

Do insulation products of man-made vitreous fibres still cause skin discomfort?

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doi:10.1111/cod.12178

Summary

Background. Man-made vitreous fibres (MMVFs) are used in products for insulation and as reinforcement in materials. Contamination of the skin may arise through direct or indirect contact, and from the deposition of airborne fibres. The scientific basis regarding the effects on skin of MMVFs dates from 1970–1980.

Objectives. To investigate whether currently used insulation MMVF products still cause skin discomfort.

Methods. Focus group interviews and structured interviews were performed among workers engaged in insulation tasks and among do-it-yourself consumers with a recent experience of MMVF products.

Results. A majority of interviewees experienced skin discomfort when handling MMVF products. Complaints caused by traditional (yellow) glass fibre products were more severe than those caused by products of rock or slag wool fibres. The wrists, forearms, neck and face were the locations where the skin was most affected. The situations causing problems varied between occupational tasks, but working with the hands over the head or in narrow spaces were described as the worst situations. Building construction apprentices performed insulation tasks more often than senior workers.

Conclusions. MMVF insulation products do still cause skin discomfort. Updated knowledge about people's experiences of work with such products should influence legislation.

Key words: focus group interviews; man-made mineral fibres; man-made vitreous fibres; mineral wool; MMVF; skin irritant.

Man-made vitreous fibre (MMVF) is a name used to describe inorganic fibre materials made from glass, rock, slag, and different inorganic oxides (1–4). They are used in many applications, for example in acoustic, thermal and electrical insulation products, as reinforcement in all

kinds of products, and as filling materials (1–5). In this study, the following terminology has been used:

- Glass wool/fibres – MMVFs made of glass. Colour: yellow, white, or brown.
- Rock or slag wool/fibres – MMVFs made of rock, stone, or slag. Colour: grey or green.
- Insulation wool/fibres – fibres used for the purpose of insulation; include glass wool and rock or slag wool/fibres.

Dermal exposure to MMVFs can occur through direct handling and contact with such materials, and through contact with contaminated areas, clothes, and personal protective equipment, but also through the deposition

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*Funding sources: Financial support was given by the Swedish Council for Working Life and Social Research.

Conflicts of interest: The authors have no conflicts of interest to declare.

Accepted for publication 6 November 2013

of airborne fibres, as described in the conceptual model of skin exposure proposed by Schneider et al. (6). Historically, it is common knowledge that MMVFs can cause irritant contact dermatitis resulting from mechanical irritation as the fibres penetrate the skin, but they can also cause itching, heat, and pain (7–10). There is some indication that coarser fibres of MMVFs cause more severe discomfort (7, 10–12). The MMVF may also exacerbate eczema in persons with atopic eczema (13–15). Lichenification can occur, but the sometimes suggested ‘hardening’ of the skin is controversial (7, 10, 14, 15). Studies from the manufacturing and building industries in Sweden performed during the 1970s (7, 8) showed that more than half of the workers coming into contact with MMVF products at that time felt skin discomfort. Approximately 10% of these could not continue working with the materials (7). Similar outcomes were described in early US studies (10). In a Danish workers’ union study on self-reported skin discomfort published in 1991, 67% of the workers reported skin discomfort when handling MMVFs for 160–180 hr/month (9).

Skin irritation caused by MMVFs may be a serious clinical problem for persons working in the manufacturing industries and those working on insulation tasks (building construction workers, electricians, loose wool insulators, etc.). Another exposed category comprises do-it-yourself insulators (laypersons), for example persons performing insulating tasks in their own houses, where information about the risk and appropriate safe work procedures is normally minimal.

Collection of information on the present situation in Sweden concerning skin effects when MMVF products are handled can be performed with interviews. These can be of different kinds, for instance questionnaire surveys, structured interviews, or focus groups. A focus group is a form of interview in which a small group of participants talk about a pre-assigned subject (16) and are led by a moderator. The size of focus groups usually varies between 4 and 10 participants, depending on the subject of the interview (17). Focus group interviews use open-ended questions in order to explore the participants’ own questions and explanations (16). In focus groups, the questions are focused and the aim is not to reach a consensus (18).

The currently available scientific basis for the effects of MMVFs on skin depends on results from workplace studies, case reports and experiments performed in 1970–1980. The overall aim of this study was to update and increase the knowledge about the effects on skin of currently used MMVF products by gathering workers’ and do-it-yourself consumers’ own experiences and views on working with such items.

Methods

Participants

A total of 106 participants were recruited by purposive sampling in order to obtain information from subjects with actual experience of handling currently used MMVF materials (Table 1). They were construction workers in different professions or do-it-yourself consumers aged between 18 and 65 years. All except 3 were males. Forty-four building construction workers were recruited with the help of company safety officers or similar from two large building construction companies (at least 5 were young apprentices). Seventeen electricians were recruited from one large building construction company and one small contractor through safety officers and through a representative from the Swedish Electrical Contractors’ Association. Eight bricklayers from one large building enterprise and one small contractor were recruited; one group was mostly Spanish-speaking. Also, 15 loose wool insulation workers from two small contractors and 8 pipe and ventilation workers from one single ventilation contractor were recruited. Fourteen private consumers were recruited: 11 were customers at retail stores who were invited after they had bought insulation materials, and 3 were colleagues or friends of the authors with recent experience of performing MMVF insulation tasks.

Interviews

An overview of types of interview, number of participants and tasks is given in Table 1. Some typical insulation tasks are shown in Fig. 1.

Pilot structured interview. Interviews (n = 11) were performed to test questions and gather information on working tasks and available fibrous insulation products.

Focus group interviews. In total, 12 focus group sessions were performed during 2009–2010:

- (1) Six groups (one with apprentices only) with building construction workers at two large construction companies (n = 33).
- (2) Two groups of facade insulators (bricklayers) (n = 8) – employees at a large building construction company and a small contractor.
- (3) Two groups of loose wool insulators (n = 15) from two contractors.
- (4) Two groups of electricians (n = 17) – employees at a large building construction company and one small contractor.

Table 1. Overview of the study with focus groups and structured interviews concerning skin discomfort caused by man-made vitreous fibres (MMVFs) by profession, work task, and use of different MMVF materials

Type of interview, company ID* and number of groups when more than one	Occupation	Tasks	No. of participants	Notes
Focus groups interviews				
A: three groups	Building construction worker	Indoor insulation	17	–
B: two groups	Building construction worker	Indoor insulation	11	1 female/10 males (including 1 foreman)
B	Building construction worker	Indoor insulation	5	Only apprentices
B	Bricklayer	Outdoor facade	4	–
C	Bricklayer	Outdoor facade	4	Spanish-speaking group; 1 interpreter (foreman)
D	Loose wool insulation worker	Indoor insulation	11	Glass wool (white); 1 foreman
E	Loose wool insulation worker	Indoor insulation	4	Glass wool (white)
B	Electrician	Electrical work	11	1 workplace safety officer
F	Electrician	Electrical work	6	–
All participants in focus group interviews			73	
Structured interviews				
A (pilot study)	Building construction worker	Indoor insulation	11	–
G	Pipe and ventilation worker	Pipe/ventilation	8	1 female/7 males
–	Private consumer	Different insulation	14	1 female/13 males
All participants in structured interviews			33	
All participants			106	

All had experience of working with rock or stone wool (green or grey) and with yellow glass wool. Experience with white glass wool and groups with female workers, foremen or other types of personnel are shown in the Notes column.

*Company ID: A, Peab AB; B, Skanska; C, JM AB; D, Sprutab AB; E, AB Isolerservice; F, Östersjö Elektriska AB; G, Universalisolering Fredriksson AB.

Each focus group interview lasted between 35 and 70 min, and they were conducted at the construction site or in a facility provided by the companies. The interviews were audio-recorded and transcribed verbatim. Two of the authors (L.L. and C.M.) first read and reflected separately on the text, and a discussion then followed, where quotes indicating some major opinions were identified and categorized.

Structured interviews. Structured interviews were performed during 2008–2010:

- (1) Do-it-yourself consumers (n = 14) were interviewed by telephone. Only persons who had purchased MMVF products and insulated within the last year were interviewed. The original intention

was to perform this as a focus group interview, but, logistically, this was not possible.

- (2) Pipe and ventilation insulators (n = 8) at a medium-sized ventilation contractor were interviewed. The intention had been to perform a focus group interview.

Other sources of information.

- (1) Four teachers at two Swedish high schools' construction programmes were interviewed about their tuition concerning insulation and the use of MMVFs. All had long experience with building construction tasks. The interviews were audio-recorded.



Fig. 1. Some occupational insulation tasks: inner roof insulation (a), cutting a batt for inner room insulation (b), cutting a ventilation insulation batt (c), and installing ventilation pipe insulation (d).

(2) Occupational hygiene specialists at different construction companies, union representatives, safety officers and personnel working with occupational health care, in total 12 persons, were interviewed. Their opinions were not used as a separate input, but they contributed valuable information.

Questions and topics in focus groups and structured interviews

The main questions were developed on the basis of a literature survey, expert consultations, and experience from the pilot structured interview. The following main questions and topics (see Questions A, B, and C) were discussed during the focus group interviews, and were highlighted in the structured interviews. As the number of participants in the structured interviews was small, and only covered pipe and ventilation insulators ($n = 8$) and do-it-yourself consumers ($n = 14$), as compared with the number of focus group participants ($n = 73$), who covered different professions, no extensive evaluation of the outcome from the structured interviews was performed.

Question A: Which MMVF material or product in use causes the most skin discomfort?

Question B: What task/working position/situation causes the most skin discomfort?

Question C: Where on the body do you experience discomfort most?

During the focus group interviews, we tried to avoid opinions and discussions concerning working with glass fibre-reinforced wet room boards and wet-area reinforced plasterboards. Handling some of these boards is regarded as extremely inconvenient by many workers (19). Effects caused by inhalation of fibres were also outside the scope of the interviews (2–5, 20–22).

The study was approved by the Regional Ethical Review Board in Stockholm, Sweden (EPN 2009/680-31/2), and all participants gave their informed consent.

Results

The most typical comments and opinions concerning the three main questions in the focus groups are shown in Tables 2–4, separately for different professions or tasks. The comments are listed as direct citations (originally in colloquial Swedish) as recorded during the focus group sessions. These citations were translated into English with the intention of keeping them colloquial.

The structured interviews with do-it-yourself consumers showed that most informants (11/14) reported some discomfort. One person stated that the yellow fibrous material was most troublesome (Question A); 1 felt that

Table 2. Focus group interviews concerning work with man-made vitreous fibres (MMVFs) and skin discomfort; some of the most typical comments and opinions concerning Question A, 'Which MMVF material or product in use causes the most skin discomfort?'

Profession/tasks	Comments
Building construction work	'The yellow material is much worse than the green, I think' 'But the rock wool is at least better than the Gullfiber stuff. The fibreglass one is, well, even more of a bitch' '(Ground insulation boards, rock wool) actually, they are even more prickly, but of course you're not working with them indoors; they're outdoor jobs, so you don't feel it as much' 'It's best to avoid anything yellow' 'The yellow material, the one with fibreglass (itches the most)'
Bricklayer	'We've also found that different types, different qualities, work differently – there are big differences between them' 'Mineral wool ... it's green (itches the most)'
Loose wool insulator	'The rock wool goes right through, of course, so it itches all the same' 'No, as soon as you start using yellow wool you start to feel itchy (previous experience)'
Electrician	'Loose wool is awful. Period!' 'With that one (the white insulation) you can at least hold it without it getting itchy' 'Greyish green is the worst (loose wool)'

inner roof insulation was troublesome (Question B). The majority of the informants (11 of 14) said that the skin discomfort was felt most on the hands, forearms, and neck (Question C), and occasionally in the eyes. One person who reported having had atopic eczema did not report any skin problems related to MMVFs. Two of the pipe and ventilation insulators (2/8) reported some skin discomfort, and all of them worked mostly with green/grey fibrous products. However, one of them preferred working with yellow glass fibre products.

Some other often discussed topics are shown in Tables 5 and 6.

Discussion

This study shows that currently used MMVF products still cause skin discomfort for workers and do-it-yourself consumers. Skin irritation caused by MMVF materials was thoroughly described in 1970–1980 (7, 8, 10, 12, 13). The former hazard classification of MMVFs as skin irritants was removed in 2009, but without scientific

Table 3. Focus group interviews concerning work with man-made vitreous fibres and skin discomfort; some of the most typical comments and opinions concerning Question B, 'What task/working position/situation causes the most discomfort?'

Profession/tasks	Comments
Building construction work	'Ceilings are the worst' 'The actual cutting is not a problem, in terms of dust, but it is a problem when you're installing it above head level' 'Although insulating ceilings is the absolute worst job' 'Insulating a suspended ceiling is the worst possible job – you have to work above your head, and you get everything falling down on you'
Bricklayer	'The person standing at the bottom passing the boards up gets stuff falling onto his head all the time' 'The absolute worst task is above the head'
Loose wool insulator	'It sort of sprays out of the hose, then you adjust the material with your hand and then you're in direct contact with it' '(The worst task is) constructing air gaps. You have to crawl right down to the eaves ... the roof, lie down there ...'
Electrician	'... (work with) those suspended ceiling batts that contain insulation, somehow those seem a lot more irritating' '... loose wool in an attic, crawl in ...' 'When you do a lot of crawling about in attics'

evidence for the change. The overall aim of the present study was to update and increase our knowledge about the skin effects of MMVF products, focusing on products used in Sweden around 2010.

In this study using focus groups and structured interviews, we hoped to receive answers to the following questions: 'Which current MMVF material or product in use causes the most skin discomfort?', 'What task/working position/situation causes the most skin discomfort?', and 'Where on the body do you experience discomfort most?' In all, 106 participants contributed with their opinions and experience in focus groups and by structured interviews. The number of focus group participants is quite large as compared with many other focus group studies (23–29). Participants were building construction workers, bricklayers, loose wool insulators, electricians, pipe and ventilation insulators, high-school teachers, and do-it-yourself consumers. We did not interview workers occupied in disassembling MMVF insulation materials, as this study dealt with current MMVF products. Neither did we interview workers

Table 4. Focus group and structured interviews concerning work with man-made vitreous fibres and skin discomfort; some of the most typical comments and opinions concerning Question C, 'Where on the body do you experience discomfort most?'

Profession/tasks	Comments
Building construction work	'It's worst in the wrists' 'It's mostly on the arms, so you get it in your eyes. That's the worst part' '... and when you get it on your neck, underneath your clothes. That's the hardest thing' 'It falls onto your neck, down on your back, inside your shirt, and everywhere' 'The eyes' 'If you move, it rubs itself in and then it starts to really itch there'
Bricklayer	'No, it's the neck and inside the collar' '... because that stuff is really awful for the eyes' 'It gets in mainly around the wrists'
Loose wool insulator	'... can burn a bit on your face' 'Right when you step into rock wool, it's the calves, I find' 'It really stings in your eyes'
Electrician	'But it was in the armpits you could feel it most ... thinned out, the itching was God-awful' '... (crawling on loose wool) ... Well actually it ends up being everywhere' 'Almost inside your clothes, too'
Pipe/ventilation work	Arms and neck

at large industrial ventilation companies, workers manufacturing MMVF materials, or people working with other types of glassy (amorphous and vitreous) fibres (2–4).

With regard to the first question, 'Which MMVF material or product in use causes the most skin discomfort?', the most common answer or comment was that yellow glass fibre insulation products caused the most skin discomfort (those available in Sweden during 2009–2010). The loose wool insulators, who seldom used yellow glass fibre wool, considered the green/grey rock wool to cause more skin discomfort than the newer white glass fibre wool. Yellow glass fibre insulation products were quite uncommon at the time in the two large construction companies engaged, where more of the grey/green rock wool products were used. Yellow glass fibre insulation products were the most frequently displayed products at building materials stores. White glass fibre wool (described as 'soft as cotton' by some

of the construction workers) was used by loose wool insulators only. We have not found any scientific report supporting or contradicting this statement.

In response to the second question, 'What task/working position/situation causes the most skin discomfort?', building construction workers and electricians jointly stated that working with the hands above the head (insulation of or electrical work in ceilings or narrow lofts) was the worst scenario, because loose fibrous materials fall down onto the face and body. Bricklayers indicated the same, describing the worst situation as lifting the insulation boards up to the next floor or to the frame. This outcome agrees well with what has been found in earlier studies (7, 9, 10, 14, 15). Loose wool insulators indicated no special worst working situation apart from crawling in attics and in narrow lofts.

For the third question, 'Where on the body do you experience discomfort most?', the most common answer was on the neck (inside the collar), wrists, forearms, and face, regardless of profession or work task. Some also indicated occasional discomfort in the eyes. This is in agreement with previous studies (7, 9, 10, 14, 15). During discussions about skin effects, inhalation discomfort, which was caused by the dusty environment according to the participants, was almost always mentioned. However, this was not a topic for the study. At the beginning of the interviews, we asked the participants not to discuss this topic, and we promised to give information about health effects and legislation when the interview was over.

Focus group interviews have been used for studying the effects of hazardous fibres, for instance in a study aiming to identify important information gaps concerning asbestos exposure assessments (30). In a study in Libby, Montana, United States, focus group methods were used in a community experiencing a disaster caused by widespread asbestos exposure (31). In both medical research and occupational and public health studies, focus groups have been used frequently to obtain a variety of information from patients or workers (23–26, 32, 33). Focus groups have been used in dermatology to obtain data concerning experiences of many conditions, for example pruritus in psoriasis (27), dermatological treatments (28, 29, 34), and hidradenitis (35).

The role of the focus group moderator is to facilitate the conversation. The moderator in the present study (C.M.) had no previous knowledge concerning the technical aspects of the problem; such knowledge might have helped to improve the questions with an explicit description of the actual working tasks. A technical expert (L.L.) participated, and answered questions about

Table 5. Some selected and typical comments on topics often discussed during focus group or structured interviews on work with man-made vitreous fibres and skin discomfort

Topics	Profession/tasks	Focus group comments
Warm and sweaty situations	Building construction work	'But it's itchier in warm weather' 'You should never work so much that you start sweating' 'The thing is you start to sweat. That's when you start to feel it' 'But as soon as the weather gets warm, I think I start to feel more itchiness'
Opinions about possible itching: How does it feel? When does it start? How long will it last?	Building construction work	'But it's prickly, itchy and God-awful' 'Like a mosquito bite. It starts out mild, then becomes more and more intense' 'Then on the face it feels like you're being pricked with tiny needles' 'You get these little red dots when it gets on your skin' 'Yes, it comes on fairly quickly – it comes right away' 'Yes, (it lasts for) 24 hr at any rate'
Removing fibres from the skin	Building construction work Teacher	'You'd think it was being absorbed into the skin and the blood' 'Shower ... hot sauna ... I think it stays on you even after you shower. I've heard that cold showers can work ... No, it should be hot, so your pores open and the fibres can get out. I've heard that you should close your pores so they can't get in' 'We say they should take cold showers so as to close the pores' 'No doubt the stuff we're telling everyone is just a cock-and-bull story'
Protective clothes/equipment	Building construction work Teacher	'When you install insulation one day in a T-shirt, for example, if it's in the summer and it's hot, and the following day you wear a fresh T-shirt – you don't put the same one on ... Installing insulation is hot. Ideally you should wear a long-sleeved carpenter's smock, that would stop ... but it gets in between your glove and your sleeve, and at the neck and at the ankles' 'People are lazy – they can't be bothered to put on the protective gear' 'But when you're installing insulation, you wear gloves' 'Apprentices want to wear gloves' 'They didn't much bother to use them'

fibre characteristics and legislation during and after the formal part of the interview.

Could the same answers to the three main questions (A, B, and C) be obtained by some other technique? The use of simple structured interviews alone would have been possible, but the depth in the answers would have been lost. We believe that the focus group interviews enhanced the reliability of the outcome, particularly for Question A ('Which MMVF material or product in use causes the most skin discomfort?'). The interview technique allowed follow-up questions and probing of the information given during the interview, for example when uncertainties were raised about the fibrous material discussed. We also believe that the purposive sampling methods used for recruiting the participants did not influence our findings.

Another interesting finding obtained from the interviews was that the majority of participants agreed that warm and sweaty situations enhanced skin discomfort independently of tasks. Explanations may be the wearing of less clothing and less protective equipment, or the fact that wet/moist skin might increase the deposition of fibres on the skin. This has also been suggested in earlier studies (10, 13–15). The most frequently reported

method for removing fibres from the skin after work was to take a shower. Most thought that cold water was better than hot water, 'so that the pores can close and thus stop fibres penetrating'; some thought that hot water 'opens the pores and lets the fibres out'. However, all claimed that showering does not completely remove fibres. Accounts of severity and duration of the discomfort ranged from slight itching to sleepless nights. This agrees well with what has been previously reported for fibrous materials (10, 13–15, 36).

It was not always easy to distinguish opinions and perceptions derived from experiences of currently used materials from those derived from previous exposure to older products. It was quite clear, however, that those with experience of both new and older materials thought that previous MMVF materials caused more severe skin discomfort. Statements such as 'Now it's much better than what it was' or 'I felt it was much more itchy before' were not uncommon. Occasionally, some new and MMVF-free insulation products were mentioned, indicating that some of these also caused skin discomfort. We did not encourage further discussion on such materials, however, as they were outside the scope of this study.

Table 6. Some more selected and typical comments on topics often discussed during focus group or structured interviews on work with man-made vitreous fibres and skin discomfort

Topics	Profession/tasks	Focus group comments
Apprentices	Building construction work	'But it was worse when I was an apprentice. But that's the way it is for apprentices – they're usually the ones doing the insulation' 'We had a terrible time, so let them have a bad time, too' 'If you have an apprentice, you let him do the grunt work (insulation)' 'As the "slave", you have to expect you'll be doing all the dirty jobs' 'That's how you learn'
How often do you work with insulation products?	Building construction work	'For us it's not a constant task. It pops up quite sporadically' 'If I had to do it constantly, I would have quit long ago' 'That is the kind of job you try to avoid as much as possible' 'You just have to look at the stuff – it's almost as if you start to itch as soon as you start work' 'I find you become immune after a while – after a few days you don't feel it as much as on the first day you're working with it'
Experience of older insulation products	Building construction work	'For sure. I don't feel it itches as much anymore' 'But I also believe today's insulation is much better than what we had in the 1970s and the 1980s' 'It's better than what it was before – before, it made you itch more than now ... The fibres were larger' 'The new types don't itch as much (as the old), but they're more irritating to the airways'
	Teacher	'The old insulation is really prickly and itchy, whereas you don't even feel the new stuff on your skin' 'Old insulation is like needles'
Inhalation and skin discomfort	Building construction work	'But I think that was the hardest part, the throat of course' 'More particles are flying around in the air when you're working with the Gullfiber insulation' 'I find you get a weird sensation in your throat more' 'And it's sure as hell not comfortable for the eyes, the throat, the lungs, the nose, and the body, and so on' '(Where on the body do you feel it most?) ... Inhaling, I find. That would be in the throat, and the eyes ... The face, mostly, in my opinion. The whole face – the eyes, the nose, and ...'

Only pipe/ventilation workers and loose wool insulators were normally exposed to different MMVF fibres on a daily basis. The other groups were exposed on separate occasions depending on tasks, for up to a few days a month. Electricians and teachers did not themselves work with MMVF materials, but were exposed through others handling them.

It is interesting that building construction apprentices performed insulation tasks more often than senior workers, who, we believe, preferred to avoid these tasks. Only apprentices participated in one of the focus groups. They acknowledged the distribution of the work, but also considered the training exercise to be part of their apprenticeship.

Protective equipment was generally limited to gloves and long sleeves, depending on room temperature and whether the insulation task was performed indoors or outdoors. The use of eye protectors was compulsory in one company, but this was viewed with some scepticism by some others. Others assumed they it would be easy

to become accustomed to eye protectors, and saw the benefits of not getting fibres in the eyes. In provisions and general recommendations from the Swedish Work Environment Authority on synthetic inorganic fibres [AFS 2004:1 (37)], it is written that 'with work generating large quantities of dust, protective clothing shall be used. This clothing shall cover sensitive areas of skin, e.g. the neck and forarms'. Also, breathing protectors shall be used 'where it is not technically possible to keep the atmospheric concentration' of MMVFs at an acceptable level.

The fibre products used by participants in the present study were characterized concerning chemical composition and fibre size [there is some indication that coarser fibres of MMVF can cause more severe skin discomfort (1–5)]. The products did not differ markedly from what has been reported previously (Supporting information Doc. S1). Yellow glass fibre materials normally had slightly higher fibre diameters (3.2–6.4 µm) than fibres made of rock or stone (1.7–3.9 µm). The new white glass wool used by loose

wool insulators had a fibre diameter between 1.9 and 2.3 µm, similarly to rock or stone wool. To the best of our knowledge, no data concerning changes in the use of fibrous material during recent decades in Sweden have been published. Additives may be present in fibrous materials (antistatic agents, anti-mould agents, anti-dust agents, binders, etc.), and their use may have changed over time. However, the possible influence of additives was outside the scope of this study.

In 2009, the EU changed the classification of MMVF products (38). The old risk phrase R38 (irritating to the skin) and the new hazard statement H315 (causes skin irritation) were removed. The decision was not unanimous, and some member states recommended that the classification should be maintained (on the basis of studies published between 1950 and 1980). One reason for the present study was to generate new knowledge, so that classification and labelling can be based on currently used MMVF materials.

Insulation tasks in Sweden are apparently performed mostly by men. In the focus groups, there was one female apprentice and two other female informants. A high-school construction programme teacher gave the opinion that female students performed the insulation task 'more accurately and better'. He also mentioned that they carried the insulation boards further away from the body than male students, who often carried more boards and were thus in closer contact with them.

The authors' perceptions from the interviews were that workers' and consumers' own knowledge on possible skin

effects of MMVF fibres was quite low. This often led to speculations and unfounded ideas about risks associated with the materials, as well as notions of mechanisms and treatment. These notions were treated more or less as common knowledge among the workers.

Our study shows that MMVF materials still cause skin discomfort for workers and do-it-yourself consumers. On the basis of the outcome of this study, a controlled provocation study with MMVF materials is currently being performed in a human exposure chamber (39, 40). The results will be presented separately. We suggest that updated knowledge about skin discomfort and other skin effects resulting from work with MMVF materials should be taken seriously, and should possibly result in a renewal of their classification and labelling as skin irritants.

Acknowledgements

We are indebted to all participants in the focus group sessions and interviews, and also to those who helped us in arranging these sessions and other interviews (high-school teachers, union representatives, safety officers, and other occupational health care personnel). Without their participation, this study would not have been possible.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Doc. S1. Fibre size and chemical composition of some current insulation MMVF products in Sweden.

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