly admitting, from a leadership business capacity, "budgeting for construction dust is viewed as a subsidiary responsibility of contractors, resulting in insufficient budget allocation at the time of the decision to carry out repair works."

Furthermore, RG observed adversarial procurement processes as the real issue that required attention. They pronounced "traditional procurement routes allied with client's predilection to select the lowest price and not on who is most suitably experienced and qualified" creates a restrictive and combative tendering nature, resonating "this type of competitive arrangement, which when trying to win the project tends to lead to underestimating the work, especially the health & safety commitments."

The second deep seated challenge was identified as: management culture/behaviour. All eight respondents agreed, mirroring to some extent the literature and the survey undertaken with middle managers, raising it, as not only a fundamental issue but a complex subject, connected to the correlated challenges of project pressures, poor OHS performance and economics. Respondent RD remarked that culture/behaviour was suffering from "a contradiction driven by an amalgamation of poor leadership understanding and knowledge driven by a culture of self-preservation coupled with resistance to change and a focus on immediate accidents rather than chronic illnesses – i.e. short-term thinking."

Moreover, consistently there appeared to be a need of assigned importance towards skills development, alignment with regulatory compliance such as adoption of engineering controls, and health surveillance, in relation to specific on-site practices silica dust exposure and control measures (i.e. management, monitoring and controlling strategies). Although, the most common and preferred formal measures employed were PPE, RPE, and RAMS, appearing to be the seen as the first and last line of defence, and central to silica dust exposure and control strategies.

The respondents suggested that the current "strategic, tactical, and operational" silica dust approaches, are, in essence, tokenism towards OHS approach, implementation and performance, and not factored into procurement decisions or risk mitigation strategies. Hence, the respondents were in full agreement that there needed to be a formal mechanism developed for health and safety implementation when it comes to controlling silica dust – similar in approach to asbestos management and control, particularly given there appeared to be a lack of understanding/ experience/knowledge that current construction health & safety process management frameworks (CDM, CEMP, CPPs etc.) do not sufficiently address silica dust (or, in fact, all construction dust).

5.2.2 Theme 2: Human Resource Challenges and Barriers

Numerous industry specific reports over the last 20 years (Clarke & Herrmann, 2007; CITB, 2025) have illustrated the continual challenge of human resourcing (HR) facing the sector with a continual decline in workforce numbers and training uptake coupled with limited trainee and apprentice opportunities.

Firms in the house construction sector face worsening skill shortages and hard-to-fill vacancies, particularly for site managers and tradespersons, but continue to rely on external labour markets for recruitment and retention. Recent research (Josa & Borrion, 2025; Khan *et al.*, 2023) underscores the importance of integrating human resources and social impact considerations into housing repair, retrofitting, and maintenance as part of the circular economy and Net Zero transition.

However, direct research on silica dust skills shortages/gaps in housing RMI and retrofitting is lacking, and further research is needed to address the specific intersection of silica dust management and skills shortages in retrofitting and maintenance.

Nonetheless, unsurprisingly respondents again echoed the wider construction sector literature and revealed several significant challenges such as skills development, skills shortages/gaps, changing the perception of the sector, recruitment/retention of the workforce, and lack of training/education. From the human resource challenges offered by respondents, again two fundamental challenges stood above the rest of the challenges offered, namely skills shortages/gaps and recruitment (see Figure 21).

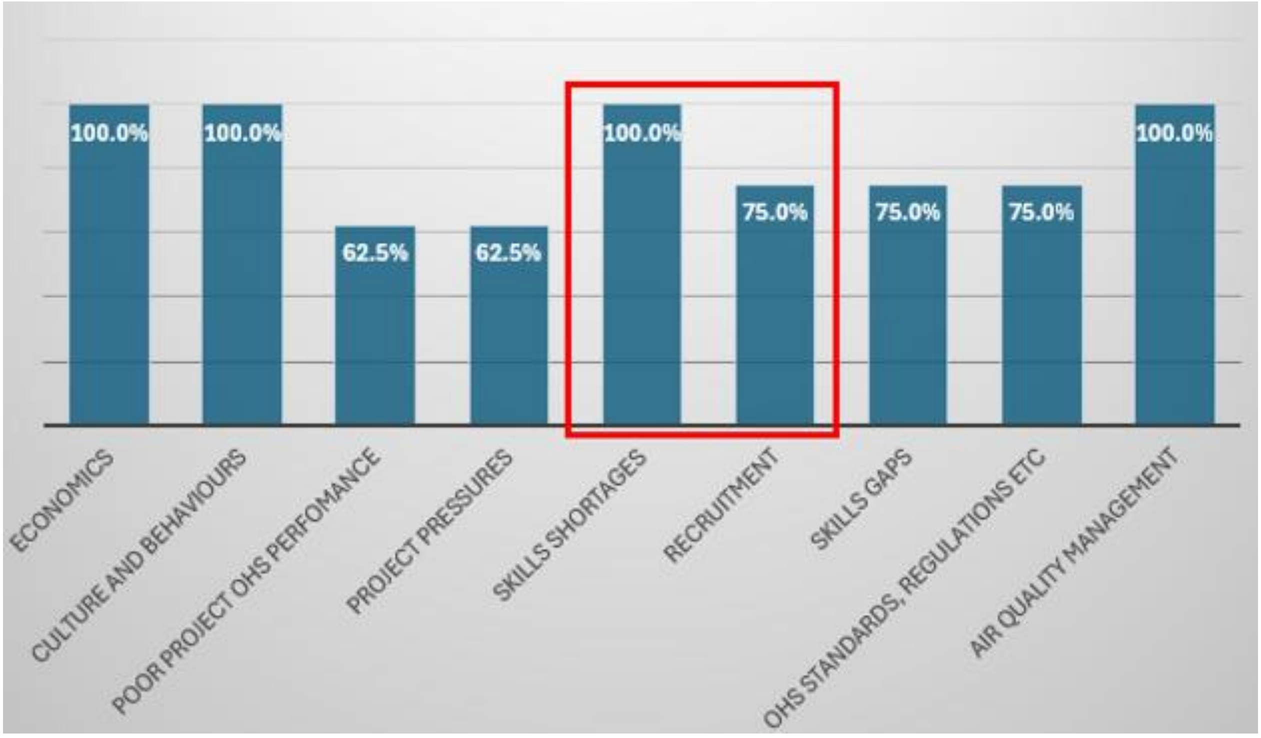


Figure 21: Percentage of Interviewees - Key Challenges Identified Within Human Resources

In terms of profession, all respondents agreed that it there was no boundary, with major issues at both contractor and professional level within each key challenge. With regards skills shortages, respondents RF and RG based on their professional background (both senior compliance directors) reiterated the literature pointing out there was “a shortage of expertise in the procurement, design and management team for RCS control and exposure and the associated management and work practices and processes” citing (as an example) “reduced site supervision due to budget constraints (e.g. clerk of works presence significantly decreased).” Furthermore, all respondents (8) remarked in one form or another that “housing professionals when specifying housing repair, retrofitting, and maintenance repairs, lack the knowledge of the health & safety complexities involved with silica dust management.”

Contrastingly, interviewees RA and RJ, whilst agreeing that professional skills shortages was a key issue from their perspective, in terms of wider health & safety needs, they both stressed that from their experience “the most complex and difficult part of the project, is defining health & safety requirements and assembling, the appropriate professional team with the suitable level of expertise and knowledge, allied to experienced and best practice specialist contractors is essential in health & safety delivery success."

In a similar vein, interviewees (RB, RC, RF, RG) provided a slightly different perspective, observing "that while deficiencies in available talent with the required skill set, results in a distinct shortcoming, in terms of recruitment ability to source people with the appropriate skills and knowledge, at the end of the day it comes down to the budget, and what fits in the budget." Very similar to the responses gained when quizzed on senior management challenges, although they underscored "RCS control and exposure and the associated management and work practices and processes require distinct skills attributed to the unique character of the project."

Hence, recruitment being highly interconnected to skills shortages was the second key human resources challenge identified. When questioned further, they offered different perspectives from both a leadership perspective as well as a business viewpoint; all respondents (8) acknowledged efforts are made to find the best practice contractors who suit the project based on "their references, past experience, trade qualification and samples of work."

Yet dichotomously, they precluded that "adversarial procurement processes as the real issue that required attention." They pronounced "traditional procurement routes allied with the industry's predilection to select the lowest price and not on who is most suitably experienced and qualified" creates a restrictive and combative tendering nature, resonating "whilst competitive, it is in fact a combative type of arrangement for contractors, which when trying to win the project tends to lead to underestimating the work." They further articulated that this was without a doubt a key issue, commenting due to this "invariably when the project begins, health & safety along with supervision of the works are the areas that tend to be hampered", expressing the persistent sentiment that often, the current tendering process is based on "economics and not on who is most suitable qualified or experienced to carry out the work."

Although both interviewees RF and RG underscored "RCS control and exposure management requires distinct skills", they intimated that in previous projects "the client and management team had carried out an interview process to determine suitably qualified contractors, based on previous RCS control and exposure management experience", although they revealed "invariably it was an informal and subjective procedure."

Unsurprisingly, based on the interviewee comments and subsequent analysis of the data the respondents discussed, a range of important strategic barriers for the human resources challenge facing housing RMI, revealed: Skills Shortages (e.g. lack of suitably qualified personnel), and recruitment pressures (ranging from leadership/management recruitment to retention of suitably qualified supply chain to deficiencies in available talent with the required skill set to understaffing issues).

They attributed these barriers to the fragmented nature of the industry, coupled with an inherently adversarial tendering disposition of project contracts, as all respondents (8) offered that often there is a distinct shortcoming between sector practice, guidance, standards and frameworks; whereby there is a need to prioritise dust control, which should be driven by procurement requirements and contractual mechanisms.

5.2.3 Theme 3: Technical Safety Challenges and Barriers

In the third theme, respondents discussed a range of technical safety challenges facing housing RMI, echoing the literature, revealing a range of important strategic challenges. However, three key issues and several key barriers were identified, namely skills gaps (e.g. lack of industry recognised/formal (regulated) training courses or stand-alone qualification; lack of continuing professional development (CPD) (manual & professional occupations)), OHS standards, regulations etc. (e.g. raft of pre-existing contractual OHS requirements, contractor information overload, from fire-related regulations to building safety acts, and CDM), and air quality management (lack of understanding and use of key air quality construction process management frameworks) (see Figure 22).

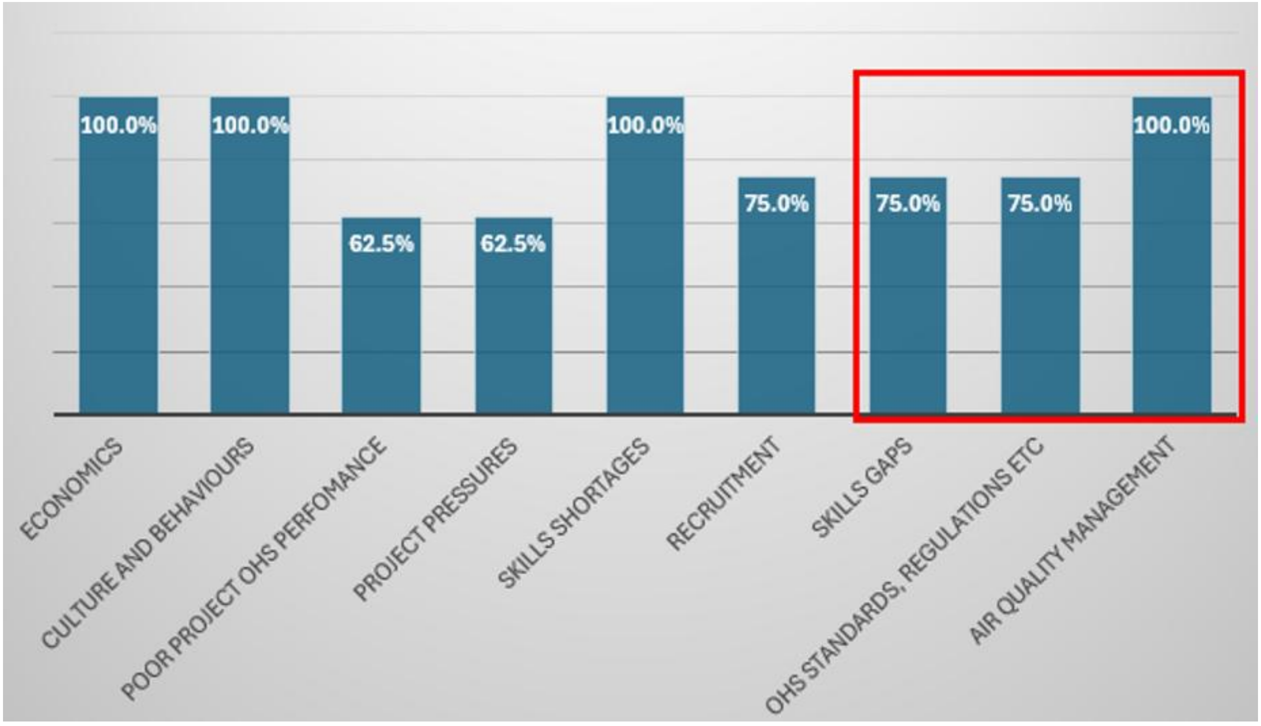


Figure 22: Percentage of Interviewees - Key Challenges Identified Within Technical Safety

In terms of the first key challenge, all interviewees (8) offered Skills gaps, however they caveated this with the fact that this challenge is intrinsically linked to skills shortages, evidenced by the plethora of literature (legislation, HSE, and wider construction industry best practice guidance documents, as well as numerous academic construction and medical sector studies), highlighting poor practice at contractor and professional level and the ever-increasing impacts of RCS exposure, and the inappropriate use of relevant control measures for silica dust exposure.

For example, all interviewees (8) remarked in one form or another that “housing sector professionals when specifying repairs (externally/internally) lack the knowledge of the complexities involved with silica dust management”, reiterating their comments surrounding the thematic area of human resources challenges. They attributed this to the lack of professionals with “hands-on technical knowledge”, a perspective that is borne out in reality; there are no further or higher education curricula that has an adequate coverage of RCS control and exposure, and the associated management and work practices and processes (e.g. procuring/ designing/ managing/ undertaking) (APPG, 2023).

This could explain why the respondents also remarked that an often-typical inference from the building professionals was that they tend to have "an over-inflated expectation of what the project budget can deliver." Giving credence to this perspective, several interviewees (RA, RB, RG), concurred, by drawing on their typical experience of the planning phase of a project, stating that "they would consider defining the health & safety scope to be one of the most difficult components of the project." This was rationally explained by interviewee RH, who indicated there needs to be "an educational shift not only from a consultant/professional viewpoint but also from a contractor perspective"; further adding "it's the whole education factor, from gaining a better understanding of the reliance of continual upkeep to the existing building stock to an improved approach to the complexities involved with project management of silica dust control."

The key challenges of OHS standards/regulations and air quality management are extremely interrelated. As such, the barriers affecting both issues intersect and correlate with each other. From the data analysis, it was decided to consolidate these two issues together, under one key challenge as illustrated in Figure 17 and 18. In fact, three or four interviewees inferred this was "the biggest one" with several echoing "unknown conditions" are one of the main causes of project health & safety inefficiencies and performance.

Yet despite these perceptions, a recurrent reaction to this challenge was the common view that it had a direct result on silica dust management processes, particularly within the planning and execution phase of a project. This was summarised by respondent RC, who reflected on their own project experience, observing "the raft of pre-existing contractual OHS requirements, contractor information overload, from fire-related regulations to building safety acts, and CDM on previous projects had impacted a number of processes such as planning/programming/scheduling which had squeezed the project health & safety budget." There was a sense amongst the respondents that this was an inherent part of not only silica dust management in projects but across the wider health & safety landscape, inferring "in actuality you have to design, specify and document health & safety knowing controls are often inadequate" emphasising the need for comprehensive exposure management.

Moreover, such comments add substantial weight to the need to address the current lack of research. It remains to be seen how far housing RMI projects are conforming to current health & safety silica dust technical and quality standards, and where the conflicts might be between education/training and application. Furthermore, such comments underline the need for multi-layered controls and harmonised standards, relevant for UK regulatory improvement and air quality management frameworks.

Thus, despite an apparent paradox, respondents from a public sector capacity, in general, viewed this challenge as being prohibitive in nature, encapsulated by RH, lamenting "meeting the requirements of silica dust standards can be time-consuming and creates difficulty from a business perspective when trying to schedule and/or programme the intended works." Whilst private sector professionals RA and RJ viewed it as a tool to drive quality housing RMI works, stressing "a lot of additional project management activities, in not only the design process but also the construction process, are needed to achieve compliance with standards and provide quality outcomes."

Yet, regardless of this apparent contradiction, the consensus of all interviewee professionals agreed, when dealing with such technical requirements, that a lack of understanding of the intricacies of current health & safety/ RCS control and exposure/sustainability standards, were one of the main reasons behind the poor OHS performance highlighting, "a considerably greater level of consultation is required, as there are significantly more people, procedures and processes to consider."

This demonstrates that deciphering technical safety challenges into their individual areas was indeed difficult, as health & safety ought not to be viewed as a straightforward and simple process. On the contrary, the project's health & safety technical challenges ought to be viewed as a natural part of a holistic and integrated approach, based on a triple partite philosophy (quality, performance, and effectiveness) combined with firm action and advanced deployment of expertise and skills. This gives rise to a further question: how can quality, performance and effectiveness be achieved in the control and exposure of silica dust within housing RMI projects? This could explain why all eight interviewees declared that further significant barriers were: "limited understanding of exposure risks in different work scenarios along with lack of understanding and use of key construction air quality process management frameworks."

5.3 Awareness, Understanding and Knowledge of Silica Dust Practices

As an initial starting point, the eight interviewees were primarily posed the following open-ended question: **"In your opinion, what is your current leadership awareness, understanding, and knowledge, of silica dust exposure and control practices?"**

The perspectives of the eight industry leaders demonstrated they have a coherent awareness of the importance of the significance of employing best practice RCS control and exposure and the associated management and work practices and processes (e.g. procuring/designing/managing/ undertaking) (Figure 23).

However, when probed further, consistently (6) there appeared to be a lack of assigned importance of engineering controls, water suppression, proper PPE/RPE, and health surveillance. Nonetheless, compellingly, within this question, there were numerous skills development issues identified, ranging from the lack of understanding of the technical knowledge, to the complexities involved with silica dust management to a knowledge and awareness deficiency concerning adopting an effective silica dust management regime and its related benefits and challenges.

They did offer a reason as to why this might be, to which, interviewee RF summed up succinctly, that given the distinctive, complex and interrelated nature of silica dust practice (i.e. various tools, methodologies and frameworks), "it was a dynamic environment, where it not only makes it difficult to differentiate completely as to what the key skills development needs really are, but also the processes and practices involved are closely linked, making it even more difficult to separate." This suggests that many current leadership skills and knowledge acquired was achieved through working experience and tacit knowledge, although it was found there was a lack of a defined training and development strategy, as the majority interviewed remarked having had only approximately 2 days of continuous professional development (CPD) training (over a period of 12 months).

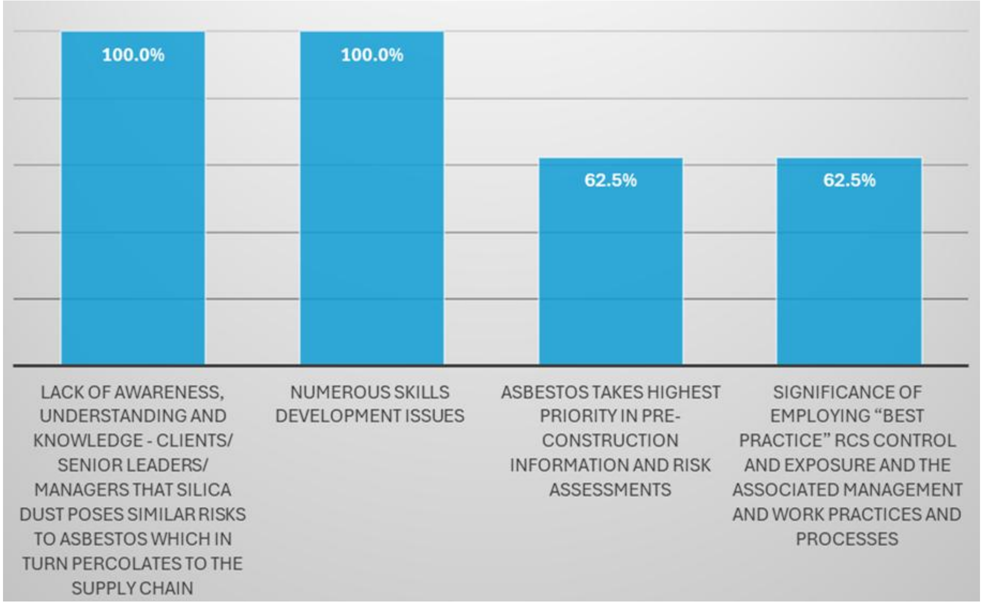


Figure 23: Percentage of Interviewees - Awareness, Understanding and Perception of Silica Dust

Interestingly two interviewees (RB and RH) from an organisational perspective alluded to the fact that they "offload all health & safety information to externals such as CDM advisors" further admitting that there were "cost implications of engaging with specialist health and safety advice." When pushed on this, they conceded such decisions were taken due to the deficiencies in knowledge and competency of their existing workforce (management and operatives).

This was rationally explained by interviewee RH, who indicated there needs to be "an educational shift not only from a consultant/professional/contractor viewpoint but also from a leadership perspective"; further adding "it's the whole education factor, from gaining a better understanding of the overreliance of OHS discharge to principal designers (PDs) or principal contractors (PCs) to an improved approach to the complexities involved with project management silica dust exposure and control needs."

Based on the comments, perceptions and attitudes from the eight semi-structured interviews, the emergent discourse illustrated that most leadership professionals within the housing RMI sector currently have deficiencies in knowledge and competency, as illustrated in the comments, which in turn, can lead to both profitability and productivity deficiencies as well as reduce performance, quality and, importantly, impact safety. The silica dust management process was considered a complex ecosystem (people, processes, technology, and structure) by most of the interviewees (6).

All interviewees (8) conceded that, in their view, all key skills development issues were of equal importance. However, the plethora of key issues offered by respondents indicate that the overarching recurring mantra: formal education was deficient in preparation for implementation of RCS control and exposure and the associated management and work practices and processes (e.g. procuring/designing/managing/undertaking).

They all concurred that this needs to be addressed, which for some may mean a radical departure from current practice. The responses from the interviewees (8), observed the same core shortcomings, in terms of awareness, knowledge and understanding, as observed from the survey data of middle management. Further correlation between the two data collation instruments emerged, as a distinctive pattern surfaced with continual similar associations between perceptions of and attitudes towards formal management control measures (e.g. RAMS; hierarchy of control; training etc). Ultimately, they offered the same core issues, a leadership deficiency along with a lack in formalised training, and the lack of a defined educational pathway.

Perhaps adopting an interdisciplinary approach to training is a way of providing a pathway for leaders and middle management to gain the necessary skills and knowledge needed to achieve successful silica dust management. Plausibly, implementing such a more integrated approach within a highly collaborative working environment, in which shared values and goals are the vision, can lead to real improvement in silica dust management approaches. In addition, there needs to be not only an integrated approach, but also a move towards supporting the describing of the: underlying management patterns, decision making interconnectedness, need for constant feedback loops, and operational complexity.

Conceivably, this perspective is feasibly a step too pervasive for housing RMI sector; nonetheless, the important conclusion is that no longer can the complexity of silica dust management and its related processes and practices, be ignored. A more integrated approach, where a highly collaborative working environment in which shared values and goals are the vision, could be plausibly implemented.

5.4 Awareness, Understanding and Perception of Construction Health & Safety Process Management Frameworks

As an initial starting point the eight interviewees were primarily posed the following open-ended question: **"In your opinion, what is your current leadership awareness, understanding, and knowledge, of Construction Health & Safety Process Management Frameworks and air quality management practices?"** Further open-ended probing was carried out with a series of sub-questions, to gauge the level of awareness and comprehension of existing Construction Health & Safety Process Management Frameworks (CHSPMF): specifically, the Construction (Design and Management) Regulations 2015, COSHH (Control of Substances Hazardous to Health) Regulations, 2002, Construction Environmental Management Plan (CEMP), Construction Phase Plan (CPP) CDM, and Construction Indoor Air Quality (IAQ) Management Plan.

To provide some context to the discussions, a brief explanation of current CHSPMFs was provided. Thus, once given insight and a brief description of these frameworks, the respondents were asked about their understanding and awareness of such frameworks. The overall response to this question was quite negative, particularly from interviewees (5) not involved in specific health & safety roles, resulting in five main issues identified (see Figure 24): resistance to change, lack of awareness (inadequate level of knowledge and understanding), and uptake.

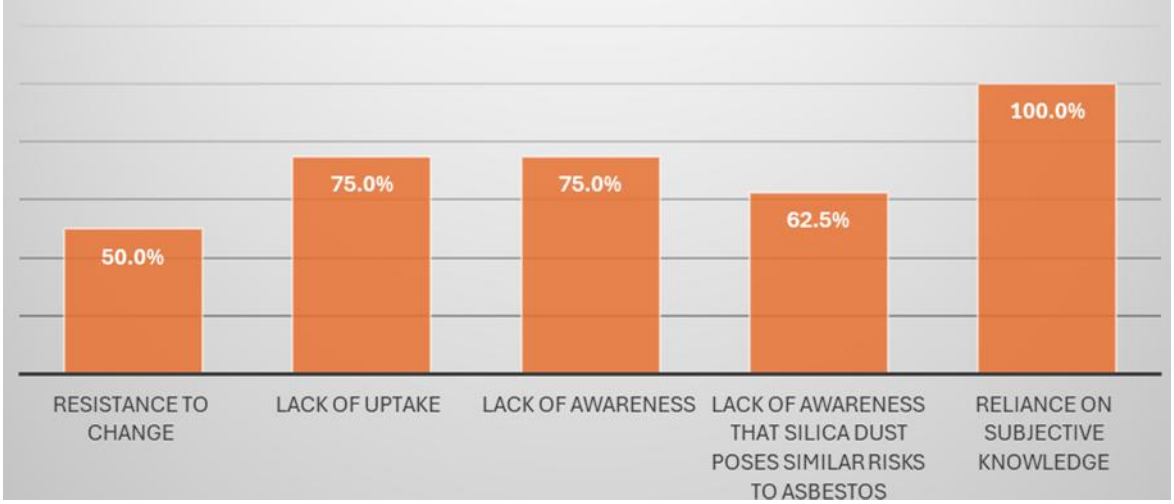


Figure 24: Percentage of Interviewees - Awareness, Understanding and Perception of CHSPMF

Emerging as key issues that are inherently linked, was a distinct poor level of uptake, knowledge and understanding as six from eight interviewees indicated that they had very limited or, from their perception, an inadequate level of awareness and understanding of some of the CHSPMFs. Not just in terms of application, but also in terms of knowledge and familiarity, which logically prevented any effective employment when being involved in RCS control and exposure and the associated management and work practices and processes delivery. For example, two respondents (RA and RD) emphasised "knowing about such frameworks as CPP, CDM and COSHH, is a given - however as for the rest of the frameworks... being honest they are something I don't even consider" reasoning "process management arrives as a last thought."

When asked to expand further, they remarked "you always hear about process management, and to some degree we do understand its use, but for us it would take time and considerable effort to actually use them." Returning to the main reason as to why they had never used such frameworks, they suggested the inherently "restrictive" environment of health & safety implementation and its "complex and interdisciplinary" nature tends to breed a negative behaviour, whereby there is a "laissez-faire attitude", which in turn amplifies the "resistance to change" culture.

Conversely, two interviewees (RF and RG), based on their professional background pointed out that they had used such frameworks in the past and "take part in things like CPD and ethics so that [they] ensure [they] have knowledge and understanding of how to apply such frameworks". Although, they further identified that most times they had employed these frameworks was typically involving new build house developments, rather than on solely on housing RMI projects.

Nonetheless, when investigated deeper, they had found them to be of only a limited use within housing RMI projects, indicating "there is no relevant one at present; they're not particularly suited to the nuances of the industry"; citing predominantly the bespoke nature of projects allied to the terminology used in these frame works did not match the terminology used by the number of specialist construction SMEs that were involved in housing RMI delivery. Nonetheless, they remarked that these frameworks did have "a coherent workflow".

Despite several practical management guidance documents existing within the literature, all respondents collectively challenged the lack of a cohesive, collective and structured approach to silica dust management stating, “the whole process seems very disjointed and reactionary”, collectively admitting they “tend to use experience and knowledge to guide [them]” as an alternative management tool to the ones discussed; further adding having no defined process was “a normal industry procedure”. In discussing this key issue further, when asked if they believed the development of a defined and structured process framework to improve and enhance health & safety delivery and practice - like the approach used for Asbestos management - they all agreed that it would be “a very welcome addition to our existing toolkit.”

A number of interviewees (5) (RB, RC, RF, RG, RH) reflected that “anything that improves project management, particularly the management of on-site silica dust practice is extremely useful because if everyone involved in the project buys in to it, we can undoubtedly gain improvements in health & safety competence, as well as enhance environmental site conditions in tandem with raising quality on site.” Two interviewees (RD and RF) offered an area that could be further enhanced is the relationship between the supply chain, the design team and the contracting team stating, “those disparate workflows between teams, and all that it consists of, are creating extensive inefficiencies and adding to the already strained project budget.”

Although, they did recognise that the propensity of the sector to use specialist consultants and contractors, coupled with the intensity and diversity of housing RMI information, makes it difficult to move away from silo-working, it was recognised that there is difficulty for a clear lead to come from any one consistent source, reverberating the literature.

Nonetheless, despite the positive outlook, many (6) interviewees remarked in one form or another, “improved collaboration and communication with clients and between contractors and professionals means better working relationships as well as using the skills set of everyone to its best potential.” Coupled with support for such a framework, many (5) of the discussions with the interviewees returned to the residual issue of resistance to change.

Respondents candidly admitted there is an industry inclination not to adopt “new ways of working” or “invest time and money into such areas”, as many assume that engaging in new methods or processes or frameworks runs the risk of being viewed as hazardous. For example, RB declared “we tend to only invest when we can see actual hard benefit; what I mean is the real benefits: cost, time and impact on the quality of our work.” This is consistent with the findings of several studies (Hardie and Newell 2011; Sexton and Aouad, 2006) who investigated the barriers of the uptake of new and innovative processes highlighting the key the difficulties in evaluating cost-benefits of investments, indicating that having no defined process was “normal industry procedure”. Respondent RG expanded on this practice by outlining a typical scenario for the scoping of works at the project planning stage and highlighting the industry’s fragmentation, remarking; “normally the architect will come up with a
generic scope of works; then it is passed to a building surveyor to do a condition survey, resulting in a different scope of works (sometimes slightly different but invariably markedly different, particularly given if a historic building specialist is involved). Then it is given to the specialist contractor who will assess it again and offer a slightly different scope of works.” Although they did recognise that the propensity of the sector to use specialist consultants and contractors, coupled with the intensity and diversity of historic building repair and maintenance information, makes it difficult to move away from silo-working, as there is difficulty for a clear lead to come from any one consistent source, this

could partly explain why a large number of respondents (8) (RA, RB, RC, RD, RF, RG, RH, RJ) reported "that disparate workflows between teams and all that this consists of, are creating extensive inefficiencies and adding to the already strained project budget through costly rework", and that they felt "project managers no longer have control over projects."

5.5 Key Opportunities and Recommendations

As a final question, in the series of four semi-structured questions, with the eight interviewees, they were primarily posed the following open-ended question: **"In your opinion, what are the key opportunities and recommendations that would support clients/senior leadership to drive more silica dust exposure and control practices into projects?"**

Like section 5.2, the key issues were identified, and, in line with the thematic analysis methodology, the key category opportunities and recommendations, which emerged from the data analysis, were housed under: (1) senior management; the supervision; planning and administrative processes; (2) human resources; the specific practical project related knowledge, skills and abilities issues; (3) technical safety (competence); the off- or on-site technical safety activities and processes (Figure 25).

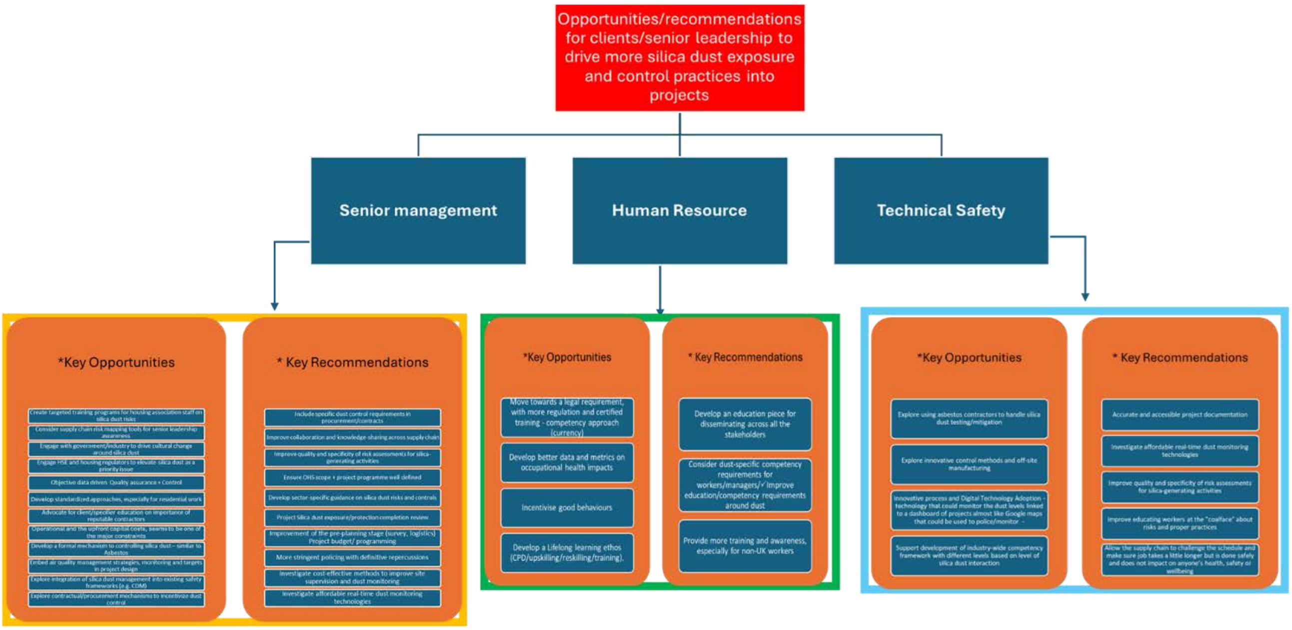


Figure 25: Themes of Key Opportunities and Recommendations – see pages 11-14 for more details

5.5.1 Theme 1: Senior Management Opportunities and Recommendations

Opportunities

In terms of opportunities for improvement, the interview data highlighted a raft of possibilities (see Figure 24) ranging from developing a formal mechanism to controlling silica dust – akin to asbestos – to seeking to embed air quality management strategies, monitoring and targets in project design to exploring contractual/procurement mechanisms to incentivise best practice silica dust control to creating targeted training programmes for housing association staff and residents on silica dust risks.

Recommendations

In terms of recommendations, again a range of suggestions were offered (see Figure 24) from including specific silica dust control requirements (e.g. KPIs) in procurement/contracts to more stringent policing with definitive repercussions to improving the quality and specificity of risk assessments for silica-generating activities to developing sector-specific guidance on silica dust risks and controls.

5.5.2 Theme 2: Human Resources Opportunities and Recommendations

Opportunities

In terms of opportunities for the thematic area of human resources, the interviewees offered four key suggestions, namely: move towards a legal requirement, with more regulation and certified training - competency approach (currency); develop better data and metrics on occupational health impacts; incentivising good behaviours; and to develop an organisational lifelong learning ethos (CPD/upskilling/reskilling/training).

Recommendations

In terms of recommendations, three key suggestions were offered: develop an education piece for disseminating across all the stakeholders; consider dust-specific competency requirements for all staff; and provide more training and awareness, especially for non-UK workers.

5.5.3 Theme 3: Technical Safety Opportunities and Recommendations

Opportunities

In terms of opportunities for technical safety improvement, four key areas were identified: explore using asbestos contractors to handle silica dust testing/mitigation; explore innovative control methods and off-site manufacturing; innovative process and digital technology adoption - technology that could monitor the dust levels linked to a dashboard of projects almost like Google Maps that could be used to police/monitor; and support development of industry-wide competency framework with different levels based on level of silica dust interaction.

Recommendations

In terms of recommendations, five key areas were identified: accurate and accessible project health & safety documentation; investigate affordable real-time dust monitoring technologies; improve quality and specificity of risk assessments for silica-generating activities; improve educating workers at the coalface about risks and proper practices; and allow the supply chain to challenge the schedule to ensure health, safety and wellbeing for all stakeholders (e.g. make sure job takes a little longer but is done safely and does not impact on anyone's health, safety or wellbeing).

Findings Overview

The perspectives of the eight industry leadership experts and the number of identified opportunities and recommendations confirmed the complexity of the current landscape facing senior leadership in driving silica dust management. Nonetheless, this demonstrated they all have coherent ideas and evaluation of the importance of sector modernisation, innovation and process improvement. Though they caveated that "invariably across the sector there were difficulties in keeping informed of the latest processes and tools available to improve health & safety performance."

Hence, they were uniform in their view that the opportunities and recommendations offered were inextricably linked to the range of education and training challenges facing the sector, at an industry-wide and project level. With the consensus, when questioned further on education and training, all agreed devoid of auditing their current practice, to identity the gaps it will be "difficult to determine as to the more effective areas for training." Furthermore, they indicated that any improvement needed to be driven by hard evidence, with RJ highlighting "really any improvement whether training or actual processes needs to be tried and tested, to be torn apart, and to be criticised to allow lasting improvements to be made."

The respondents indicated that these management concepts are currently seen as a weakness. All the interviewees (8) stressed they believe these recommendations "to be more of an opportunity to support continuous
improvement"; further suggesting if any of these propositions were developed and created "they could provide a much-needed silver bullet, to not only the sector, but the wider societal overarching need for clean air." There appeared to be a lack of understanding/experience/knowledge of current construction health & safety process management frameworks (CDM, CEMP, CPPs, etc.) and how to employ these tools to sufficiently address silica dust (in fact all construction dust).

Hence, collectively, it was felt there were two key senior management, human resources and technical support areas, which would provide more relevance and currency, offering; (1) the need for an up-to-date technical construction process management framework handbook/guide tailored for silica dust exposure and control – offering a structured roadmap approach to the silica dust management process mirroring the existing approach to Asbestos management and control; and (2) create a raft of HA demonstration projects showcasing the benefits of employing such a framework - offering the findings as a benchmark but also raise the awareness and highlighting the ROI and CBA potentials.

Hence, developing and creating such a formal mechanism, according to several interviewees (RB, RC, RF, RG) "would help direct [their] thinking", while many observed, "guidance would improve and increase the possibilities of using a framework" and highlighted "as a by-product", it could "prompt contractors to adopt a more pertinent management function." Therefore, this could help guide, both practical and professional reasoning towards adopting and deploying a more joined up approach. With many interviewees suspecting the lack of identifiable benefits which could be realised from engaging in such a silica dust process, the road map may not be conducive to adoption across the sector.

Therefore, it was unsurprising that all touched on the need for demonstration projects highlighting the potential time, cost and quality benefits. This was encapsulated by interviewee RF, who stressed "it would be a highly effective way to show pay back for all scales of projects from straight forward to complex projects." They further added "having greater access to hard evidence from real life projects would be extremely valuable." It was striking to note that they underlined "that enabling the whole team to work towards the same aspiration, allowing everyone to be on the same page resulting in swifter decision making would, without a doubt, be a major step forward in helping ensure the silica dust management success."

The interview findings produced diversified yet correlated findings, in alignment with the questionnaire, such as providing a standardised approach; adopting integrated management processes; enabling more transparent, and better, communication and collaboration between desk and field management and field practice; improve the design of work practices/processes and workspace with respect to safety; and optimum utilisation of current training capacity; and harnessing digital and technological innovations (practice and training).

This suggests that, in order to achieve the combined health & safety delivery performance objectives of health, safety, environment and quality on projects, leadership teams need to not only look for new management paradigms and practices that lead to real improvement but also be aware of the benefits and advantages of such tools. However, whilst, providing a valuable snapshot, the need for caution is critical in terms of the reliability of data, as the responses offered would likely be focused on their own perception of needs.

6.0 Recommendations

In this section we have included recommendations we would like to see implemented at an industry and project level. A systemic change needs to occur at a triple level: at government, industry and project level to see rates of silica dust impacts decrease. To support this, the industry must focus on how it currently approaches management of exposure and control of silica dust, and how training and education for desk and field management (i.e. off-site and on-site) and field practice (i.e. on-site workforce) can be better fostered. Hence, the recommendations are focused on these areas for industry and projects to make progress in. Allowing decision-makers to move forwards, to positively influence Housing sector OHS silica dust approach, systems, and tools, and prepare the workforce more competently, by better engagement with the skills needed.

Additionally, this research will support the development of a Resident, Client & Construction Professional silica dust toolkit (ReACT).

Government

In January 2023 the UK's All Party Parliamentary Group (APPG) for Respiratory Health released an up-date of its 2020 report on silicosis (*Silica – The Next Asbestos?*). This new report laid out several clinical and regulatory recommendations that are intended to make a real difference to silicosis outcomes and the future protection of workers' health from RCS. However, whilst the report is a step in the right direction, it only focused on the risk of silicosis, yet RCS can create serious respiratory diseases such as pneumoconiosis, COPD, asthma, and bronchitis; along with a range of autoimmune, cardiovascular and renal diseases; and cancer dangers, resulting in reduced life expectancy, not only to occupationally but also non-occupationally exposed individuals.

While the report gained widespread support from numerous industry and safety groups, Jim Shannon MP, the Democratic Unionist Party MP for Strangford and chair of the All-Party Parliamentary Group for Respiratory Health suggested there appears to be an overall lack of focus silicosis and the government, the Health and Safety Executive (HSE) and the silica-related industries need to wake up to the dangers before it is too late. Whilst there appears to be a shared unconsciousness to the dangers of silicosis, the same cannot be said for the numerous other disease dangers (autoimmune, cardiovascular, renal diseases and cancer) from RCS exposure. Yet, a key part of the UK government's objective is to reduce health inequalities across the country. Such diseases are placing an immense strain on health systems not only in the UK, but also worldwide. Although when looking at other countries, the situation seems to mirror itself, whereby silicosis is the focus.

The current UK government are committed to a preventive approach to air pollution, of which construction dust and, by association, silica dust are significant contributors (both indoor and outdoor), particularly within urban areas. In 2024, for England *The National Planning Policy Framework* (NPPF) and the National Planning Framework 4 (NPF4) Scotland introduced updates surrounding air quality and the government have also pledged to deliver a comprehensive and ambitious Clean Air Strategy. The NPPF4 will look to enhance the planning system which is a positive move forwards. However, it is unlikely to have an impact on how organisations deal with silica dust exposure. Whereas the Clean Air Strategy has a section on emissions reduction and actions from homes. It specifically targets the reduction of fine particulate matter ($PM_{2.5}$), (silica dust/RCS tends to be below PM_{10}), setting a goal to reduce the number of people living in areas with such concentrations above 10µg/m^3 (the WHO recommended limit) by 50%.

Clean Air Strategy

Given construction is a high-risk sector for the number of operatives employed and who are reporting poor levels of respiratory, cardiovascular, autoimmune and cancer health, along with similar impacts directed towards non-occupational groups, the government should:

- Work with industry stakeholders to develop and monitor the effectiveness of the strategy and its intended outcomes, in relation to construction activities within the housing RMI sector.
- Include a dedicated section within the strategy which focuses on a tailor-made approach for each high-risk construction sector, such as housing RMI.
- Develop metrics for measuring the effectiveness of RCS/silica dust initiatives that the government puts forward as part of this strategy to ensure good outcomes.
- Produce targets that can be measured on an annual basis
- Assess the implementation costs of these recommendations and commit funding to implement this work.

Industry

Silica dust approach, systems, and tools

To support the reduction of the risk of longer-term impact from working in a silica dust exposed environment, whilst addressing the serious concern about the gap between guidance and practice within the professional and contractor landscape, the industry should:

- Develop an up-to-date technical construction process management framework handbook/guide tailored for silica dust exposure and control – offering a structured roadmap approach to the silica dust management process mirroring the existing approach to asbestos management and control.
- Undertake detailed research and information to develop effective strategic, tactical, and operational housing RMI sector-specific indicators, to encourage greater inclusion at the design and procurement stages to ensure projects are deliverable without having negative consequences on people's health and wellbeing.
- Explore the feasibility of undertaking the quantification of RCS exposure (exposure assessments) of the housing RMI sector common silica dust related work processes, practices, activities, and tasks to provide a deeper understanding of project specific RCS issues and implemented control measures.
- Implement mandatory RCS training and skills development (trainee/upskilling/reskilling), to support best practice approach to safeguarding the workforce and the public when involved in various work processes, practices, activities, and tasks (akin to P405 – Management of Asbestos in Buildings).

- Use the tendering process to reward organisations, contractors and developers who are taking proactive approaches to improving silica dust control within their workplace.

Project Level

It is not enough for industry to tackle this alone. UK housing associations, local authorities and registered social landlords must also support individuals and businesses to enable better wellbeing for all. As this report contained only UK responses, we are directing the following recommendations to such organisations:

- Employ existing approved code of practice and guidance for asbestos as a guiding best practice framework/methodology to follow when dealing with RCS dust control and exposure
- Embark on thorough occupational health preventive and protective measures (e.g. bespoke risk assessment, integrated health surveillance and development of enhanced exposure limit guidance and training) that reduce the risk of longer-term impact from working in a silica dust exposed environment.
- Explore the potential to develop a series of housing RMI sector best practice demonstration projects to showcase the benefits of employing such a framework - offering the findings as a benchmark but also to raise the awareness and highlighting the ROI and CBA potentials.
- Sustain future progress by adopting a continuous improvement approach (e.g. safety excellence competence), built on optimal utilisation of current/future training capacity, to support enhanced skills development competence.

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