International Commission of Occupational Health
Scientific Committee on Thermal Factors (SCTF)

3rd Meeting Report (2022-2024)

Time: Tuesday, 27 June 2023, 3:00 p.m. – 4:30 p.m. (GMT+8)

Venue: Virtual Meeting on Zoom

Participants: Annex I

1. Welcome and Introduction

1.1 Jason Lee welcomed the attendees.

1.2 Jason recapped the objectives of the Scientific Committee on Thermal Factors (SCTF), and also urged that collaborations between SCTF members should continue.

1.3 Jason gave time for invited guest Jenni Kaisto, and new members, Yogeshwaran Murugaiyan and Mohammed Al-Bouwarthan, to introduce themselves briefly.

1.3.1 Jenni Kaisto, Research Scientist, Finnish Institute of Occupational Health, Finland

1.3.2 Yogeshwaran Murugaiyan, Ph.D student, Sri Ramachandra Institute of Higher Education and Research, India

1.3.3 Mohammed Ali Al-Bouwarthan, Assistant Professor, Imam Abdulrahman Bin Faisal University, Saudi Arabia

1.4 Jason introduced another invited guest Alvin Tan, Senior Manager, Workplace Safety and Health Institute, Ministry of Manpower, Singapore.

1.5 The meeting agenda was as follows:

1.5.1 Presentation by Alvin Tan on "*Trial Results for Heat Stress Mitigation in Construction using Ice Slurry"*.

1.5.2 Presentation by Mengzhen Zhao on "*Estimating Economic Costs of Occupational Heat: Why and How*".

2. Alvin Tan: "*Trial Results for Heat Stress Mitigation in Construction using Ice Slurry".*

2.1 Link to presenter's deck

2.2 Alvin Tan presented about a pilot study involving more than 200 construction workers, which aimed to measure the effectiveness of ice slurry, and gauge the workers' reception of ice slurry.

2.3 Alvin shared that workers who consumed ice slurry had lower average Perceptual Strain Index scores, and workers also shared positive feedback about the ice slurry. However, concerns were raised by supervisors over cost and manpower constraints if ice slurry were to be implemented as a long term solution.

2.4 Alvin concluded that the suitability of using ice slurry will continue to be studied, and the ice slurry manufacturers will explore more practical and scalable solutions for on-site deployment.

2.5 Discussions:

2.5.1 Sirkka Rissanen raised a question about the possible disadvantage of consuming cold drinks.

2.5.1.1 Alvin replied that although ice slurry may not be suitable for individuals who experience symptoms such as sore throat, runny nose, or cough, the consumption of cold water has not been known to pose any inherent harm to the human body.

2.5.1.2 Sirkka continued to ask about the recommended amount of ice slurry for consumption each time.

2.5.1.3 Alvin answered that he was aware of low volumes of ice slurry less than 200ml being ineffective in lowering body core temperature, hence workers consumed about 400ml of ice slurry each time.

2.5.2 Yogeshwaran posed questions on whether the study involved indoor or outdoor workers, and the challenges faced during the study.

2.5.2.1 Alvin commented that the study involved mostly outdoor workers. He also shared that one concern was the durability of the ice slurry machine when placed in a rugged environment like a construction site. Another concern was the cost of the ice slurry, though a potential solution could be to disseminate it via vending machines so that companies can subsidise some of the cost.

2.5.3 Bruno Lemke asked if there were cases of brainfreeze leading to migraines among workers during the study.

2.5.3.1 Alvin responded that this side-effect of consuming ice slurry was dependent on individual responses to consuming cold drinks, and the rate of consumption. He also sought the insights of Jason Lee on the side effects of brainfreeze when consuming cold drinks.

2.5.3.2 Jason suggested that the benefits of consuming cold drinks may outweigh the acute discomfort from consuming cold drinks.

2.5.3.3 Bruno brought up the possibility of workers disliking the sweetness of ice slurry, comparing it with his own study which found discomfort among pre-diabetics when consuming glucose drinks.

2.5.3.4 Alvin explained that the sugar content in the ice slurry might not put the workers at risk of diabetes due to the workers' strenuous physical work under the hot sun. He also mentioned that potential long-term side effects such as dental issues could be an area of concern worth investigating.

2.5.3.5 Jason added that consumption of high sugar drinks such as energy drinks is a trend among construction workers in Singapore and Thailand. He assured that the ice slurry contained about half the sugar content found in energy drinks and thus, the ice slurry should be a better hydration choice.

2.5.4 Efi Yuliati Yovi enquired if body core temperature will still be lowered if non-isotonic beverage is used.

2.5.4.1 Alvin Tan replied that the cold temperature of the ice slurry played a larger role in lowering workers' body core temperature than its isotonic nature.

2.5.4.2 Jason clarified that Efi was also referring to a possibility where workers who consumed other cold beverages can also benefit from a lowered body core temperature. However, he assured that many studies have shown that consumption of beverages in ice slurry form produced a greater impact than consumption in non-ice slurry form.

3. Mengzhen Zhao: *"Estimating Economic Costs of Occupational Heat: Why and How".*

3.1 Link to presenter's deck

3.2 Mengzhen Zhao shared about the necessity of estimating economic cost from specific climate change impact channels, factors affecting heat impacts on economy, and current methods of estimating economic costs.

3.3 Mengzhen proposed that future research can be expanded to more granular levels, estimate wealth impact rather than only gross domestic product (GDP), and conduct cost-benefits analyses of different adaptation measures at different levels.

3.4 Discussion:

3.4.1 Elspeth Oppermann commented on the possibility of reduced labour supply to arise from normal and morbidity health endpoints in Australia, and possibly Europe and USA, due to better labour mobility.

3.4.2 Kinnaleth Vongchanh clarified about how the different classifications for administrative measures in heat stroke prevention were made, and requested Mengzhen to explain adaptation measures affecting heat impact on economy.

3.4.2.1 Mengzhen replied that she was unaware of how the different classifications for administrative measures in heat stroke prevention were made.

3.4.2.2 Jason stated further that the threshold values were possibly dry bulb temperatures and are usually derived from mathematical calculations, which may sometimes be linked to epidemiological data.

3.4.2.3 Mengzhen elaborated more about economical impacts of adaptation measures taken against heat impacts.

3.4.3 Bruno Lemke expressed his surprise that Sweden is an outlier in terms of GDP loss despite its cold weather.

3.4.3.1 Mengzhen associated the high rate of saving and growth rate of labour, and added that GDP growth in Sweden will mainly depend on labour input in the future based on predictive models.

3.4.4 Hsiao Yu Yang enquired if Mengzhen was aware of methods to measure adaptation levels between countries for comparison.

3.4.4.1 Mengzhen suggested that while the AD-DICE model could be a possible method to estimate adaptation levels, she does not know other models.

4. AOB

4.1 Jason Lee shared about the 34th International Congress on Occupational Health (ICOH2024) held from 28 April to 3 May 2024 in Marrakesh, Morocco, and cited this as an opportunity for members to convene and trigger more collaborations.

4.2 Jason highlighted that the number of SCTF members has grown from about 10 members to 32 members, showing that the problem has been growing and more attention has been gained.

4.3 Jason concluded the meeting by quoting Associate Professor Daniel Brooks from Boston University. The quote is as follows: “It is true that causes of chronic kidney disease or other diseases are indeed multi-factorial, but in itself that is not a very meaningful statement, because we know every disease is multifactorial. The real question from a public health perspective is what exposures are important causes, either independent or interacting with heat stress. Causes of diseases are multi-factorial but causes of epidemics usually are not.”.

Meeting minutes were recorded by Clarence Leow, endorsed by Sirkka Risannen (Secretary) and approved by Jason Lee (Chair).

Annex I – List of Attendees

Jason Lee (Chair), National University of Singapore, Singapore

Sirkka Rissanen (Secretary), Finnish Institute of Occupational Health, Finland

Alvin Tan, Ministry of Manpower, Singapore

Bruno Lemke, Health and Environmental International Trust, New Zealand

Clarence Leow, National University of Singapore, Singapore

Efi Yuliati Yovi, IPB University, Indonesia

Elspeth Oppermann, Ludwig-Maximilian University of Munich, Germany

Gerald Yeo, Ministry of Manpower, Singapore

Hidenori Otani, Himeji Dokkyo University, Japan

Hilde Feverik, SINTEF Digital, Norway

Hsiao Yu Yang, National Taiwan University, Taiwan

Jenni Kaisto, Finnish Institute of Occupational Health, Finland

Kinnaleth Vongchanh, Institute of Technology of Cambodia, Cambodia

Mengzhen Zhao, Beijing Institute of Technology, China

Mohammed Al-Bouwarthan, Imam Abdulrahman Bin Faisal University, Saudi Arabia

Ross Di Corleto, Monitor Consulting, Australia

Yogeshwaran Murugaiyan, Sri Ramachandra Institute of Higher Education and Research, India

Screenshot of participants in meeting on Zoom: