

# Environment and Health International

*Magazine of the International Federation of Environmental Health*

ISSN 1683-3805



IFEH



The Federation works to disseminate knowledge concerning environmental health and promote co-operation between countries where environmental health issues are trans-boundary. It promotes the interchange of people working in this sector and the exchange of Member's publications of a scientific and technical nature. Amongst other things, the Federation seeks to provide means of exchanging information and experience on environmental health, to hold Congresses and meetings to discuss subjects relevant to environmental science health and administration, to represent the interests of environmental health to state agencies, national governments and international organisations and to promote field studies of environmental health control.

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## IFEH President's Address

**Susana Paixão**

I took over as President of the International Federation of Environmental Health in October 2020 and it is with great sense of pride that I write my introduction to the 2020 edition of the magazine. I hope this new format appeals to all, academic and practitioner alike.

2020 was a year of remarkable events, for many, a year we would rather forget. However, for Environmental Health professionals around the world, we should look on this as a year of recognition. The year in which ordinary people better understood the importance of prevention and came to understand the work of the Environmental Health professionals. Additionally, the results of scientific research have never had so rapid and significant an impact on people's lives. We hope vaccines will reach all countries and through clear and effective education Environmental Health professionals will help explain the benefits far outweigh known risks. There are powerful reasons for optimism, because Environmental Health seems to have found recognition, and the path to a healthy recovery is the opportunity to reconnect with its most essential values, allowing us to look forward to the year 2021 with hope

During my Presidency there are some goals I would like to achieve and I would like to share them with you. Work with all regional and national organisations to increase worldwide visibility of the Environmental Health professionals. Attract more members from existing Countries, new organisations and new regions. We need to proactively publicize our work and involve IFEH in more international working groups with key global partners in particular with official bodies. This will be, in my opinion, essential for the global recognition of the Environmental Health workforce.

So, supported by the IFEH Board, we are going to work with professional organisations from Latin American countries and strengthen the presence of Middle East countries in the Federation. This will be essential to reinforce the Federation's global presence.

At the last IFEH Board meeting we agreed the theme of the World Environmental Health Day 2021 -

### **Prioritising Environmental Health for healthier communities in global recovery**

I would ask all organisations to assist by dissemination and by generating ideas and reporting them through the web site, newsletter and magazine.

I will be working on getting the World Environmental Health Day included on the WHO official agenda and formal calendar.

By strengthening the International Environmental Health Faculty Forum (IEHFF), through the appointment of Dr Andrew Mathieson onto the IFEH Board, I look forward to the publishing of this magazine twice yearly. So, please support by sending articles, opinions, success and failure stories, so we can all learn and become a true community of practitioners, collaborating and sharing around the world.

Email Andrew for a style guide to help make his job and that of the editorial team more streamline.

To paraphrase WHO, "Attempting to save money by neglecting environmental protection, emergency preparedness, health systems, and social safety nets, has proven to be a false economy - and the bill is now being paid many times over." It is necessary that the world understands there is an integral connection between the environment, health and the economy. It is therefore important to invest in healthy and green recovery, close to all communities, with the support of the Environmental Health workforce.

I would like to end by wishing you a more peaceful and healthy 2021, I send my personal greetings to each of you and your family in the hope that we will be able to reconnect face to face in Tartu - Estonia, from 4 to 8 May 2021 under the 4th IFEH World Academic Conference on Environmental Health.

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## Past President's Report

It gives me great pleasure to present my report as President of the International Federation of Environmental Health (IFEH) from 20<sup>th</sup> March 2018 to 24<sup>th</sup> October 2020.

### **Selva Mudaly**

My Presidency was a key period in the history of the IFEH. From the first day of my term I was given the enormous task of developing a Strategic Plan for the IFEH. At the Council meeting of the 18<sup>th</sup> March 2018 in Auckland, many member organizations raised issues about the management of the IFEH and the clear direction it needs to take to make it a true representative of all our National Organization, i.e. a real visible and recognized International Body representing Environmental Health and all our members as equal partners in the decision making of the organization.

The road in getting the finalization of the Strategic Plan for the IFEH was not an easy one. 5 Task teams were established, ensuring that member organizations participated in these task teams viz;

1. Communication Strategy/ Plan
2. Finance Committee
3. History of the IFEH
4. Marketing and Membership Strategy/ Plan
5. Good Governance, Branding and Procedure Manual.

Each of these Task Teams submitted their reports with recommendations. These reports and recommendations together with the scoping strategy points laid the basis to create a new three- year Strategic Plan. Regular reports were submitted at each Board meeting and Council Meeting, so as to keep the members updated. The Strategic Plan was finally adopted on the 24<sup>th</sup> October 2020 at the Council Meeting. During the process certain urgent actions had to take place to ensure that good governance and management of the IFEH can take place so that the IFEH can function properly with transparency and democracy thus transforming the Organization.

Some of the achievements thus far are as follows:

- A new logo for the Organization was developed and approved
- The Organization now has a set of Branding Rules
- A new Mission and Vision Statement for the Organization was adopted:  
“To promote International co-operation between Environmental Health professionals, thus striving for safer, cleaner and healthier environments in the interest of world health.” And “To be the Internationally recognized leading professional organization in the field of Environmental Health.”

- We now have a set of Values, a new set of Objectives, defined who we are and who is our audience and stakeholders
- All our Board of Directors, Extraordinary, the Council and Annual General meetings are now virtual via Zoom platform, thus making these meetings more accessible to our members. The attendance at our meeting has improved tremendously.
- A membership audit has been carried out to clearly determine what our numbers are in the Organization. This updated audit must be regularly updated as office-bearers change, as we had very old membership numbers and contact details on our records.
- The Board of Directors have co-opted the Chairperson of the Faculty Forum onto the Board, so as to strengthen the relationship between the Board and the Faculty Forum.
- On the 30<sup>th</sup> November 2019, the Council rationalized the membership and removed individual membership from the Procedure Manual.
- On the 21<sup>st</sup> March 2020, the Council agreed to further amendments to the Procedure Manual, where the Honorary Treasurer and the Honorary Secretary must be elected like other office bearers, i.e. President and President-Elect and they must be representatives on the Council from their National Organizations. All the terms of these office-bearers shall be 2 years. Furthermore, the cost of travel to conferences and Congresses will not automatically be paid by the IFEH, but the IFEH can decide to appoint anyone of these office-bearers to represent them.
- The Council at its meeting held in Uganda on the 30<sup>th</sup> May 2019 resolved to establish a Finance Committee to assist the Honorary Treasurer to manage the finances of the IFEH. A final term of reference for the Finance Committee was approved as part of the Strategic Plan. The new Board of Directors must establish this Committee and ensure that all financial matters must be dealt with by the Finance Committee and its recommendations must be submitted to the Board for approval.
- One of the most significant achievements for the IFEH during my Presidency was that the History of the IFEH was captured in a comprehensive document for future reference of the membership. This document must be updated on a regular basis and Mr. Jerry Chaka offered to ensure that this is done regularly.

It was agreed that the Board of Directors of the IFEH will be the drivers of this Strategic Plan.

During my Presidency, it became more and more clearer that our Procedure Manual was old, outdated and not user friendly. In fact, it does not comply with the United Kingdom Company laws. Going forward this Procedure Manual must be the first task the new Board must deal with so as to legitimise the operations of the IFEH. This responsibility to update this Procedure Manual is the task of the Honorary Secretary and published at the direction of the Council.

The other aspects I carried out to enhanced the profile of the IFEH are as follows:

- We were approached by the Editor of SciTech Europa quarterly, Ms Olivia Frost to write an article on the IFEH, what is it work, what role it plays in health, its objectives, World Environmental Health day, the current activities and projects the IFEH are running and what is next for the IFEH and where would I like to see the IFEH in five years' time. The article was published in the July 2019 edition of this journal.
  - We were signatory to a letter, dated 26<sup>th</sup> May 2020 to the members of the G20 Countries, where the Health professionals stand united in support of pragmatic, science-based approach to managing the COVID-19 pandemic and in the same spirit , we also stand united in support of a Healthy Recovery from this crisis, including the new health threat of climate change upon vulnerable populations.
  - I was mandated by the Board of Directors to draft the theme for the World Environmental Health Day for the 2018, 2019 and 2020 which was approved by the Board.

Also as the President of the IFEH sent message of support to our National Organizations, which suffered with incidents and disasters, viz:

- 1 Sri Lanka – storms, flooding and deaths
  - 1 Zimbabwe – storms, flooding and deaths
  - 1 South Africa – storms, flooding and deaths
  - 1 New Zealand – killing of worshippers in a mosque

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## Reflections from the President-Elect

I am honoured to have served as the Chair, Region of the Americas of the IFEH since 2016 and up to my election as President-Elect of the IFEH in October 2020. Let me express gratitude to all those who supported my nomination and voted for me. I will be president elect and president for all.

The IFEH is an important organization and all of us should be committed to ensuring that it is supported and transformed over time to the global environmental health giant it can become.

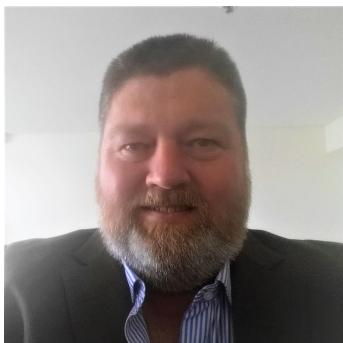
Unfortunately, when reference is made to health care globally, two professional groups tend to get mentioned, doctors and nurses. While we cannot deny the importance of doctors and nurses, they are only two of the many professional groups that work in the health field. Environmental health practitioners (environmental health officers, sanitarians, public health inspectors etc.) represent a very diverse group of professionals who have and continue to play probably the most important role in preventing diseases and death in the global community but hardly ever get mentioned or recognised for the work we do. It is indisputable that the environment is one of the most powerful determinants of health and there is hardly any disease which does not have an environmental contribution.

The IFEH is in the best position to promote the profession globally so that environmental health practitioners can get the respect and recognition they deserve for the difficult but necessary job they do to protect individuals, families and communities. Efforts to enhance the global image of environmental health practitioners should start with supporting and strengthening national environmental health associations to make them more professional and proficient thus being able to attract larger sections of the environmental work force. In many cases the organizational structures that exist militate against EHOs being able to achieve their full potential as they do not have an independent structure leading to the top and the person to whom they report to at higher levels tend not be EHOs. There is greater urgency for EHOs and their professional organizations to establish more partnerships with local, national, and multinational health institutions and the environmental health academic community.

As President-Elect, I am committed to work with the Board and Council of the IFEH to develop and implement programmes and policies to enhance the professionalism, technical competence, visibility, and solidarity among EHOs. I would like to see the regions becoming more organized with growth in membership and influence especially with respect to government officials, policy makers and NGOs. With the advent of modern technology it is possible for the IFEH to learn more about its members and to engage members more in seeking solutions for their local environmental health problems and other challenges. I would also like to see EHOs and their national associations becoming more involved in meaningful research to generate data and information which can be used for decision making by themselves and policy makers. In this respect academics in environmental health and their institutions should stand ready to be partners in environmental health research and publication.

The role of EHOs continues to evolve and the current COVID-19 pandemic provides an excellent example of how EHOs have performed traditional roles as well as assuming new roles in an effort to defeat the pandemic. When this pandemic is over we should ensure that the role of EHOs is properly documented and published and the appropriate recognition be accorded to them for their valiant and heroic efforts in responding to this pandemic.

## Editorial: IFEH Honorary Editor in Chief



**Andrew Mathieson**

Chair International Environmental Health Faculty Forum (IEHFF)



This is my first opportunity as Editor in Chief, chair of the IEHFF and Board member of IFEH to offer my thoughts in support of the President, fellow Directors, Council, members of IFEH and IEHFF. I believe I hold a unique position in that I am a member of three of the organisations within IFEH that is REHIS, CIEH and EHA. I remember the early days of IFEH when I was a student in Scotland and wondered what all the fuss was about? Those were the days when my professional horizon was limited to studying somewhere I could get to by taking the bus and where I could work locally. Over the years many colleagues have inspired and motivated me to look over the horizon and to see every challenge as an opportunity. With this approach to life (both professionally and personal) I am able to look back on a career that took me from Scotland to Wales, England and now Australia. Learning the profession of environmental health in local government allowed me to transition to academia. I had always thought about the Army and my experience and qualifications allowed me to enlist in the Royal Army Medical Corps (Volunteers). During my time in the Army I served in many countries around the world. I have also worked as a consultant for the EU, several NGOs and UNIDO. During my travels, I have met an amazing array of practitioners whom have been kind enough to share their experiences and perspectives. What they have achieved often in the most challenging environments humbles me.

My desire as editor in chief of this magazine is to work with fellow editors in each region (each region should nominate an editor and let me know) to meet the challenge set by the President to produce two magazines a year. Ideally these will be along the format I am developing in this edition with sections for everyone including region perspectives, information on member organisations, articles championing good practice, professional/journal standard articles, course and conference adverts.

My other responsibility is as chair IEHFF. I want to thank my predecessor Charles D (Chuck) Treiser from University of Washington, Seattle, USA who carried the IEHFF torch with humble professionalism for many years. Chuck and I have a shared vision for IEHFF. In time we hope to see the IEHFF grow in membership, presence and activity. Academics can join IEHFF without being members of IFEH (although we do encourage membership of IFEH). Academics who are members of IFEH, can from the next issue send me information that fellow academics (and professionals) may find of interest including grant opportunities, opportunities to collaborate, research areas, staff lists, staff exchange opportunities and course adverts.

Apologies in advance for any style, spelling or grammar errors and to anyone that sent me an advert/article that was not included ... please resend as I know I lost a few.

Front Cover Photos:

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Small photos from Erik Mclean, Branimir Balogovic, Tai's Captures & Logan Weaver on Unsplash.

## THE ROLE OF THE COMPANY SECRETARY OF THE INTERNATIONAL FEDERATION OF ENVIRONMENTAL HEALTH

Rob Bradbury  
Company Secretary  
IFEH.



The role of the Company Secretary of the International Federation of Environmental Health (IFEH) is primarily defined within the Procedures Manual of the organisation. The Company Secretary is appointed by the Council for such a term and conditions as the Board sees fit and as such, may also be removed by it.

The Company Secretary plays no active role in the day-to-day operations or decisions of the Board or the Federation. The Company Secretary receives no remuneration or funding from the Board or Council.

The Company Secretary's two key areas of responsibility are to act on behalf of the IFEH in all matters relative to the Companies Acts and other appropriate legislation; and the preparation of agendas for the Annual General Meeting and any Extraordinary General Meetings. The Company Secretary is the recipient of all legal documents sent to the organization. The Company Secretary must always act in the best interests of the Federation and its members, ensuring that all regulatory requirements with respect to United Kingdom legislation governing the organisation are met where appropriate.

The Company Secretary is not a member of the Board of Directors, however, the Company Secretary may attend all Board meetings and as such, has no voting rights or privileges in any matter concerning the Board or its deliberations. Should the Board enter into any 'in-camera' sessions for private discussions, the Company Secretary must immediately withdraw from the meeting for such discussions. The Company Secretary may make recommendations and suggestions to the Board respecting matters of organizational governance or administrative policy and should always strive to ensure the best interests of the organisation are protected.

The Company Secretary should possess a sound understand of organisational governance, regulatory frameworks, legal issues management. Operating procedures, and best management practices and norms. The Company Secretary must ensure that the Board complies with any and all duties and obligations, making the necessary accommodations that arise through its routine course of governance.

The current Company Secretary is Robert Bradbury who is a former President of the IFEH and is also an Honorary Vice President of the organisation.



## Environmental Health on the frontline.

Whoever coined the unfortunate phrase “2020 vision” clearly had no sense that in a year like no other, the one thing we would all struggle for was clarity and certainly. One thing that was clear for all of us is that environmental health was firmly on the frontline in the battle against Covid 19, and it will remain there in the fight for global recovery.

### Martin Fitzpatrick

For IFEH members it has been a year of learning and showing just what we can achieve and contribute in difficult circumstances. With the glimmer of hope on the horizon with the emergence of safe efficacious vaccines, the reality now is that the challenges have not diminished but rather they are evolving. IFEH played its part in 2020 in showcasing good practice and showcasing lessons learned through a number of initiatives.

The challenge now will be to create ways of working with the communities we serve to get businesses and livelihoods kick started again, identify the emerging hazards and providing credible advice and information to an often confused and battle weary public. In the meantime, the immediate threat posed by the virus has not receded – and where there is brief respite we must be vigilant to ensure it does not reignite.

Those of who work in environmental health are well used to facing challenges without the glare of public appreciation. It would be great to think that when we will all get to the other side of this – and we will – some of the things that eventually gained some level of universal appreciation might stay in the public consciousness.

In the field of my “day job” - air quality management - the signs are not all encouraging. Despite significant drops in some pollutant levels earlier in the year, the most recent studies emerging show that traffic and associated pollution levels are surging as we approach year end. We cannot afford to put climate action on hold – even in the face of a global pandemic, simply because climate action can't wait.

To conclude on a positive note, perhaps 2020 may just be the year when more people, maybe even policy makers, started listening to and buying into the science of public health. Maybe hope and history can rhyme.

### Martin Fitzpatrick

Honorary Secretary - IFEH  
Member of The Environmental Health Association of Ireland  
Principal Environmental Health Officer - Dublin City Council

## I'm proud to be an EHP



"I WORK FOR A WETLAND conservation charity that does marvellous things in the UK and abroad. With support I manage the health and safety of all staff and volunteers, wherever they are based, plus that of the members of the public who come to enjoy a day out at our centres.

"EH is so relevant today, as workplaces change and the type of food that we eat or the type of housing we get changes too. We have to keep abreast of that so we can do our best for people. There is still a long way to go with public health and some issues that we thought had gone away are coming back. We should be using our profession at its best to inform and help people.

"I became an EHP because I had an interest in environmental law but wanted to go into a profession where I could enforce the law, rather than just know about it. It is an incredibly rewarding profession. When I qualified most career routes were in local authorities, but now there is a huge variety of sectors that you can put your skills to good use in.

We're raising the profile of EH to let the public know what we do and who we are.

"There is still a long way to go with public health and some issues that we thought had gone away are coming back"

Head of safety management  
Adele Masztalerz at Slimbridge  
Wetland Centre

"I've taken quite a non-traditional route in my career. I'm really keen to give a voice to people who don't work in local government and to show that there are lots of people who work in other industry sectors and that we're still very much part of the profession."

ONE OF THE MOST remarkable things about EHPs is their ability to get on with an often difficult job with a minimum of fuss. But the flip side to that is a profession whose public profile is not as good as it could be. Ask a member of the public what environmental health is and their answer might be hazy at best.

So CIEH is on a mission to raise the profile of this rewarding, varied and hugely important profession. To do that it has launched a public-facing campaign called 'I am Environmental Health', at the heart of which are ordinary EHPs from across the EH landscape talking about their job and what it means to them.

## How the COVID-19 pandemic affected Environmental Health training in Uganda

By

Suzan Nakalawa, Rachelle Ikol and Dr. David Musoke

Makerere University School of Public Health, Uganda

The Corona Virus Disease (COVID-19), a respiratory infection caused by SARS-CoV-2 virus, was declared a pandemic by the World Health Organization in January 2020. In an effort to prevent the spread of COVID-19, governments across the world put in place measures in their countries including those aimed at minimizing preventing gatherings and restricting travel. The Government of Uganda declared COVID-19 an emergency in March 2020, with a national lockdown that included closure of all learning institutions including primary schools, secondary schools, universities and other tertiary institutions.

With schools and universities closed, students were sent back home to their parents and guardians. After months of staying at home, some universities and schools introduced online learning including Makerere University which runs a Bachelors of Environmental Health Sciences (BEHS) programme. Several platforms were therefore introduced to support virtual teaching such as Zoom and the Makerere University E-Learning Environment (MUELE). Students of Environmental Health had to adapt to this new mode of learning which was not easy, with several challenges faced for example poor internet connectivity especially in the rural areas of the country, electricity blackouts, expensive mobile data costs, and interference by domestic chores. Nonetheless, some provisions were made by the university to support students during this period. For example, the university through the Vice Chancellor partnered with some internet service providers in the country to make online learning platforms such as MUELE free of data charges.

At Makerere University School of Public Health (MakSPH) which hosts the BEHS programme, the university closure interrupted the teaching schedule, semester completion dates, and also the internship activity for second year students. New dates were thus set for the different activities, whereby the internship had to be delayed and done in two shifts, one in October and the other in December, which seemed insufficient. In preparation for online lectures, the course coordinators mainly communicated with class representatives who later passed the information to students in WhatsApp groups. For students who were offline, the class representatives endeavoured to call them on phone so that all were informed. Revised course timetables were sent a week before the

online teaching commenced which gave students time to prepare and plan effectively. Lectures were mainly held on Zoom, although the student - teacher interaction was not as before during in-person sessions. Unfortunately, many students missed out some parts of the lectures due to internet instability, and thus did not fully contribute to the discussions. In other incidents, some students lacked Zoom etiquette, leaving their microphones on which interrupted the lectures and wasted time due to the background noise.

Although the online lessons were for a good cause, they also had some health effects on the students. The long hours spent on phones, laptops and tablets resulted in frequent headaches and eye pain. Indeed, many students experienced more headaches than before when the online learning was taking place. As a way of preventing some of these side effects, students would have periods of rest in between the lectures, and also during some long lecture sessions. Furthermore, despite Environmental Health being a practical course, students did not have the opportunity for field visits and practicals for the course units studied through the online mode of teaching. The pandemic also had an impact on the final year students who should have completed the course in May 2020 therefore delaying their graduation, hence hindering them from acquiring career opportunities.

The online teaching period was not only challenging to students but also university lecturers. Indeed, poor internet connectivity at times also affected lecturers while delivering online sessions. In addition, since many of them were working from home at the time, it was not easy for them either carrying out these online activities in such an environment which at times had other domestic demands. The lecturers were disappointed by the low attendance of students during some of the online sessions. For example, attendance in some lectures was as low as 15 learners for classes with over 40 students. Nevertheless, the lecturers were able to provide online materials for all students to access, as well as provided additional support to those who had missed the various sessions.

The pandemic and university closure also affected activities of the Makerere University Environmental Health Students' Association (MUEHSA). For example, the MUEHSA annual scientific conferences, which take place in April every year, could not be held in 2020. In addition, election of the new MUEHSA executive could not take place, with the old executive having to stay longer in their positions which was undesirable. Some of the routine activities of MUEHSA such as community clean up exercises and sensitization could also not take place. The World Environmental Health Day (WEHD) celebrations, which MUEHSA always commemorates with several activities, could not take place physically. Nevertheless, a Zoom webinar was held on 26<sup>th</sup>

September 2020 with different speakers tackling issues related to Environmental Health and the COVID-19 pandemic ranging from the public and private sectors as well as academia.

Fast forward to the end of the year, students had adapted to the “new normal”. The end of semester examinations were successfully completed physically at the university while observing the COVID-19 standard operating procedures as stipulated by the Ministry of Health. These included social distancing, wearing of face masks at all times, and observing hand hygiene. Students are now awaiting the guidance from the government on the way forward for the education sector in Uganda in the new year 2021.

# The Impacts of Climate Change and the Public Health Inspector

By: Vanessa Nickelo, B.Sc., BEH, CPHI(C)

Climate change refers to changes in patterns of weather and climate events which may cause public health impacts due to extreme climate and weather events. Examples of environmental impacts are changes to air quality; ozone depletion; and water-, food-, vector- and rodent-borne diseases. When discussing climate change, heat waves are often a topic of conversation as they are becoming more prominent. However, climate change is not just heat waves warming land surfaces; our waters are warming up as well. The rising temperatures from extreme heat events are also causing sea level to rise and change precipitation frequency and intensity, leading to more severe droughts, floods, and fires. These physical aspects of climate change will affect environmental public health in many ways. With the increasing threat of climate change, standing on the front lines in the effort to prepare for and respond, are Environmental Public Health Inspectors.

## Foodborne Diseases

Food safety will likely be significantly impacted directly and indirectly due to climate change. Climate change will affect bacteria, viruses, parasites, harmful algae, fungi, and the patterns of foodborne diseases. Foodborne illnesses are defined as diseases that are infectious, parasitic or toxic in nature, and are acquired through the ingestion of contaminated food. Symptoms from foodborne illnesses vary from gastrointestinal to neurological, acute kidney failure and hemolytic uremic syndrome, and congenital malformations.

Climate change will increase the risks from existing and emerging foodborne diseases, through increases in extreme weather events, increases in air and water temperatures, and changes to the intensity and frequency of precipitation. Food safety systems exist to ensure food is safe from harvest and processing, to retail and human consumption. Along the food production chain are links where food safety may be susceptible to climatic effects. Livestock stressed by temperature may be more likely to become ill or to shed greater amounts of harmful bacteria and viruses. Increased local risk of contamination would ensue, along with the potential for enhanced survival of pathogens, leading to a greater risk of contamination during processing.

Climate-related changes in wild animal population health may bring about new bio-security issues, potentially leading to the emergence of new foodborne pathogens as temperatures rise and there are extreme precipitation changes. Extreme heat events or brown-outs could

cause cold storage failure during food processing and storage, compromising food safety when food is stored at the temperature danger zone. The summer season often changes human activities, meaning there are more opportunities to come into contact with mishandled or contaminated food during barbecues and picnics. In agriculture, a longer growing season likely means produce is more readily available, which can be more easily contaminated. Produce fields are often frequented by animals and insects which may carry bacteria or parasites with them, for longer parts of the year. An increase in water temperature means an increased risk of contamination of shellfish from phytoplankton and zooplankton blooms.

## **Waterborne Diseases**

Floods, droughts, heavy storms, changes in precipitation, and an increase of temperature and sea level are factors that may increase the risk of waterborne diseases. Waterborne disease outbreaks have been linked to weather events, predominantly heavy rains and drought, and to increasing temperatures. Increasing temperature could favor the growth of some pathogenic bacteria, and some *Vibrio* species which are already common etiological agents responsible for diseases transmitted by seafood consumption. Waterborne illnesses result from exposure to pathogenic microorganisms or chemicals in drinking water or recreational water. Contaminated water typically enters the body by ingestion, but contaminants can also be inhaled or adsorbed, or enter the body through contact with open wounds. The majority of symptoms resulting from waterborne pathogens are enteric. Other symptoms can be neurological, cardiovascular, respiratory, ocular, hematological or dermatological.

## **Cyanobacteria**

Climate change may also increase the frequency of algal blooms. Cyanobacteria, commonly known as blue-green algae, are microscopic organisms that are naturally present in lakes, streams, and reservoirs in low numbers. Blue-green algae can rapidly increase in warm, shallow, undisturbed surface water that receives plenty of sun. Increases in water temperatures favor the growth of some algae and also increase water temperatures by absorbing sunlight. Some bloom-forming types of blue-green algae produce toxins. Contact with affected water can cause skin irritation and rash, sore throat, and hay fever-like symptoms. Ingesting toxins can also cause gastroenteritis symptoms, such as vomiting, diarrhea, fever, headaches, liver damage, weakness, and muscle and joint pain. Blooms can also be problematic to farm animals or pets that come into contact with this water.

### **Rodent-borne Diseases**

Rodents are reservoirs and hosts of diseases that are transmitted by close contact with humans. Warmer winters and increased rainfall are likely to increase rodent survival, and thus the abundance of rodent reservoirs of disease may increase. Extreme weather events such as hurricanes, or high rainfall coupled with flooding may increase the likelihood of human contact with rodents, their fleas, and their potentially infectious feces and urine. Hantavirus pulmonary syndrome is caused by a virus spread mainly by rodents, mainly deer mice. A person may become infected with the virus through direct or indirect contact with the saliva, urine or droppings of an infected rodent. Based on the Hantavirus mode of transmission, it is likely that climate change might influence Hantaviruses through impacts on reservoir host populations.

### **Lyme Disease and other Tick-borne Zoonosis**

Climate change is expected to increase the risk of ticks and tick-borne diseases. The change in weather patterns will alter the prevalence, activity, and range of a variety of ticks and the pathogens they carry. Higher ambient temperatures will shorten tick life cycles, create more favorable conditions for host-seeking activity and increase tick survival. Such effects are likely to increase the probability that new tick populations become established by migratory birds. Climate change is therefore likely to create an additional epidemic of tick-borne zoonosis, such as Lyme disease.

### **West Nile Virus and Other Mosquito-borne Diseases**

Distribution and habitat modification of mosquito vectors that are known to transmit disease is possible due to climate change. Climatic change influences the emergence of vector-borne diseases such as malaria, dengue and West Nile virus by altering their rates, ranges, distribution and seasonality. Vector-borne diseases are vigorous systems with a complex ecology which tend to adjust to environmental changes. Weather conditions affect the survival and reproduction rates of the vectors, their habitat suitability, distribution and abundance. Additionally, climatic factors impact the intensity and temporal activity of the vector throughout the year and affect the rates of development, reproduction and survival of pathogens within the vectors. With the current levels of travel, the lack of vaccines and effective medical treatment for many of these vector-borne diseases, public health professionals can anticipate for the predicted effects of climate change on vector distribution.

## Conclusion

Changes in the expected patterns of food-, water-, vector-borne and zoonotic infections related to climate change have strong implications for public health. This creates tremendous opportunities for Environmental Public Health Inspectors to raise awareness, enforce public health legislation, and promote discussion within the field of Public Health. Inspectors can aid with educating the public, and work together to further develop mitigation and adaptive strategies with the aim of protecting public health.

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## THE CHALLENGE: dstgroup VS COVID-19

### February 2020

The year 2020 was set to be a year of opportunities, favoured by a growth environment for companies at the national level. However, alongside the favourable economic environment, the beginning of the year also brought COVID-19, a virus that many initially underestimated, but which quickly gave rise to a public crisis, on a global scale, which has already led the IMF to advance that 2020 will be marked by a global recession as bad or worse than that seen during the financial crisis that started in 2008.

All companies were victims of this pandemic that changed the state, said to be normal, of society. Given the economic and social disaster that was envisioned, the dstgroup, with the mastery of those who are already a reference in the national economy and various sectors of activities, anticipated a set of measures, based on the awareness and conviction that it was necessary to continue to take the boat forward and ensure, at the same time, the material, social and mental security of more than 2000 workers who daily wear the shirt of the business group. The objective was clear: "reach the end of this battle with all our "soldiers" standing".

In 1946, the World Health Organization (WHO) defined the concept of Health as "**State of complete physical, mental and social well-being and not only the absence of disease or infirmity**". Based on this premise, the dstgroup deconstructed the definition in three aspects and implemented preventive measures against COVID-19 at all levels of the organization.

### March 2020

When the first cases of SARS-COV-2 infection appeared in Portugal, on March 3, 2020, the Chairman of the Board of Directors of dstgroup, José Teixeira, who always followed closely the evolution, development and proliferation of the virus, distributed his first leaflet on the new coronavirus to his workers. February 29, 2020, thus marked the launch of the program to prevent, inform and contain the spread of COVID-19 within the group, followed by other measures, implemented from March 10, with the aim of reducing physical contact between workers. The first was evidently aimed at lunchtime, considered a high-risk moment due to the concentration of workers in the campus restaurant in Braga. Thus, the group

challenged workers to opt for the takeaway service in the restaurant and to enjoy their moments of break and lunch in the extensive gardens that beautify the group's headquarters, serving the dual purpose of ensuring less concentration of people and promoting relaxation of the mind and stress, accentuated by the moment of uncertainty that was beginning to live, in contact with nature.

Still, in order to minimize physical contact between his workers, on March 12, 2020, the administration placed 108 people in telework, obeying four criteria, namely contact with infected people, immune weakness, pregnant women and workers with young children.

In order to protect the remaining workers who continued to occupy their workplace on campus, the frequency of cleaning the spaces was increased and the workers were placed in Quincunx.

Before the State of Emergency was decreed in Portugal, the dstgroup already defined its first contingency plan for all companies in the group, covering offices, works, factories and workshops. Disinfectant gel and masks were immediately distributed to all workers in the group.

With the epidemic situation taking on greater proportions and in order to face all the external implications that were felt, complementary measures were adopted, among which the reinforcement of cleaning and disinfection mechanisms of the various workplaces, the availability of disinfectant in all offices/works, the obligation to keep doors and windows open, to guarantee air circulation, the deactivation of all air conditioning in the various installations, the distribution of kits (thermometer, disposable gloves, disinfectant wipes, paper, a disposable mask and a plastic bag for waste disposal), the creation of isolation rooms in case of identification of workers with symptoms, the use of digital platforms to hold meetings between workers, customers and suppliers, limiting face-to-face meetings to a maximum of four people and in outdoor space and the increase in the number of office containers, as well as the number of chemical toilets on site.

In addition to these measures, and in order to safeguard the safety and well-being of all workers, some exclusive benefits of dstgroup were suspended, namely the free aesthetic consultation, dentist and manicure services, which take place at the company's facilities, as well as the use of the existing soccer fields on the headquarters campus and the fitness classes that took place outdoors on the dst campus. This temporary suspension was taken to decrease physical contact between workers and thus to reduce the risk of transmission of the virus.

On March 16, 2020, a State of Emergency is declared in Portugal, which forced many sectors of activity to stop. The news from the four corners of the world was not encouraging: Italy, France, England, Germany and Spain were being attacked by this invisible enemy. In Portugal, schools closed, many companies entered *layoff* and the restaurant's sectors closed its doors. However, the civil construction sector continued to work, not at 100%, but at 200%.

Three days after the State of Emergency was installed, international teams begin to return to Portugal, following the group's contingency plan to the letter. With the return of workers from risky countries, the dstgroup communicates to the health authorities showing its concern for the health of its workers and their families. It also decrees the performance of tests to all workers who, with the support of the authorities, are in Prophylactic Isolation.

The contingency plan within the group becomes more robust with the reduction of the capacity of workers' transport vehicles to 1/3, together with the use of numerous vehicles to reduce car-sharing, with daily disinfection being mandatory of these. On March 20, the use of masks and gloves becomes mandatory in all the works of the group. However, the civil requisition of personal protective equipment by the State, namely masks, led to a shortage of this material and managing the quantity of this equipment by all workers became a challenge.

Managing emotions was, however, an even greater challenge. Fear and panic were installed among all, and the Occupational Health and Safety Technicians never had such an important and fundamental role as in this phase of the pandemic. Managing people, calming workers, clarifying doubts and fighting fears was undoubtedly one of the biggest challenges that this pandemic left us, especially due to the unpredictable and unstable evolution of a virus hitherto unknown. Given this situation, marked by uncertainty, the Chairman of the dstgroup, implemented on March 25, some measures to lift the spirits of his workers. To alleviate the stress that was already being felt strongly, free consultations were made available with a psychologist and thematic lunches were implemented, prepared by renowned chefs, some with Michelin stars, always including the *takeaway* service that still remains today.

Also, the shipyards and works were subject to measures adjusted to the pandemic moment. On the work fronts, sprayers were made available and all common spaces started to be disinfected, and temperature measurements were also started for workers at the beginning of the daily workday. At this time, the mandatory use of visors in works is also introduced, which, as they are not practical, had to be adapted, through a system for coupling to helmets, a solution created by dstgroup to answer the problem of discomfort and inadequacy equipment to the type of work developed on site.

In order to quantify the risk of disease transmission in the group's companies, the first Hazard Identification and Risk Assessment (IPAR) for COVID-19 is carried out on March 30, which is transversal to all the group's activities.

## **April 2020**

Considering the philosophy of continuous improvement of its processes, the dstgroup starts on 1 April the KAIZEN meetings in all departments including Security, where we discuss preventive measures and their improvement in the daily fight against the virus.

The Chairman of the Board of Directors presents the challenge of presenting new ideas to combat the transmission of the disease at these weekly meetings. His involvement is notorious, participating daily in one of the KAIZEN meetings and twice a week in meetings with the Security department.

On April 9, with the collaboration of the University of Minho, the University of Porto and Automaise, the Covid-19 digital assistant is launched, available to all workers through the dstgroup intranet. This digital assistant aims to help assess the symptoms and the risk of spreading the disease.

Also, on this day, the safety vest is launched, which identifies prevention measures on the back and whose distribution to workers and subcontractors takes place on April 13.

Tools that pass from hand to hand become a source of concern. Thus, an attempt was made to find a solution to eliminate this possible source of spread. The tooling shops were already organized considering the 5S philosophy (*Seiri, Seiton, Seisō, Seiketsu and Shitsuke*), which made it easier to implement the solution found. All tools, when returned to the tooling, undergo a sanitization process, exclusively after which they could be requested.

In order to manage Personal Protective Equipment more efficiently, the Security Department and the Logistics Centre of dstgroup create on April 20 the group G Covid, dedicated to requesting all types of material related to preventive measures for COVID-19.

Still, in April, two actions were launched, with the objective of minimizing the emotional impact on the workers' lives and, at the same time, providing them with intellectual tools from reading excerpts from books on various topics. They are the series "Leitura Furiosa às Quintas" (Furious Reading on Thursdays) and "O que amo a Ler" (What I Love to Read) were implemented on Thursday and Friday, respectively, on a weekly basis. In this way, workers are weekly challenged to enter a humanist, enlightenment and Renaissance dimension, through philosophers, sociologists and behavioural economists, such as Rousseau, Edgar Morin, Sartre, Albert Camus, Hanna Harent, Joseph Maria Esquirol, Raimond Aron, Adam Grant, Bauman, Jorge Steiner, among many others.

## **May 2020**

In May, the media began to publicize the existence of several outbreaks in the civil construction sector, one of the sectors in which there is the greatest stereotyping, both because of the low level of literacy among workers and because of the range of nationalities. At the forefront of this situation, the chairman of the dstgroup's Board of Directors brought the teams together and encouraged the assessment of risk groups, taking into account various criteria, such as mobility, workers' overnight stays (in order to observe the conditions of hygiene), the existence of associated diseases, low literacy and behaviours resistant to protocols to combat Covid. This list of workers, who are at greater risk of contagion, is worked on more intensively and with a language that identifies with this type of audience.

From this list of risks comes the list of observers, made up of a multidisciplinary team of workers with the aim of verifying compliance with preventive measures and helping to convert the most resistant workers who are opposing to existing measures.

On May 11, the rule of mandatory use of masks inside vehicles was instituted, as well as the reinforcement with all our partners of the measures in force, to promote their adoption with them.

On May 13, working groups were created in the security department to elaborate stories about the experiences of workers who were sick and who lived close to prophylactic isolation. The objective was to make workers aware of the new reality and the difficulties experienced by those who went through that pathology.

The need not to give up and to continue to innovate has always been an imperative of dstgroup. And, in a pandemic context, it couldn't be different. Thus, at the end of May, new forms of struggle were implemented with the placement of hand washers and mirrors in all the work entrances and cafeterias. The mirrors served as a vehicle for transmitting messages, changed weekly, aimed at continuing the mission of raising awareness among workers. The campaign started with the phrase: "Take care, we want to see you again".

In order to continue the growing concern and improve conditions for workers, glass partitions were installed in the workstations at the beginning of June, with a specific place for placing the mask, a measure extended to the dstgroup's M restaurant, as well as in the pantry of office buildings. This measure was also replicated for construction work cafeterias, which are adapted to the reality of the work. In the refectory containers, for example, it was defined that there would only be six places, with tables equipped with acrylic dividers. To mitigate the accumulation of workers, several shifts were also created for lunch periods.

The installation of tables with acrylics in the cafeterias was so well accepted by the workers that we innovated the measures, adapting all the furniture on-site, mainly in the changing rooms. We limited the number of workers allowed for each space (considering the useful area). All of this to continue to improve working conditions in all possible places.

## **June 2020**

In the second and third weeks of June, the General Directorate of Health and the Ministry of Health together with the Authority for Working Conditions and Ministry of Labour, Solidarity and Social Security as well as the Regional Health Administration of several Regional Areas of the Country, carried out inspection visits to the civil construction sector, through massive testing of workers and surveys about the health conditions of their homes. After these inspection visits, on June 11, 2020, the guideline for this sector was published, under which measures are already stipulated that were already implemented in the group's works.

During these seven months, several screening tests were carried out both for our workers and our partners and the costs were fully borne by the dstgroup. The tests were carried out always with the workers' consent, namely those who returned from vacation or teleworking, and also in the case of new admissions, internships and those who travelled abroad.

Testing is seen in the group in two ways: on the one hand, it is the state of health of workers and, on the other, it is about contributing to the mitigation of the state of uncertainty and anxiety of those who work, in order to alleviate the fears not only for the labour aspect but also for the family and to protect those on the construction site.

In the dstgroup complex, towers with automatic alcohol gel dispensers and body temperature readers were installed. All people entering the complex must pass through the towers in order to disinfect their hands, and if they have a fever, entry to the complex is not allowed.

### **July/August 2020**

In line with his strategic thinking of providing workers with mental tools and a critical spirit, the Chairman of the Board of Directors has encouraged, over this time, the realization of various training courses in the area of psychology, philosophy and neuroscience. The objective is to stimulate skills to better deal with the emotions and frustrations of this struggle - still with no end in sight - against the invisible enemy.

The mental health - mind@work training course recently ended, covering subjects such as mental health and well-being in the workplace, self-knowledge, communication and empathy and positive parenting. Bullying and conflict resolution, stress, burnout and work-life balance were the topics covered in this training. Meanwhile, the "small talks" started, aimed at promoting knowledge in the area of neuroscience, emotion and reason. These sessions aim to provide, reinforce and optimize the behavioural skills of workers, most of whom are trained in technical and engineering areas.

In the constant search to improve working conditions and new preventive measures, the group updated the measures implemented in the cafeterias and changing rooms and recreated the furniture of the construction offices with the placement of acrylic separators. These measures, in line with the limitation of the number of workers in closed spaces, seek to further reduce the risk of contagion among workers.

With the arrival of the second wave and an increase in cases worldwide, it was decided to use a mask permanently in all spaces and not only in contact with workers. As well as the creation of bubbles/clusters between work teams.

## September/October 2020

With the arrival of winter, the group started new efforts to adapt different spaces in the offices, so that they could be used as pantries for takeaway lunches. Restaurant M is also equipped with a drive-in in an independent space to facilitate the collection of the takeaway. Simultaneously, tests are taking place in one of the group's factories, where a disinfection tunnel is being tested for the entry and exit of workers.

During these months dstgroup also reinforced its social responsibility policy and put in place a support plan for external partners, as was the case of the Braga's Theatre Company, to whom it guaranteed the salaries for four months, or Liga Amigos Braga Hospital and other health institutions, which is supported with the offer of masks. The group also installed several containers for Covid-19 tests to help the Municipality of Braga and ARS-Norte. It also offered 50 new portable computers to students in need at the Sá de Miranda School Group, in Braga, among many other initiatives.

Everyday Safety Technicians together with the Chairman of the Board of Directors seek new ways of raising awareness, training, changing mentalities and cultural habits. Every week we look for innovative ideas to fight this fight and to stay in good health.

After nine months of this invisible struggle, the one who was unknown to everyone started to walk side by side with us.

Companies had to adapt, and workers had to adapt. The fight is not always easy, and, at times, it even seems inglorious, especially when we know that one of ours is a suspect case. We immediately thought, "What went wrong? What failed? Where could we have done better? "

Resilience is the buzzword of this whole battle, we cannot give up, we cannot leave the boat adrift, we must continue side by side with all workers.

Ending with a phrase from our commander, Chairman of the Board of Directors, José Teixeira, "It is not easy to define a soul or listen to what our hearts say, but in this group, we are what we do: **A culture of construction that builds culture**, and so through the construction of culture, we fight every day."

**Article written by occupational safety technicians António Santos, Carla Santos and Magda Cordeiro on behalf of the department of health and safety at work dstgroup.**

## Adapting to a global pandemic: The Solusi University experience

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### Introduction

The COVID-19 pandemic affected higher-education in multiple ways, with impacts that will most likely reverberate through the next few decades. The rapid spread of the disease forced educators around the globe to adapt their curricula to meet the sudden demands of a socially and geographically distanced student population. After suspending in-class instruction in March 2020, Solusi University pivoted and continued instruction in a totally remote environment. During a brief hiatus between the closing of classes and switching to a remote teaching model, faculty undertook efforts to adapt both lecture and lab courses to best serve their students.

### Setting the scene

Solusi University (<https://www.solusi.ac.zw/>) is a private institution located in the South-western part of Zimbabwe, about 50km out of Bulawayo, the second-largest city. With students from all member states of the SADC, Solusi University has served the Southern African region for over 12 decades, the last two as a chartered institution of higher learning. Solusi students learn in small class environments with lecturers prioritizing evidence-based learning and high student engagement. Maintaining this supportive environment, without increasing the cost of access to learning was a key factor in mapping the move to remote teaching.

### Remote teaching 1.0

The transition to COVID-19 initiated remote teaching took place midway through the first semester. Solusi university rode on a government initiative to migrate classes to WhatsApp, a ubiquitous chat app in the sub-region. This low-cost platform served as an [excellent tool] (<https://youtu.be/fPVE2AnmZTE>) for educators to maintain contact with their students and to share instructional resources such as voice notes, videos, and slide-decks. While most students and lecturers welcomed the use of a technology platform that was already an integral part of their daily life, it had a few challenges. For students, concentrating on learning amid the noise of non-class related chats was no mean task. Instructors on the other hand found it difficult to conduct meaningful assessments.



## It gets better with version 2.0

The collaboration of administrators, faculty members, and support departments in developing better strategies for online course delivery played an important role in refining the remote teaching model. Faculty and staff familiar with the Australian open-source learning management system, Moodle, prepared tutorials that made it possible for first-semester exams to be delivered entirely online. The success of this exercise informed the decision to conduct all second-semester classes using a Moodle-first approach, with exam delivery continuing on that platform. Although Moodle proved to be a better pedagogical tool, the high costs of internet access and subsidized WhatsApp data bundles kept WhatsApp as the de-facto interaction platform for most classes. All roses come with thorns

Solusi University's pivot to remote teaching allowed students to continue with their studies despite the threatening prospects of an indefinite break with the global shutdown. The university was also able to support employees and their families through a period that ushered in unprecedented levels of global unemployment. This transition helped shelter the blow of what might otherwise have been a disastrous closure for a university that has been struggling to thrive in Zimbabwe's challenging economic environment.

Amid all the laudable achievements of Solusi's model, it would be remiss of us not to mention some of the challenges that the COVID-19 pandemic brought with it. The sudden reality of a new-normal presented the very real threats of a rapidly spreading killer disease and impending economic meltdown and this increased anxiety among students and staff. A new remote model also exacerbated inequalities between economically stable students with internet-ready gadgets and unfettered access to the world-wide web, and those that struggle to access basics such as stable electricity. Social isolation, somewhat tempered through technology, also affected many learners.

## The future outlook

As we write this article in the middle of December 2020, the pandemic-driven disruption of Higher-Ed is far from over. Many countries are experiencing a resurgence of COVID-19 cases with the second-wave spreading over an already anxious global populace. Solusi University will continue to build upon the successes realized in 2020 as it delivered higher education under a "new normal." The university is currently exploring innovative approaches aimed at ensuring student and faculty success by addressing challenges related to content delivery, internet access, and the well-being of all university patrons. If there is any lesson 2020 taught us, we may plan, but we are not in control of the future. Adaptation is key to future success!

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## The COVID-19 Activities of Environmental Health Officers and Assistant Environmental Health in Malaysia

Malaysia's preparedness and planning began in December 2019, when they first received information from the Chinese authorities that there were cases of acute respiratory illness.

Aided with previous experience from Middle East Respiratory Syndrome related Coronavirus (MERS-CoV), the 2002-2003 Severe Acute Respiratory Syndrome (SARS) epidemic and experienced contact tracing teams, Malaysia was able to initiate a speedy response and contained the pandemic with very low daily reported cases of 1 to 2 digits only and a low number of death cases of around 100 only since the first reported cases in February through the 1st and 2nd wave of the COVID-19 pandemic.

However, since the middle of September, due to a slack in the observation of the SOPs in certain part of the country during the Sabah State Election, Malaysia is now facing the 3rd wave of the pandemic where the number of daily cases had risen to an average of 600 cases per day, forcing the government to enforce the Conditional Movement Control Order in the states of Sabah, Selangor and Kuala Lumpur.

With this sudden increase of cases, the health services capacity is overwhelmed with critical shortage of manpower especially the front-liners like the EHOs and AEHOs. The Malaysian Association of Environmental Health (MAEH) is now calling for volunteers among its members to answer the call of the government to assist in controlling this pandemic.

There are more than 5000 EHOs employed in the Ministry of Health and about 2000 EHOs in the Local Authorities. All these officers are gazetted as Authorised Officers under the Prevention and Control of Infectious Disease Act 1988.

Among the responsibilities and duties of the EHO's during the COVID-19 Pandemic are:

1. Screenings of travellers at the borders (air, land and sea)
2. Investigation of reported cases and identifying new clusters of from index cases
3. Conducting contact tracings of all positive cases.
4. Monitoring of Quarantine centres (EH requirements)
5. Monitoring of persons under surveillance (PUS) or self-quarantined at their homes
6. Supervising mass disinfection in premises and public areas
7. Supervising the burials of all death due to COVID-19
8. Enforcing of the requirements of Lockdowns (Movement Control Order Phases)
9. Food safety monitoring in food premises and quarantine centres
10. Monitoring the compliances of SOPs during the various phases of Movement Control Orders
11. Enforcement of the Prevention and Control of Infectious Disease Act 1988.
12. Conduct prosecution for COVID-19 related offences under the Act

Reported by MAEH



## MAEH Urban Health Forum 2019 and Focus Group Discussion 2020

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MAEH Urban Health Forum 2019 (MUHF 2019) was a program conducted to bring together various agencies to address urban health issues that have become a challenge in the environmental health paradigm. The forum was held on the beautiful island paradise in northern Malaysia, the Langkawi Island. MAEH and the co-organizers: Langkawi Municipal Council, Langkawi District Health Office, Langkawi Development Authority and Integrated Mosquito Research Group (I-MeRGe) have successfully gathered representatives from various agencies for the collaboration. The invited panels are experts in the field related to the topics discussed and consist of academic experts, research experts, local government, industries and community. The sub-themes discussed during MUHF 2019 were:

1. Construction site as transmission hub for dengue: challenge and conflict in urban area
2. Health adaptation towards climate change
3. Towards zero waste: technology and minimization strategies
4. Raising food safety to street food vendors in urban area
5. On social norm: extension of non-smoking areas



The focus group discussion was made possible with the academic assistance of Master in Health and Environmental Safety students, Faculty of Health Sciences, Universiti Teknologi MARA (UiTM) Selangor, Malaysia. The program was officiated by the President of the Malaysian Environmental Health Association (MAEH), Mr. Tee Eng Ong followed by a welcoming speech by the program advisor, Dr Farah Ayuni Shafie from UiTM. MAEH also provided food free handlers training and health screenings during the forum. The outcomes of the Focus Group Discussions (FGDs) were published in the MAEH Journal of Environmental Health (MJEH). The write-up can be used as a guide for the academia, local authorities and environmental health professionals to understand the issues and review the suggested control measures.

**MAEH URBAN HEALTH FORUM:  
TOWARDS LIVABLE COMMUNITIES  
DATE: 17-18 JUNE 2019**

**ACTIVITIES**

- FOOD HANDLING CERTIFICATION COURSE
- HEALTH SCREENING
- HEALTH EXHIBITION

**VENUE:**  
LANGKASUKA HOTEL,  
LANGKAWI ISLAND

**MAEH Journal of Environmental Health** (ISSN 2637-1929)  
Jurnal Kesihatan Persekutuan MAEH  
Published by Malaysian Association of Center Environmental Health  
<http://jurnal.maeht.org/journal/>

**TOWARDS ZERO WASTE: TECHNOLOGIES AND MINIMISATION STRATEGIES**

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**SHORT COMMUNICATION ON  
THE LANGKAWI CHARTER ON URBAN HEALTH**

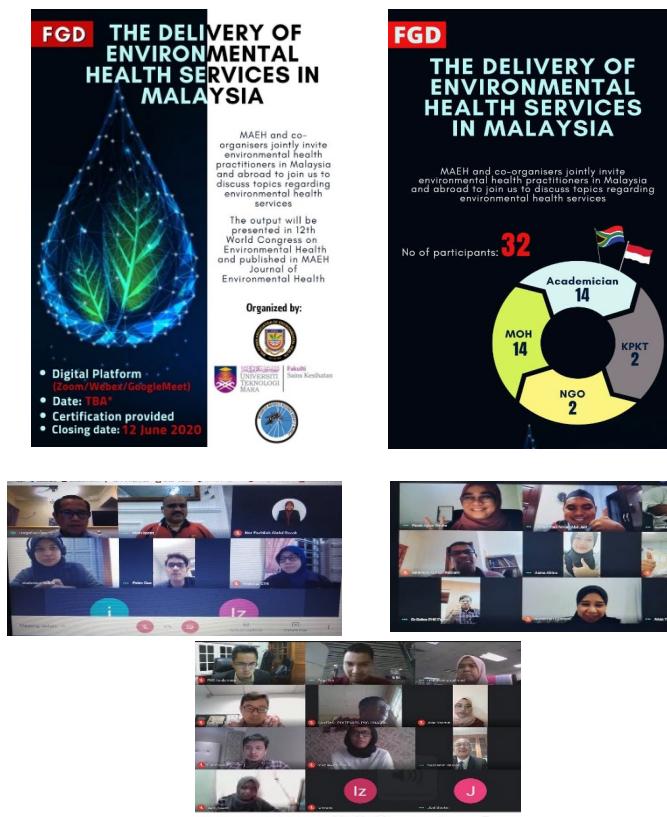
To read the short communication, please go to:

<https://maeh4u.org.my/journal/index.php/shortcom/index>

Following the successful MAEH Urban Health Forum in 2019, MAEH again brought together the environmental health professionals for a discussion on the delivery of environmental health services in Malaysia through Focus Group Discussion 2020 (FGD 2020). The work of Environmental Health professionals in Malaysia is truly diverse in both public and private sector. MAEH with the assistance of Master in Environmental Health and Safety students from Faculty of Health Sciences, Universiti Teknologi MARA (UiTM) Selangor, Malaysia took up the commitment to acknowledge and document the works and services of Environmental Health in Malaysia for future credible references. The FGD 2020 focused on five components in the delivery of Environmental Health services in Malaysia:

1. The current status and way forward for Environmental Health delivery in Malaysia
2. Crisis management in Environmental Health services in Malaysia
3. Environmental Health law enforcement
4. Environmental Health framework review for developed and developing countries
5. Environmental Health staff workloads and competencies

The documents will be available in MAEH Journal of Environmental Health in early 2021.



Virtual meetings were conducted amidst the Covid-19 pandemic



**Flinders**  
UNIVERSITY

## **Flinders University Environmental Health Researchers establish a mask testing facility**

(reproduced in part from Flinders in Touch: <https://news.flinders.edu.au/blog/2020/09/23/virus-tests-support-masks-against-covid-19/>

Flinders University Environmental Health Researchers established a mask testing facility to test masks commercially, and then used the set up to test commonly available masks purchased from shops and the internet. This study, published in *Pathogens*, (full text available here: <https://www.mdpi.com/2076-0817/9/9/762>) found even the poorest performing mask filtered at least 50% of viruses.

The viral filtration (VFE) was calculated for two sizes of aerosols, 6 microns (VFE 6  $\mu\text{m}$ ), which is the size of aerosols produced by coughing, and 2.6 microns (VFE 2.6  $\mu\text{m}$ ), which are small enough to be inhaled into the lower respiratory system.

The mask testing was carried out in accordance with the ASTM F2101-14 Standard Test Method for Evaluating the Bacterial Filtration Efficiency of Medical Face Mask Materials, Using a Biological Aerosol, in a special apparatus developed for further COVID-19 studies. The fabric face masks tested were purchased from five Etsy retailers based in Australia and chosen at random.

The best performing fabric masks filtered 97% to 99% of the virus numbers – at both VFE measures, with one mask performing at 98.6% (VFE 6.0  $\mu\text{m}$ ) and 99.1% (VFE 2.6  $\mu\text{m}$ ) when made according to the Victorian Department of Health and Human Services guidelines with two layers of reusable shopping bag fabric and one layer of cotton.

Another mask made from two layers of cotton had a VFE 6.0  $\mu\text{m}$  of 55% and a VFE 2.6  $\mu\text{m}$  of 93%. However, the effectiveness of this mask increased to become one of the best performers by simply inserting a section of vacuum cleaner bag (VFE 6.0  $\mu\text{m}$  of 99.5%, VFE 2.6  $\mu\text{m}$  of 98.8%) or a dried baby wipe (VFE 6.0  $\mu\text{m}$  of 98.5%, VFE 2.6  $\mu\text{m}$  of 97.6%).

This study also found the VFE of N95 and surgical masks supported their high advertised bacterial filtration efficiency.

While a 50% reduction might not seem particularly effective, the Flinders environmental health experts say US modelling studies have shown that if 80% of the population was wearing a 50% effective mask in areas of high transmission like New York, the number of COVID-19 deaths could fall between 17% and 45%

This predicted reduction in deaths is significantly increased by wearing masks in areas with lower transmission rates, the Flinders researchers say.

"This study gives useful guidance for people who are required to wear face masks in public during the COVID-19 pandemic," says Dr Harriet Whiley.

"The information will also inform best practice for fabric face mask design to protect against respiratory diseases and reduce community-based transmission of SARS-CoV-2".

Co-author Associate Professor Kirstin Ross says further research is also needed to test face mask design and fitting. "Fit is very important to reduce the risk of viruses entering through gaps between your face and the mask," Dr Ross says. "There also should be an education campaign to inform people about how to wear fabric masks," she says. "It's important to wear the mask correctly. Do not touch your mask except to take it off, and wash your mask after use in water that is hotter than 60°C with soap or laundry detergent." The article, 'Viral filtration efficiency of fabric masks compared with surgical and N95 masks' by Harriet Whiley, Thilini Keerthiratne, Muhammad Atif Nisar, Mae White and Kirstin Ross has been published in *Pathogens*.

This research received funding from the Flinders Foundation and South Australian Government through the Research, Commercialisation and Startup Fund to establish the mask testing apparatus at the Flinders University Medical Device Research Institute.



Kirstin Ross and Harriet Whiley in the Environmental Health laboratory.



Mask testing set up



Two of the masks tested: one made according to the Victoria DHHS guidelines and a fabric mask purchased from the internet.



# Cardiovascular Health Effects Associated with E-Cigarettes and the Growing Popularity Among Adolescents and Young Adults

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## ABSTRACT:

Electronic cigarettes, also referred to as vape pens, e-cigs, mods, are smoking simulating electronic devices. The main use of the e-cigarettes is that it is commonly used as smoked tobacco cessation tool, which offers a safer alternative to smoking consequently leading to a healthier lifestyle.

Despite being recommended as a healthy smoking alternative, electronic cigarette use and popularity continues to grow worldwide, and the adverse health effects are becoming concerning due to limited clinical research. The principal concern arises from the variety of available e-liquids that supposedly substitute harmful ingredients found in tobacco yet can be highly addictive and may adversely affect human health. This trend has been rapidly increasing among adolescents and young adults primarily due to e-liquid flavourings that mimic deserts and fruits, as well as due to the misconception that e-cigarettes are harmless.

This report aims to identify the possible adverse health effects on cardiovascular system from e-cigarette e-liquids, research the trends of e-cigarette use among adolescents and young adults, and determine why are e-cigarettes becoming so popular by an overview of the literature.

**Keywords:** e-cigarettes, public health, cardiovascular health, tobacco control

## 1. INTRODUCTION

### 1.1. What are e-cigarettes?

Electronic cigarettes, or also commonly called as vape pens, e-cigs, mods, and tanks systems, are battery powered devices that use heat to convert liquid into vapour (aerosol) which the user inhales (CDC, 2020; NIH, 2018). Most of electronic cigarettes contain a reservoir where a flavoured liquid can be deposited (CDC, 2020; HSE, 2018). The electronic cigarette may come in different shapes and sizes, may be disposable or rechargeable (as seen in Figure 1.1), and may or may not contain nicotine (in varying strengths) (as seen in Figure 1.2) (NHS, 2019).

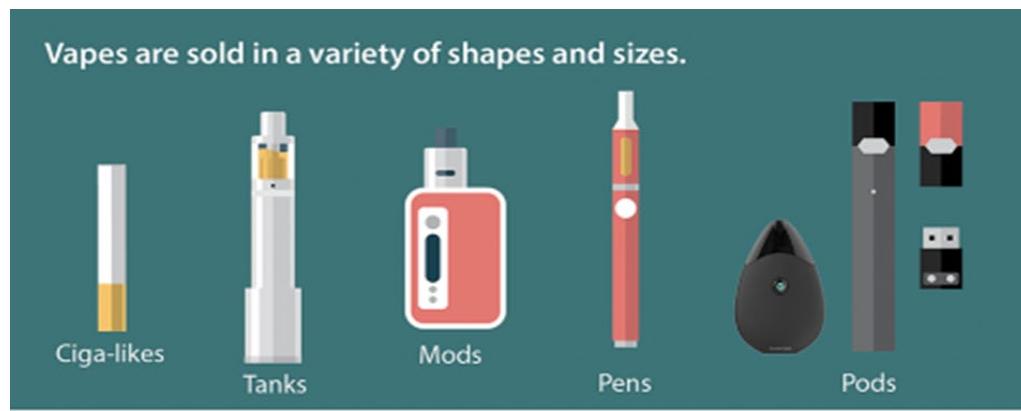


Figure 1.1: Different types of e-cigarettes (Harris, 2019).



Figure 1.2 Different nicotine strengths in e-cigarette liquids (Perez, 2018).

The principal purpose of an electronic cigarette is acclaimed as a tobacco product cessation tool and a safer alternative to smoking, leading towards a healthier lifestyle while combating the addictive and health harming tobacco products. E-cigarettes do not contain tobacco or other harmful ingredients such as tar or carbon monoxide, substituting these harmful ingredients with e-liquids/e-juices. This, however, mainly applies when completely substituting e-cigarettes for conventional cigarettes, which in turn reduces users' exposure to many toxicants and carcinogens present in traditional cigarettes.

## 2. TRENDS

### 2.1. E-cigarettes around the globe

E-cigarettes were first introduced in the U.S. in 2006 and in 2015 the country has seen the most recent developments in e-cigarette (EC) evolution – pod-mod devices such as JUUL (Fadus, 2019). In United Kingdom, there was a 55% increase in EC users between 2013 and 2015, making it the fastest growing country in Europe for e-cigarette consumption (George, 2019).

A total of 63 million (14.6%) of people living in the EU aged 15 or older had tried e-cigarettes by 2017 and 7.6 million (1.8%) used e-cigarettes on regular basis, according to Eurobaster study (O'Brien, 2020).

Adolescents are increasingly using the e-cigarettes nationwide (Parks, 2020). There is currently an outbreak of vaping-related illnesses such as pulmonary diseases and newly identified lung disease vaping related disease which accounted for a total of 2,807 hospitalizations or deaths across 50 states in the U.S., notably among young adults (Parks, 2020; CDC, 2020).

### 2.2. E-Cigarettes in Ireland

According to a Special Eurobarometer Attitudes of Europeans towards tobacco and electronic cigarettes study by EU, respondents in Ireland stated that most started smoking conventional cigarettes between the ages 15-17 (39%), while ages 18-25 came to close second (37%) (EC, 2017).

The prevalence of smoking, among all people aged 15 and over, has fallen from 23% in 2015 to 17% in 2019 (14% smoke daily and 3% smoke occasionally) according to the recent Healthy Ireland (HI) Survey (Figure 1.2) (Power, 2019; HI, 2019). Smoking rates remain highest among those aged 25 to 34, 26%, which has dropped from 32% in 2015), more men (19% in 2019) said they had tried vaping, compared to women (16% in 2019) (HI, 2019).

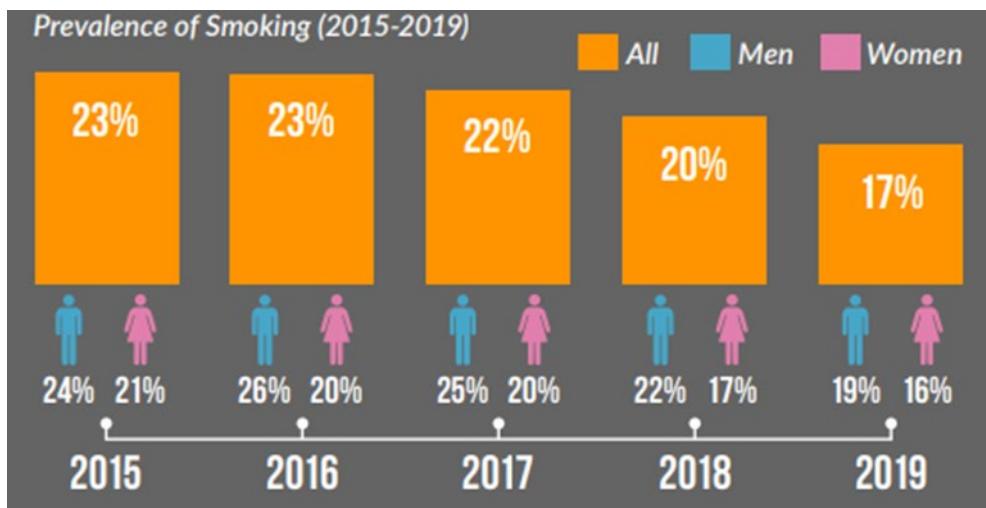


Figure 1.2. Trends among various age groups from years 2015-2019 in Ireland (HI, 2019).

The overall use of e-cigarettes has increased from 3% in 2015 to 5% in 2019 (Figure 1.3), and at least 12% have tried them at some point (HI, 2019). Most of the respondents who currently use e-cigarettes are between ages 15-24 and 25-39 (~19%) and most of the respondents are smokers (10%) and those who stopped smoking (13%) while those who never smoked reached 1% (Figure 1.3) (EC, 2017; HI, 2019).

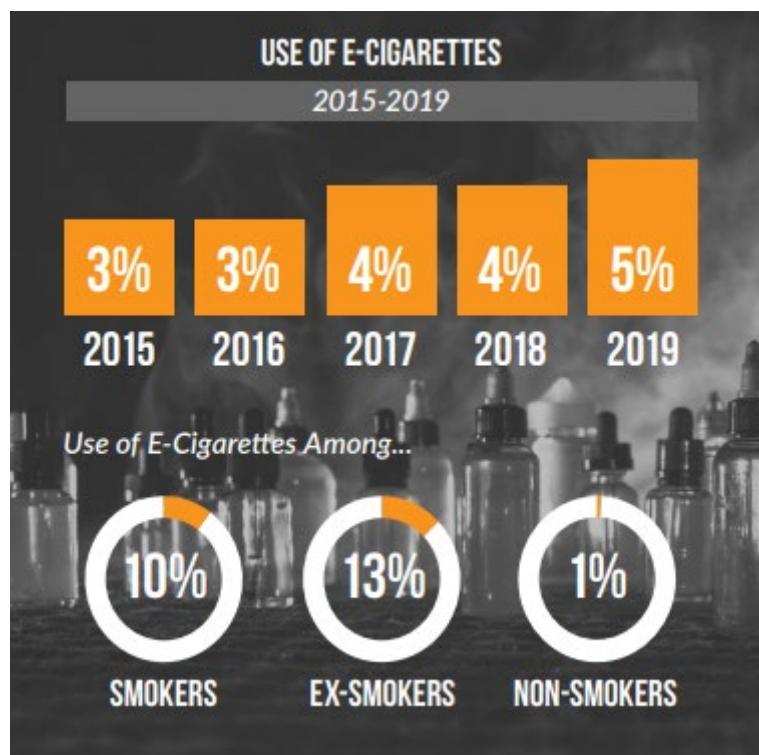


Figure 1.3: Use of cigarettes between years 2015 – 2019 and rates of e-cigarette usage among smokers, ex-smokers and non-smokers (HI, 2019).

The 2016 European School Survey Project on Alcohol and Other Drugs (ESPAD) survey reported that 23% of second-level students aged 15–16 years had ever used an e-cigarette (43% of boys and 31% of girls) and a further 52.7% of respondents reported that they first tried e-cigarette when they were 15 years old (ESPAD, 2020). The Health Behaviour in School-aged Children study in 2018 discovered that the percentage of children who ever consumed an e-cigarette increased with age - 11.5% 13-year old to 30% of 17-year old children, with boys (26%) being more likely than girls (18%) to report that they have ever used electronic cigarettes (Kolto, 2020; O'Brien, 2020).

### 3. HEALTH OUTCOMES

There is an abundance of information regarding the negative health impacts tobacco products may pose to humans, there is currently limited scientific clinical research to confirm that electronic cigarettes are harmless and

do not pose any injurious effects to human health. Current research primarily focuses on the fact that electronic cigarettes help to reduce the tobacco product consumption and help to improve overall wellbeing. A study by Gathright (2019) has shown that e-cigarette use to cease smoking and to reduce harm from traditional tobacco continues to grow, yet research is needed to determine ultimate health impacts e-cigarettes may potentially pose.

There has been documented cases of electronic cigarette explosion due to faulty battery, which resulted in severe burns and in some cases, resulted in detrimental incidences. In the United States, there have been 134 incidences of overheating, fire or explosion involving e-cigarettes. There are currently no similar documented incidences in Rep. of Ireland, however, Ireland is the third-biggest prodigal on e-cigarette products per capita (€14.40 in 2017), therefore it is likely a similar event may occur. (Gallagher, 2018). There is also evidence suggesting that electronic cigarettes cause respiratory problems, although of lesser regard than what traditional cigarette consumption causes to our health, but nonetheless sparking concern and doubt if electronic cigarettes are a way to a healthier lifestyle. New emerging speculations regarding health concern is the e-cigarette relationship to increased cardiovascular issues.

Counterfeit e-liquids have been a major concern ever since introducing e-cigarettes to the worldwide market. These fake e-liquids may contain incorrect ingredients or concentrations that do not match the label and may contain certain unknown to user impurities mixed in such as drugs or added nicotine in the product stating it does not contain any (Assi, 2018; Omaiye, 2017). Undeclared additive use may expose consumers to nicotine addiction, poisoning or lead to serious health implications (Omaiye, 2017).

### **3.1. Exposure to E-Cigarettes and Cardiovascular Health**

Combustible cigarette smoking is a contributor to mortality among adults with heart failure (HF), therefore smokers with cardiovascular diseases (CVD) are turning to e-cigarettes to reduce the harm combustible cigarettes are causing (Gathright, 2019).

E-cigarettes are largely viewed as a safe alternative to the traditional combustible tobacco, as e-cigarettes do not involve combustion process which releases pulmonary carcinogens such as polycyclic aromatic hydrocarbons and N-nitrosamines, but instead heats the tobacco which consequently reduces the volume of toxic compounds such as carbon monoxide. Some studies discovered that e-cigarette vapour has been proved to contain fewer toxic substances compared to traditional combustible cigarettes vapour. Common short-term use of e-cigarettes may include throat and mouth irritation, headache, dry cough, and nausea, still these side effects are often self-limited and resolve over time (Fadus. 2019). However, emerging evidence suggests that e-cigarettes may not be harmless (Gathright, 2019; Fadus, 2019).

E-cigarette use can elevate heart rate and diastolic blood pressure but less so compared to traditional cigarettes. (Fadus, 2019). A study by Alzahrani (2018) published in the American Journal of Preventive Medicine, showed that the risks of myocardial infarction is higher with tobacco cigarettes (TC), there was also increased risk of myocardial infarction from daily use of EC.

A study by Lisko (2015) showed that most of the e-liquids tested had a high percentage (60%–90%) of nicotine existing in free or unprotonated form. This indicates that consumers do not know how much nicotine there may be exposed to when using e-cigarettes. Additionally, this study found that minor tobacco alkaloids in all nicotine containing e-liquid varieties, which suggests the nicotine in the e-liquids is extracted from tobacco (Lisko, 2015). Longer-term nicotine use may contribute to acute cardiovascular events in the presence of cardiovascular disease (George, 2019). Endothelial dysfunction is the earliest detectable change in vascular health, which has been shown to be associated with CV risk and long-term outcomes (George, 2019). The American Heart Association reviewed the cardiovascular risk of EC smoke and concluded that EC provide a lesser cardiovascular risk than smoking, it still poses some CV risk and recommended against it use in patients with current cardiovascular disease (Burbank, 2016; George, 2019; Piano, 2010).

Unfortunately, little is known about long-term effects associated with the use of e-cigarettes as these are new tobacco related products, compared to traditional cigarettes, and require long-term research to establish the health consequences.

### **3.2. E-Liquids/E-Juices**

Electronic cigarettes became extremely popular over the recent years, especially among young adults and children. The misconception that electronic cigarettes are less harmful thus “healthy and allowed” is ever growing. The electronic cigarettes became highly popular when various flavours were introduced. Today, it is estimated that there are over 7'000 different electronic cigarette liquid flavours and the numbers keep increasing due to the new trend of DIY reservoir liquids popularized via social media and video sharing websites, such as YouTube (Becker, 2018). Some developed flavours are specifically aimed at younger audience by introducing flavours, which mimic fruit and desserts (Clivebates, 2017). According to some studies, it is estimated that the most popular flavours are

fruit (berries) and desserts. Some e-liquids may be specifically targeting the youth by using alluring names to describe the flavour of the liquids such as "Gummy Bear", "Cotton Candy", "Cherry Pie" or "Candy Crush" (Kenney, 2020).

Electronic cigarette liquids, otherwise known as "e-liquids" or "e-juices", are typically composed of four basic ingredients: water, nicotine, flavouring and propylene glycol or vegetable glycerin base (or both) (Hamilton, 2018). However, nicotine, PG, VG and flavourings have been raising concerns recently regarding their potential health effects, especially to the cardiovascular system (Ooi, 2019).

### **3.2.1.Nicotine**

Nicotine itself is an addictive chemical ingredient which stimulates the central nervous system and raises blood pressure, respiration and heart rate (Mishra, 2015; Benowitz, 2010). Nicotine can penetrate the brain and release an artificial sensation of pleasure and satisfaction as dopamine levels increase (Benowitz, 2010; Jiloha, 2010). Manufacturers of e-liquids may produce and offer their products in varying strengths of nicotine ranging from none to 20%, which was lowered from 24% in 2016 by the European Union (Manufacture, Presentation and sale of Tobacco and Related Products), Regulations 2016 (ISB, 2016).

Additionally, it has been recorded that long-term users, who display longer and extra frequent aspirations, have higher nicotine levels in their blood compared to traditional tobacco cigarette smokers, whereas less experienced e-cigarette users typically have lower levels of nicotine in their circulation system (D'Amario, 2019; Shahab, 2017). It is now being observed that nicotine levels in electronic cigarettes can be regulated according to the users taste they prefer to inhale, therefore raising a concern regarding nicotine abuse and its addiction potential (D'Amario, 2019; Benowitz, 2010). Moreover, vaping low-nicotine against high-nicotine e-liquid in e-cigarettes is accompanied by an increase in larger quantities of potentially harmful e-liquid consumption (Smets, 2019).

### **3.2.2.Carbonyl Compounds**

E-cigarettes may eventually emit harmful compounds such as carbonyls, including aldehydes (e.g. formaldehyde, acetaldehyde), which result from heat deterioration of propylene glycol and glycerol.

There are limited studies available to evaluate the effects of e-cigarette aldehydes on human health, animal studies have revealed that formaldehyde exposure altered the heart rate, blood pressure, cardiac contractility and subacute as well as chronic inhalation of formaldehyde was linked with cardiac oxidative stress and cardiac cell damage (Qasim, 2020). A study by Qasim (2020) also found that total blood platelet counts significantly increased in mice exposed to formaldehyde gas and this could be associated with platelet homeostasis, which could lead to abnormal blood clotting and thrombotic complications. Another report showed that after inhaling acetaldehydes, blood pressure and heart rate increased (Egle, 1972). The levels of formaldehyde and acetaldehyde concentrations used in animal studies are comparable to the levels generated by e-cigarettes (Qasim, 2020).

### **3.2.3.Flavourings**

Over seven thousand e-liquid flavours exist to date, many containing complex chemical compositions. However, the chemical that stands out and raises most concern is diacetyl, which can trigger obliterative bronchiolitis (OB), also known as "Popcorn Lung." (Kishlock, 2017). Standford University carried out a research on endothelial cell growth and showed that human endothelial cells, collected from e-cigarette users' blood shortly after inhaling e-liquid, are less viable and display reasonably increased levels of molecules implicated in DNA damage and cell death and are closely related to those seen during the development of cardiovascular disease (Best, 2019; Lee, 2019).

Cinnamon, caramel and vanilla flavours exhibited an increased uptake of low-density lipoproteins and lipids often linked with inflammation and endothelial dysfunction and triggers body's self-repair mechanism via blood platelet (wound healing) (Goto, 2015; Best, 2019; Lee, 2019).

The severity of the damage varied among different tested flavours. Nonetheless, according to a study published by Journal of the American College of Cardiology, cinnamon and menthol flavours proved to be the most harmful even in the absence of nicotine (Best, 2019; Lee, 2019). Both, cinnamon and menthol flavoured e-liquids had significantly disrupted the ability of the cultured cells to form capillary tube structures associated with the growth of new blood vessels (Best, 2019; Lee, 2019).

## **4. ADOLESCENTS AND YOUNG ADULTS**

Many of e-liquid consumers may not be aware what they are inhaling, and a younger audience is at a greater risk. According to a recent survey by Fadus (2019), 63% of high school students and young adults did not know that nicotine is present in e-cigarettes, 19% believed that e-cigarette smoke was only vapour from the water inside, and although e-cigarettes are considered as tobacco related product in Ireland, a further 23% thought that e-

cigarettes were not considered as tobacco containing products (Fadus, 2019). Additionally, adolescents believe that fruit e-liquids are less harmful than tobacco flavoured e-cigarettes.

E-cigarettes may become popular among adolescents and young adults because they are viewed as a healthy lifestyle choice therefore becoming more socially accepted compared to traditional cigarettes. The designs, user-friendly functions, more pleasing smoking experience due to variety of available flavours and the ability to use the device discreetly in places where smoking is forbidden are alluring factors among younger audience (Fadus, 2019).

A younger audience find ways to purchase e-cigarettes. It is not complicated now to purchase an e-cigarette online. Many websites online selling such products now have an age verification popup campaign which requires you to confirm your age ("YES - over 18" or "NO" - not over 18; or by entering your date of birth) whether you are only browsing or actually purchasing the products, however, this notification is very easy to avoid by a simple mouse click, without the seller's knowledge of your true age. Some websites may not have any ways of confirming the person is of legal age to purchase their products, which makes it even easier access for younger audience. Many sellers may also sell e-cigarettes and e-cigarette products on e-commerce websites such as Amazon or Ebay, without the need to confirm the legal age to the seller at all.

According to a recent study by Parks (2020), e-cigarette use in adolescence potentially increases the chances of the future use of combustible cigarettes, substances and nicotine-related products and increases rates of dual tobacco product use.

Additionally to the previously mentioned adverse health effects to inhaling e-cigarettes, children may also ingest e-liquid flavourings, which can be dangerous to health. This case has been reported as quite common among children aged under the age of five (Fadus, 2019). This is a serious concern as the e-liquid container may contain several times the lethal dose of nicotine and chemicals contained in flavourings for children (Seo, 2016).

#### **4.1. Migration from e-cigarette use to conventional cigarettes**

As e-cigarette use substantially increased in 2014, more data regarding the migration from e-cigarettes to traditional tobacco was collected around the globe (O'Brien, 2020). A study by the Health Research Board (2020) found that e-cigarette users were around 2.14 times more likely to adopt conventional cigarette smoking compared with non-e-cigarette users and a study by Zhong (2016) and Spindle (2017) also indicated association with the increased smoking intention among never-smoking adolescents and young adults (Zhong, 2016; Spindle, 2017).

The daily usage rate among youths in Ireland remains relatively low. However, there is concern that without appropriate e-cigarette regulation there is a risk that e-cigarette usage rate may substantially increase as it was seen in the US - where daily e-cigarette use among teenagers has risen by 78% from 11.7% in 2017 to 20.8% in 2018 (O'Brien, 2020). The Tobacco Products Directive 2014/40/EU states that "electronic cigarettes can develop into a gateway to nicotine addiction and ultimately traditional tobacco consumption, as they mimic and normalize the action of smoking" (IHIF/ICS, 2020). Other research, such as by Leventhal (2015), Bunnell (2015) and Wills (2015), support this statement and also suggests that a young audience may migrate from e-cigarette use to initiation of combustible tobacco use and show more willingness to smoke conventional cigarettes or try other tobacco related products compared to those who had never used any tobacco product.

A study on the prevalence of e-cigarette use in approximately 1500 non-smoking children (aged 10-11) or associations with intentions to smoke in Wales by Moore (2016) revealed that 6% of children aged 10-11, including 5% of never smokers, reported having used an e-cigarette. Findings also suggest that children are more likely to imitate parental and peer e-cigarette use if parents used either/both tobacco and e-cigarettes compared to those whose parents never smoked or used tobacco related products (Moore, 2014). Trimis, (2016) explains that e-cigarette use may promote smoking during the development to adulthood due to personal or environmental factors, including those who considered to be at lower risk of such factors. This suggests that e-cigarette use likely introduces youth to tobacco products and the likelihood of future smoking, even if no interest in smoking was expressed (Trimis, 2016).

### **5. CURRENT E-CIGARETTE REGULATIONS**

E-cigarettes restrictions are relaxed as they are not regulated by Health Products Regulatory Authority (HPRA) and are considered as consumer products rather than medicinal products or medical devices. The European Union Tobacco Products Directive regulates certain aspects on e-cigarettes such as deciding safety and quality standards, making health warning and marking necessary, present manufacturers and importers mandatory requirements, introducing notification requirements for manufacturers and importers, imposing stricter rules on advertising and monitoring market developments (HSE, 2018).

S.I. No. 271/2016 - European Union (Manufacture, Presentation and Sale of Tobacco and Related Products) Regulations 2016 is the main regulation in Ireland that states what a manufacturer, importer and distributor must follow in order to comply with the legal obligations in the country (GOI, 2016).

Under the S.I. No. 271/2016 a person shall not place electronic cigarettes or refill containers on the market unless they comply with the provisions of these Regulations and all other relevant European acts (GOI, 2016). The Regulations also state that a manufacturer or importer of an e-cigarette or refill container must submit a notification to the Health Service Executive of any such products that is intended to be placed on the Irish market and the following must be included in the notification:

- "(a) the name and contact details of the manufacturer, a responsible person within the European Union, and, if applicable, the importer into the European Union;*
- (b) a list of all ingredients contained in, and emissions resulting from the use of, the product, by brand name and type, including quantities thereof;*
- (c) toxicological data regarding the product's ingredients and emissions, including when heated, referring in particular to their effects on the health of consumers when inhaled and taking into account, any addictive effect;*
- (d) information on the nicotine doses and uptake when consumed under normal or reasonably foreseeable conditions;*
- (e) a description of the components of the product, including, where applicable, the opening and refill mechanism of the electronic cigarette or refill containers;*
- (f) a description of the production process, including whether it involves series production;*
- (g) a declaration that the production process ensures conformity with the requirements of this Regulation and Regulation 27;*
- (h) a declaration that the manufacturer and importer bear full responsibility for the quality and safety of the product, when placed on the market and used under normal or reasonably foreseeable conditions" (ISB, 2016; GOI, 2016).*

The notification then must be submitted through a European Union Common Entry Gate (EU-CEG) made available by the European Commission (HSE, 2018). The Executive may request completion of information if the product deems to have incomplete submitted information and as a result the manufacturer/importer must comply with this request and must inform the Executive of the modification of the product. Furthermore, the manufacturer/importer must submit a report electronically annually regarding (a) sales (volume of sales, by brand and type of product), (b) consumer preference information (incl. youth, non-smokers and current type of users), (c) mode of sale of the products, and (d) executive summaries relating to subparagraphs (a), (b) and (c), translated in English upon request (GOI, 2016).

Additionally, S.I. No. 271/2016 states the following must be complied with:

- E-cigarette must also include, under section 27 (2) ensure that "*(a) nicotine-containing liquid is contained in— (i) dedicated refill containers not exceeding a volume of 10 ml, or (ii) disposable electronic cigarettes or in single use cartridges or tanks and that the cartridges or tanks do not exceed a volume of 2ml; (b) nicotine-containing liquid does not contain nicotine in excess of 20 mg/ml; (c) nicotine-containing liquid does not contain an additive listed in Regulation 8(3)"*
- Information and labelling on e-cigarettes and refill containers, with every e-cigarette on the market, there should be d) a leaflet containing the information that the product is not suitable for young people and non-smokers as well as state (e) the possible adverse health effects (f) addictiveness and toxicity. It also (2) shall "*(b) includes an indication of the nicotine content of the product and the delivery per dose, (c) and a reference that the product is not recommended for use by young people and non-smokers, , (d) includes a recommendation to keep the product out of reach of children" and additionally, have a (3) health warning on their packaging.*
- Electronic cigarettes (1) should not be promoted (a) for consumption, (b) suggesting its not harmful or less harmful than any other tobacco related product, (c) suggest or imply that electronic cigarettes/refill products benefit health and lifestyle, (d) reference taste/smell, (e) resemble food/cosmetic product or are (f) environmentally friendly.
- A manufacturer, importer or distributor of electronic cigarettes or refill containers shall establish and maintain a system for collecting information about all the suspected adverse effects on human health of such electronic cigarettes or refill containers". Additionally, under paragraph (2) of section 33 the manufacturer/importer/distributor must recall or withdraw the product in his/her possession if tobacco related product is deemed unsafe for public health, is damaged/not in good quality and must inform the Executive (3) of the potential risk to human health and safety and of any corrective action taken as well as the results of correction action taken (GOI, 2016).

The Directive sets out the ban on selling tobacco products to young persons under 18, however it does not address the new tobacco related products that have entered the retail since 2014 including products such as new and improved e-cigarettes, e-liquids, herbal cigarettes and vaping products and does not strictly regulate them in terms of sale and advertisement to younger audience. According to S.I. No.271/2016, advertisement of tobacco related products is not allowed on radio, newspapers and on television to which Broadcasting Act 2009 (No. 18 of 2009) and the European Communities (Audiovisual Media Services) Regulations 2010 (S.I. 258 of 2010) follows, and it is not specified that it is illegal to advertise e-cigarettes on billboards outdoors, public transport, bus stops

(GOI, 2016). As a result, several health organizations, including Irish Heart Foundation are calling a ban on e-cigarette advertising after a report found that e-cigarettes can damage the brain, heart, blood vessels and lungs (Gorman, 2019; IHF/ICS, 2020). The advertisement (as seen in *Figure 1.3*) is an example of allowed advertisement in public, which suggests the product is fashionable, glamourous therefore encouraging you to try this e-cigarette product. This type of advertisement, especially near educational institutions, where larger number of populations consists of adolescents and young adults, may contribute to the rapidly growing e-cigarette consumption and addiction among youth as well as increase in future health risks. Younger population appear to be more influenced by such advertisement and are more vulnerable to advertisement traps.

Government policy on tobacco control is set out in the Tobacco free Ireland (2013) report, which stated that there is a lack of scientific research on the adverse health effects related to e-cigarettes and their role in supporting smoking cessation (HSE, 2018). Current government policy does not identify a role for e-cigarettes in tobacco control in Ireland (HSE, 2018).



*Figure 1.3: Blu e-cigarette/vaping product advertisement on Dublin Bus (Gorman, 2019)*

Former Minister for Health, Simon Harris, stressed that restrictions regarding advertisement of e-cigarettes close to educational institutions, such as schools, playgrounds will be considered (Gorman, 2019). The Department of Health continues to monitor evidence in this area as part of its ongoing monitoring and review of Tobacco Free Ireland and will determine any updates to policy as appropriate (HSE, 2018).

## 6. RECOMMENDATIONS

It has already been proven that e-cigarettes are a much healthier choice compared to traditional tobacco cigarettes helping towards smoking cessation, there is still a gap in research to determine the full health impact of electronic cigarettes may pose to human health, therefore, evidence-based clinical research is required, especially focusing on young and vulnerable populations.

Prohibition of e-cigarette advertising through communication mediums such as social media and outdoor areas, e.g. bus stops, billboards, public transport, and at point of sale, is recommended to reduce the level of people purchasing e-cigarettes. Current e-cigarette marketing methods continue to find creative ways to approach the public whilst still following lax regulations.

Although, strict sale of tobacco related products exists, prohibiting anyone to purchase tobacco products under the age of 18, it is especially important now to consider strengthening such prohibition measures on online sale platforms as well. Recently initiated and presented Public Health (Electronic Cigarettes and Herbal Cigarettes) Bill 2019 is aiming to incorporate such restrictions on tobacco related product sale to young persons, similar to the existing tobacco legislation, by banning the sales of tobacco related products such as e-cigarettes and herbal cigarettes to persons under 18, prohibiting vending machine locations or events where children may be located, introducing enforcement tools for authorised officers, penalties in case of legislation breach and annual fees requiring the businesses to pay in order to sell tobacco related products, including e-cigarettes (Farrell, 2020; McGee, 2019). The Bill remains on the first stage of initiation, however, if it is enacted soon it may help to reduce the number of tobacco users without the increase in e-cigarette consumers, prevent young persons from practising e-cigarette use and avoid the associated health implications.

The public appears to lack understanding what an e-cigarette is and what is inside its e-liquid. Implementing tobacco related product awareness programmes/campaigns into educational institutions, such as schools, and work

environments could educate people to better understand the possible adverse health effects concerning tobacco related products.

## 6.1. CONCLUSION

Further evidence-based research is needed to determine the ultimate health impacts, including clinical research on cardiovascular complications of e-cigarette use. Adolescents and young adults are especially vulnerable as e-cigarettes became mainstream, accessible and are considered healthier than traditional smoked tobacco, however little is known by the users what e-cigarette consists of and whether the product is genuine.

It is anticipated that e-cigarette popularity will continue to grow and more adolescents and young adults will be lured into this phenomenon, nevertheless, there is the possibility of tackling the issue by proposing stricter regulations and increasing awareness of the possible adverse health effects among the public, especially adolescents, young adults and vulnerable populations.

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## Dengue Crisis in Malaysia - It can be terminated! By Veeramohan Supramaniam, FRSH.



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Malaysia has consistently reported a high incidence of dengue fatalities in the ASEAN region. Malaysia reported a total of 130,101 dengue fever cases with 182 deaths in 2019 last year.

A pioneering study carried out by Muhammad Azami et al., 2011, showed high dengue IgG seropositivity (91.60%) found in the population indicated that dengue might be endemic in Malaysia for a long time into the future. IgG or "Immunoglobulin G" is an indicator of past infection while IgM indicates recent infection.

In Malaysia and Asian countries, where all 4 serotypes of the viruses circulate, those previously immune to an earlier serotype can develop severe dengue which can result in deaths if they are exposed to another serotype. This risk of subsequent infection to different serotypes increases proportionately with the duration taken to control the outbreak. Therefore, if we can control outbreaks from lingering (persisting) as early as possible after its onset, we can surely save many lives. Deaths also translate to a loss of human capital, productivity, and potential talent.

Our productivity losses are also high due incidence of dengue occurring in 6-digit numbers compared to only tens of thousands in the past decades. A joint study in 2005 for justifying dengue vaccination, published in 2006 showed that our socio-economic burden was enormously high at USD13,000,000 per 10,000 reported cases equivalent to 940,000 lost days of productive work output. Using this conservative estimate, the total number of cases for 2018 would have cost about USD169,000,000. enough to construct many fully equipped hospitals or to payout critical allowances for our overworked health workforce.

Despite repeated control efforts by the Ministry of Health, including fogging, larvicide application, enforcement inspections and the release millions of Wolbachia-transinfected mosquitoes last year, dengue fever continues to increase uncontrollably, spilling over from each year to the next.

Wolbachia mosquitoes are expected to mate with Aedes mosquitoes to suppress the natural population over many months and even years making this experimental approach totally unsuitable for emergency outbreak response. Dengue outbreaks must be controlled within 14 days as prescribed by the Key Performance Index of the Ministry of Health. As such, prolonged "uncontrolled" outbreaks can incrementally increase the financial burden resulting in millions of wasted taxpayer funds and claiming many lives.

Evidently, all these control measures are being directed at all the wrong areas resulting in uncontrolled cluster localities becoming "hotspots" when the outbreak continues unabated beyond 30 days. Most of these "clusters" are residential areas based on the cases' current home addresses. After decades of successful door-to-door inspections the Ae. aegypti breeding rate has been reduced to near zero (Aedes House Index). It is interesting to note that according to the original guidelines of the WHO, dengue transmission is virtually impossible in and around habitable

premises within residential areas or workplaces if the House Index falls below the 5 percent "threshold of transmission".

The WHO guidelines assume that dengue transmission takes place at residential or peri-domestic locations. Therefore legal-educational messages require residents to inspect their home for at least 10 minutes every week. This can also be seen in Singapore's "Do the 10-minute Mozzie-Wipeout" and similar "source reduction" messages broadcast by most Health authorities in the region.

While such advocacy may be remotely useful, the WHO guidelines did not place any strategic emphasis on the possibility of acquiring infection away from the home through people commuting, to and from, workplaces, schools, places of worship or recreation. It would be interesting to note that primary school children who usually walk or ride bicycles to school contribute to about 20 to 30 percent of the total number of reported cases.

Foreign workers make up for a similar percentage of reported dengue cases. Some of them may have been infected in their countries of origin before arriving in Malaysia during the 1-3 day pre-symptomatic "window" in the incubation period when dengue viruses are actively circulating in their peripheral blood ready to infect local populations of the native species called *Ae. albopictus* also known as the Asian Tiger mosquito. Therefore, early case detection efforts will have little impact in interrupting transmission.

Due to the above observations, health authorities adopting the WHO guidelines have consistently failed to control dengue epidemics. In fact, the former Director-General of WHO Dr. Margaret Chan, admitted in 2016 that the WHO dengue control policy has failed massively.

The case's residence does not support infection, since most household members especial infants, pre-school children, senior citizens and the disabled remain relatively unaffected. The lack of secondary cases in adjacent houses further strengthens the hypothesis that infection is "being acquired away from home" as suggested by sero-epidemiological studies in Singapore by Goh KT, et. al., 1998. Dengue is obviously being transmitted by hungry female mosquitoes biting such commuters and school children around locations near their path of travel.

A fixation to WHO's "failed" policy may be indirectly responsible for the continued implementation of a case-reactive approach to vector control, inadvertently contributing to "increased incidence" of dengue cases and deaths in Malaysia, Singapore and other countries in the region.

"Mobility mapping" is essentially an epidemiological investigation procedure to identify the real-time location of "active" transmission hotspots or epicentres. The timely elimination of such reservoirs of infection is a prerequisite for interrupting secondary transmission of dengue viruses in order to eliminate the so called "hotspots" or "uncontrolled outbreaks" persisting in a dengue cluster locality for more than one or two combined incubation intervals in vectors and victims.

This epicentre-identification and elimination approach has been instrumental in halting the spread of dengue ever since we applied the above strategy in the Chinese New Villages at Triang, Mengkarak and Mengkuang in the District of Temerloh, Pahang during the nationwide outbreak in the early 1980s.

After my promotional transfer to the District of Manjung, we applied the same technique in mid-2002 at Sitiawan, Perak.

The township of Sitiawan and the Naval Base at Lumut had not reported any "uncontrolled outbreaks" or "persistent" hotspots ever since. This approach, based on findings of field epidemiologists from Singapore, was presented at the "1st Malaysian Conference on the Management and Administration of Dengue" organised by the Malaysian Association of Environmental Health in September, 2003.

In Seri Iskandar, Perak the results have been replicated since 2008 where annual incidence was held down below 10 cases at the time of my retirement, while in WPKL, Setapak was the first area under City Hall (DBKL) chosen for a pilot study in 2007. In the 3 areas mentioned above, there was a "consistent absence of hotspots lasting more than 30 days" resulting in a consistent drop in annual cases for at least 3 consecutive years. Setapak reported only 103 cases in 2013 as compared to 2,431 cases in 2006 before the start of the pilot.

The most encouraging results were demonstrated after obtaining an official letter of support from the Deputy Director of Public Health in 2014. The DBKL Vector control and urban sanitation teams were briefed in the implementation of the epicentre-elimination approach in late August 2014, and the intervention resulted in a concurrent (in all the eleven Parliamentary Constituencies) and consistent absence of "hotspots" for 53 consecutive weeks since epidemiological week 39 of 2014.

Earlier, Mr. Danny Wee Kong Heng who was the DBKL Senior Environmental Health Officer in Setapak, and I, responded to requests by En. Azraei from Batu Constituency Health Office as well as Mr.

Chandrakant Patel in charge of the Seputeh-Pantai Dalam Health Office, to help suppress hotspots reported in their respective areas. This resulted in a consistent absence of cases in both Constituencies and the actual incidence of dengue was suppressed 10 weeks before our official interaction with DBKL yielding a total of 63 consecutive weeks of "hotspot" elimination.

In 2014, at the height of the first outbreak in Japan after 70 years, health authorities explored the reasons for the unexpected epidemic. Subsequently, they managed to locate the active epicentre of the infection in Yoyogi Park, Tokyo and closed it temporarily, killed all infected stages of Ae. Albopictus mosquitoes and the reported number of cases ceased after about 8 weeks.

In 2018, during an epidemic in Hong Kong and the health authorities found that most of the cases had visited the Lion Rock Hill which they quarantined to destroy mosquito breeding sites. Within 14 days of epicentre-elimination, the outbreak was terminated in less than 4 weeks from the date of onset of the index case.

Since August 2014, Japan and since 2018, Hong Kong have not reported any more uncontrolled outbreaks. This outcome proves that timely identification and permanent elimination of dengue epicentres in the urban outdoors will result in sustained interruption of local transmission.

Through the Malaysian Association of Environmental Health, I will be able to provide hands-on practical field training in epidemiological investigation techniques to accurately identify the location of active epicentre.

# Spatio-Temporal Analysis of Hand, Foot and Mouth Disease (HFMD) in Bentong District, Pahang, Malaysia

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## Abstract

Hand, Foot, and Mouth Disease (HFMD) is an endemic disease in Malaysia and has been around for over a century. The state of Pahang has contributed to HFMD cases in Malaysia with a significant aggregate. Spatio-temporal examination has progressed in the field of epidemiological investigation. Therefore, the objective of this study is to assess the distribution of HFMD cases in Bentong District, Pahang from 2010 to 2017 using spatial and temporal analysis. Secondary data of HFMD cases from 2010 and 2017 were collected from Bentong District Health Office. All the longitude and latitude data were obtained from the 'e-notification' system and the coordinates were verified. Then, case plotting into the map was conducted. The study depicted that the distribution of HFMD cases was a clustered pattern. Along the month of May to December was identified to be consistent and significant temporal distribution of HFMD. Spatial analysis positively mapped the HFMD distribution pattern for eight years. Bentong mukim (smaller administrative area in a district) was recognized as a high incidence locality between 2010 and 2017. This outcome indicated the benefit of spatial mapping for viable public health strategy of HFMD prevention.

**Keywords:** HFMD, Spatio-temporal analysis, Pahang, Malaysia

## INTRODUCTION

Hand, foot, and mouth disease (HFMD) is a typical infectious disease in children and has caused a number of infections in East and South-East Asia. HFMD is mainly caused by enterovirus 71 (EV71) and coxsackievirus A16 (CV-A16). The average incubation period of HFMD is 3 to 7 days with the symptoms of fever, anorexia, cerebral pain, and small vesicular lesions or ulcers showing up on hands, feet, and other body parts. This disease can cause serious complications, for example, myocarditis, respiratory edema and meningitis (Wang et al., 2011).

HFMD is one of the endemic diseases and has been around for over a century in Malaysia. World Health Organization (2017) stated that transmission of HFMD in Malaysia is progressively limited to Sarawak and Sabah with occasional occurrences in other parts of Malaysia. The Annual Health Indicator from 2012 to 2016 by the Ministry of Health Malaysia reported that Pahang has contributed a great deal of HFMD cases in Malaysia with an aggregate of 1798 cases out of 158797 cases (1.13%). The report showed that rural and urban areas in the state of Pahang persist in HFMD cases. Bentong District Health Office in 2018 listed HFMD as one of the most common and most reported communicable diseases in the district. HFMD occurrence rate for Bentong region in 2017 was 4.2 per 100,000 population.

HFMD in Malaysia is still one of the biggest threats in public health besides other communicable diseases such as malaria and dengue (Koh et al., 2018). Therefore, controlling the case of HFMD in high-risk area is essential to accomplish the target of the HFMD reducing program. Counteractive action program for high-risk locality can be undertaken by plotting the disease area. The frequency of HFMD occurrence is geologically distributed in both rural and urban area. Geographic Information System (GIS) is a methodology in mapping cases so that the information will be read easily. The geographic arrangement

demonstrates the data information of the areas using longitude and latitude.

The spatial and temporal study is among the best technique to build up an exact model or to picture the health-related event in different view. Health events and spatial-temporal analysis can associate with one another and become a significant component in public health research and studies on disease transmission. Additionally, the effectiveness of the investigation offers a sensible and target impression of the investigation in infection transmission (Lu et al., 2014). Many spatio-temporal studies on communicable disease, for example, dengue, leptospirosis, typhoid, hand, foot, and mouth disease and gastroenteritis have been carried out around the world (Middelkoop et al., 2009; Deng et al., 2013; Pardhan-ali et al., 2012; Hsueh et al., 2012; Jeefoo et al., 2011; Liu et al., 2015; Samputthanon et al., 2013).

In spite of the way that some of countries around the world recently completed the spatiotemporal studies on HFMD infection (Qi et al., 2018; Wang et al., 2016; Samputthanon et al., 2013; Wang et al., 2011), not many studies on HFMD were conducted in Malaysia. Thus, the spatio-temporal study of HFMD in Bentong District assessed the reported cases from 2010 to 2017. The purpose of this study was to provide a helpful information to the observation of a disease, particularly HFMD to manage the HFMD infections in Bentong district.

## METHODOLOGY

### Study Design

A cross-sectional study design with retrospective data including the analysis of data collection in Bentong between 2010 and 2017 was implemented as study design. Time and space series analysis was built as a feature of the structured research process to decide the general perspective on HFMD distribution in Bentong district. In this study, secondary data related to HFMD cases between 2010 and 2017 were

collected from Bentong Health District Office. All the case location coordinates were uploaded into ‘e-notifikasi’ system. ‘E-notifikasi’ system is a system used by the Malaysian Ministry of Health to inform any infectious disease to the nearest district health office using web based software. The process of identifying case location is needed to verify the coordinate data. Then, after the coordinates were retrieved, a case plotting into the map must be done to prepare the data for further analysis.

### **Study Area and Population**

Pahang is the largest state in Peninsular of Malaysia with an area of 35840 km<sup>2</sup> and population of approximately 1.5 million. There are eleven districts and Bentong is one of the eleven districts in Pahang (Department of Statistics Malaysia, 2020). Bentong District is the second smallest of the administrative districts in Pahang after Cameron Highlands. There are three mukims (smaller administrative area in a district) under Bentong District and is led by Bentong Municipal Council. The total area of Bentong District is 1381 square kilometers. It has three administrative mukims namely; Bentong, Sabai, and Pelangai. The main economic activities for these areas are timber industries, food industries, and electronic components assembly factories.

### **Study Profile**

Table 1 shows all the variables in analysing spatio and temporal distribution utilized in Arc-GIS. SPSS was utilized to decide the hotspot area by spatial distribution.

Table 1. Study profile of spatio-temporal distribution of HFMD

<b>Independent Variables</b>	<b>Dependent Variables</b>
<i>Temporal distribution</i>	
By months	<i>Distribution of HFMD cases</i>
By years	
<i>Spatial distribution</i>	
By cases	<i>Distribution of HFMD cases</i>
By localities	
By mukim	
<i>Spatial distribution</i>	<i>Distribution of HFMD infection</i>
By hotspot area	

### **HFMD cases data analysis**

ArcMap Version 10.5 was utilized to plot all the HFMD cases in Bentong district for the GIS analysis. The configuration for all HFMD cases geological directions should be in the arrangement of World Geodetic System 1984. In ArcMap, both spatial statistic tools and spatial analyst tools were adopted.

## **RESULTS AND DISCUSSION**

### **Temporal Analysis of HFMD Distribution in Bentong District, Pahang from 2010 to 2017**

From month point of view, the beginning of May until December recorded the highest prevalence of HFMD cases. A total of 23 HFMD cases was recorded in May 2010 to 2017 followed by an increase of 9 cases in August and 12 cases in December. The most noteworthy warning of HFMD cases was accounted in May 2016 with 13 cases reported to Bentong Health Office. The cases of HFMD have diminished during June consistently except in 2012 and 2015. The four trends of HFMD are expanding during April, May, August, October, and December in 2013. The highest reported HFMD cases in Bentong from 2010 to 2017 was shown in May 2016 followed by May 2014 with 13 cases and 9 cases respectively. HFMD cases in year 2014 continued to increase until the end of 2014. In contrast, HFMD cases in 2016 decreased throughout the year.

### **Spatial Analysis of HFMD Distribution in Bentong District, Pahang from 2010 to 2017**

Based on the HFMD incident rates, the mukims in Bentong can be categorized into four classes. HFMD free area under Class 1 is defined

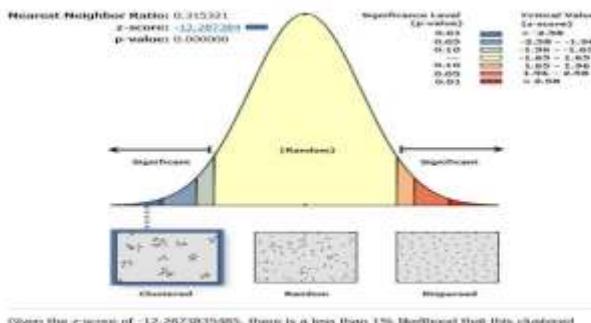
by zero cases per 100000 population. Meanwhile for Class 2 is by 0.1 cases to 10.0 cases per 100000 population. Class 3 is by 10.1 cases to 20.0 cases per 100,000 population and Class 4 is more than 20.0 cases per 100,000 population. In 2010, only one HFMD case was recorded in Bentong. Mukim Sabai was classified as Class 2 locality. Bentong and Pelangai mukims were categorized as Class 1 locality as they recorded a zero incidence rate per 100000 population. In 2011, Bentong and Sabai mukims recorded 1.36 and 7.46 rate per 100000 population respectively and it was classified as Class 2 locality. Bentong mukim recorded 4 HFMD cases (5.45 per 100000 population) in 2012 meanwhile there is no case recorded in other mukims. In 2014 and 2016, there was a sudden increase of HFMD cases involving all the mukims. Bentong mukim was the most affected locality with 26 cases recorded in 2014. In 2016, Bentong categorized as Class 3 locality (10.1 to 20.0 per 100000 population) due to only 11 cases recorded. Only Sabai mukim was categorized as Class 4 locality (above 20.0 per 100000 population) in both 2014 and 2016. In 2017, the whole Bentong district were recorded as Class 2 locality.

### **Distance Analysis of HFMD Distribution in Bentong, Pahang from 2010 to 2017 - Average Nearest Neighbour (ANN)**

Average Nearest Neighbour (ANN) analysis is used to determine the point pattern analysis of disease transmission. The point of the analysis is to assess the list of the ANN Index. Through the analysis, it can be found whether the targeted area of the HFMD cases inside a specific region is clustered, random or dispersed. From the outcome of ANN analysis, it can be said that the average ratio was less than 1. From 2010 to 2017, the nearest neighbor ratio of HFMD cases in Bentong District is 0.32 (p-value = 0.00). All the p-value and z-score were statistically significant in every one of the 8 years except for in 2011, 2013 and 2017 where the ANN outline shows p-value more than 0.05. HFMD incidence in Bentong from 2010 to 2017 was with the z-score of -12.29 (p<0.001) and spatial of HFMD incidence occurred at an average distance of 721.88 meters. Hence, the pattern of HFMD cases generally between 2010 and 2017 could be portrayed as clustered.

The nearest neighbour ratio (NNR) is scaled from 0 (extreme clustering) up to 1 (extreme dispersion). Since the nearest neighbour ratio from 2010 to 2017 is 0.315, clustering pattern was classified in that particular years. As the given the z-score of -12.29, there is a less than 1% likelihood that this clustered pattern could be the result of random chance. Spatial distribution of HFMD in 2010 to 2017 was clustered (excluding 2011, 2013 and 2017). On the other hand, distribution of HFMD in 2011 portrayed as random patterns and the distribution of HFMD in 2013 and 2017 were classified as dispersed patterns. In 2011, the outcome from ANN analysis demonstrated the pattern of HFMD case is showing a random pattern which is 0.85 (0.63). The z-score for HFMD incidence inside the area is -0.48 (0.63). The distribution of HFMD occurrence in Bentong District in 2012 was clustered, with z-score = -2.90 and the p-value = 0.003. P-value below 0.05 indicates the clustering pattern. From a clustered pattern, HFMD incidence in 2013 is transformed into the dispersed pattern with z-score = 1.79 and the p-value= 0.07.

For nearest neighbour analysis in 2014, mean distance that was observed = 664 m while expected mean distance = 3438 m. Other than that, 0.19 observed as the neighbour nearest ratio, that is smaller than 1 and exhibited HFMD cases in the clustered pattern. Meanwhile, ANN study in 2015 indicated that the pattern of HFMD incidence is clustered. This is reflected by z-score for HFMD incidence for the district is -3.83 where p value (<0.001). For year 2016, the outcome from ANN study demonstrated the example of HFMD case is showing a clustered pattern which is 0.57 (<0.001). The z-score for the district is -0.407 (<0.001). Although cases have been reduced to 7 cases in 2015 due to effective prevention and control program, however the pattern was still classified as clustered pattern. This is caused by an increase in HFMD cases in the same locality in 2015 and 2016. Dispersed pattern in 2017 demonstrated z-score = 1.89 and the p-value= 0.06.

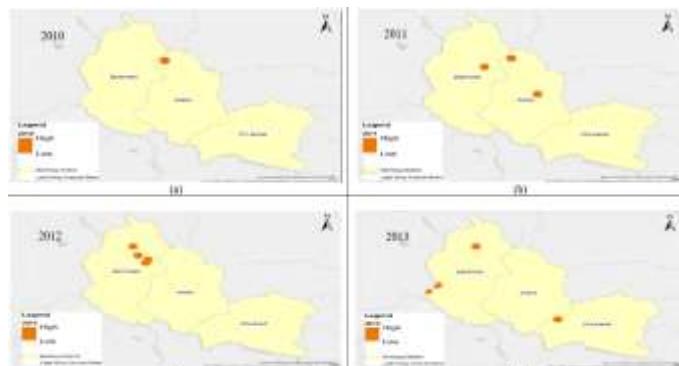


**Fig. 1** Average Nearest Neighbour Summary of HFMD cases cumulatively from 2010 to 2017.

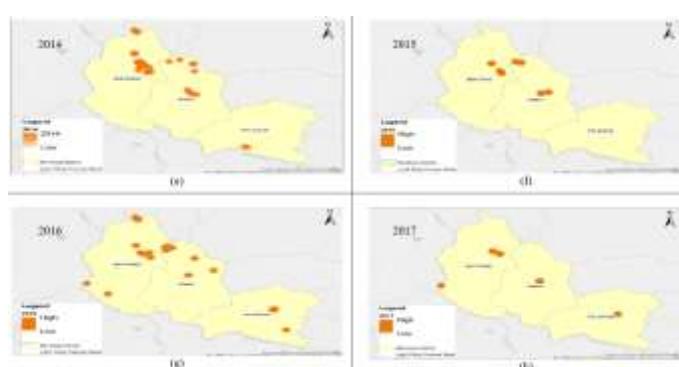
From the outcome of ANN analysis, it can be said that the average ratio was less than 1. From 2010 to 2017, the nearest neighbor ratio of HFMD cases in Bentong District is 0.32 and p-value 0.00. All the p-value and z-score were statistically significant in every one of the 8 years except for in 2011, 2013 and 2017 where the ANN outline shows p-value more than 0.05. HFMD incidence in Bentong from 2010 to 2017 was with the z-score of - 12.29 ( $p<0.001$ ) and spatial of HFMD incidence occurred at an average distance of 721.88 meters. Hence, the pattern of HFMD cases generally between 2010 and 2017 could be portrayed as clustered.

#### HFMD Distribution Hotspot Analysis in Bentong District from 2010 to 2017

The distribution of HFMD cases recorded from 2010 to 2017 were evaluated further by analyzing the Kernel Density (Fig. 2 and Fig. 3). With the analysis, Bentong district high-risk area can then be recognized. HFMD density map could help in locating up the area of the cases precisely to the degree of spatial and the severity of the HFMD hotspot area.



**Fig. 2** Kernel density estimation of HFMD incidence at Bentong District, Pahang by year (a) 2010, (b) 2011, (c) 2012, and (d) 2013.



**Fig. 3** Kernel density estimation of HFMD incidence at Bentong District, Pahang by year (e) 2014, (f) 2015, (g) 2016 and (h) 2017.

This analysis provided the location of most commonly affected area with HFMD cases. The hotspot area with a higher rate of HFMD, for the most part, spread in all mukims of Bentong, particularly around the

Jalan Tras zone. The most elevated density of HFMD was situated in Batu 1 zone. Moreover, the locality of Taman Desa Damai and Taman Gemilang were recognized as having more density of HFMD cases in 2014.

#### Spatio-temporal HFMD management

Spatio and temporal analysis of HFMD in Bentong District, Pahang between 2010 and 2017 was clarified by utilizing the application and analysis of the data by the GIS application for HFMD incidence. It demonstrated where HFMD incidence analysis can be located by geographical area. Therefore, more efficient and effective methodologies, particularly for health authorities, can be performed by applying the utilization of GIS to develop a progressive activity for preventive and control programs of HFMD. The temporal analysis indicated that HFMD incidence in 2014 was the highest. Other than that, most of the HFMD cases located in Bentong mukim from 2010 to 2017 followed by Sabai and Pelangai mukims. The high incidence of HFMD occurred from May until December. The factors adding to the rising trend of the HFMD cases in Bentong during that period was due to high temperatures and the lack of precipitation during that time.

HFMD incidence can be introduced as a pattern of dispersed or clustered as opposed to random chance by actualizing the ANN study and the pattern of HFMD cases were clustered statistically. The previous study in Northern Thailand uncovered a practically comparative spatial clustered pattern of HFMD cases too (Samphutthanon et al, 2013). Other than that, previous study by (Wang et al., 2012) indicated spreading cases of HFMD in Guangdong Province, China to be statistically clustered. Apart from that, these outcomes can additionally predict that spatially, infectious disease spread in clusters (Wang et al., 2016). Kernel density is one of spatial analysis tools that is essential in successful control for HFMD disease by having the capacity to find the hot spot area. The most elevated density of HFMD was situated in Batu 1 zone. Moreover, the locality of Taman Desa Damai and Taman Gemilang were recognized as having more density of HFMD cases in 2013 and 2014.

#### CONCLUSION

The execution of GIS for HFMD distribution was found effective in this study. The spatial tools and GIS advancements could be a powerful surveillance method to build up the spatio-temporal density of HFMD infection especially in high risk areas. The utilization of the GIS in this study could provide extra information precisely towards the management of incidence of HFMD in a continuous intervention.

#### ACKNOWLEDGEMENT

Acknowledgements are due to Communicable Disease Unit of Bentong District Health Office and Pahang State Health Department for their data contribution and support.

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# Lessons learnt from COVID-19 in Afghanistan, Health System Perspective

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**Disclaimer** The views expressed in this paper are based on observation of the author and do not necessarily reflect the views of any entity or organization.

## Introduction

Afghanistan recorded its first COVID-19 case in February 2020 in Herat province in the western region, neighboring Iran. The first case was detected with an Afghan migrant returned from Iran, which was the epicenter of COVID-19 in early February in the region. Due to steady spread of virus in Iran, majority of Afghan refugees returned to Afghanistan, putting the country at high risk of COVID-19 and making it difficult for the health system to apply mitigation and prevention measures. Based on information from Ministry of Public Health, the country experienced unprecedented influx of returnees from Iran that in one single day of 3<sup>rd</sup> week of March 2020, more than 20000 refugees returned to the country. The peak of the first wave of COVID-19 was marked as 4<sup>th</sup> June 2020, where 915 cases were tested positive with test positivity rate of 58%.<sup>1</sup> This was the time when the testing capacity was limited to 2500 samples per day in all over the country. As of November 15<sup>th</sup>, more than 42000 people were tested positive and the number death due to COVID-19 exceeded 1500. Despite limited capacity, the system could manage to deploy all available resources to respond to COVID-19 requirements and provide essential services to the public. However, there have been certain areas, where the system faced serious challenges, especially in case management, risk communication, contact tracing, diagnosis and overall governance and stewardship of the emergency operations at national level. This paper analyses the major lessons learned during the COVID-19 response considering six building blocks of the World Health Organization.<sup>2</sup>

## 1. Governance of the health sector

World Health Organization defines governance as a wide range of steering and rulemaking related functions carried out by governments/decisions makers as they seek to achieve national health policy objectives that are conducive to universal health coverage. Governance is a political process that involves balancing competing influences and demands. It includes maintaining the strategic direction of policy development and implementation; detecting and correcting undesirable trends and distortions; articulating the case for health in national development; regulating the behavior of a wide range of actors - from health care financiers to health care providers; and establishing transparent and effective accountability mechanisms.<sup>3</sup>

Governance is the core function of the health system. It contains aspects related to oversight, coordination, stewardship and collaboration among the key players. Ensuring accountability and transparency is the other core function of governance, which should be given the highest priority. Considering the magnitude of the COVID-19 pandemic in Afghanistan, the system experienced both positive and negative implications at the governance level. The positive side has been the political support by the government and allocation of 25 million USD to fight the pandemic immediately in early March.<sup>4</sup>

This governance level decision encouraged the system to plan for immediate response both from social and economic point of view. Decentralizing the response mechanism of COVID-19 to provincial authorities had been a major decision. This decision made the provincial authorities alert to fight the pandemic considering local capacities and challenges. Principally, this was a good decision, however, with limited knowledge, capacity and resources, several provinces could not handle the situation effectively. Few provinces could not make public health related decision on time making it difficult for the health sector to respond the needs effectively. This implies to decisions related to lockdown of the cities, and decisions related to gradual easing of the lock down. In few provinces, including Kabul and Herat, delays in high level decisions made the health system prone to failure and reduced the public trust during the difficult times. The decision on suspending school and universities in March assisted the system to slow down the spread of the virus.

On identifying policy directions on efficient use of resource, the system could not immediately utilize available resources in the country. For example, policy decisions related to involvement of primary healthcare providers (contracting NGOs) and the private sector was delayed till mid-June 2020, which was the peak time for spread of virus.<sup>5</sup>

On accountability and transparency, the system did not have an effective mechanism to track all resources provided to the country. Due to limited capacity of the government institutions, most of the financial aids from the development partners were contracted out or implemented through international agencies. For example, the support from the World Bank was sourced through WHO and UNICEF to provide support to Ministry of Public Health during the pandemic.<sup>6</sup> Keeping record of equipment and supplies donated to MoPH had turned to an issue. The scandal of ventilators' illegal export to Pakistan took months to be clarified. All such irregularities are attributable to lack of proper and well-functioning stock management and tracking system. In general, the system lacked national unified center for control to address the health aspects of COVID-19 at national level. This was mainly due to decentralizing the authority and responsibility to provincial actors, who did not have experience of governing such large-scale health emergency.

Multi-sectoral collaboration was another challenge at the beginning of the pandemic. The influx of Afghan refugees from neighboring Iran, which was the epicenter for the virus in March made the control mechanisms more challenging. Collaboration between Ministry of Health and Ministry of Refugee and Repatriates at the beginning of the pandemic, when thousand of Afghan returned to Herat was a major issue of concern. Huge and uncontrolled influx of Afghans from Iran was the main source of virus spread, especially in Herat and to the rest of the country. **Decisions. Unnecessary delays in policy decisions during pandemics and health emergencies may deteriorate the situation.**

#### Major lessons learnt on governance function

1. The system should have dedicated, well-equipped and unified center for command and control of health emergency in the country. The center should have direct links and relations with all 34 provinces and its communities.
2. The health system should ensure proactiveness when it comes to policy level decisions. Unnecessary delays in policy decisions during pandemics and health emergencies may deteriorate the situation.
3. Collaboration mechanism with internal and external stakeholders should be in place. Intergovernmental and multi-sectoral collaboration mechanism should be in place well in advance.
4. Before the next wave of COVID-19, or any other health emergency, this is highly recommended to identify roles and responsibilities of the government authorities, ministries and related departments.
5. Stock management system should be digitalized and linked to all provinces and health facilities. Regular stock consumption reports from health facilities needs to be strengthened.
6. To ensure transparency and accountability, the system should apply business management tools at central and provincial levels to regularly update the public, partners and the media on expenditure, supplies and use of resources during pandemic or health emergency.
7. Anti-corruption measures should be in place to ensure transparency and accountability during the fight against health emergency. The system should identify the risk areas and apply risk mitigation measures to reduce risk of corruption and misuse of resources.

## **2. Service Delivery – Case management and diagnosis**

Service delivery is one of the major building blocks of the health system. This includes provision of all level healthcare services including preventive measures through various actors including the public, private and not for profit organizations. In service delivery, the system had several achievements, namely identification of dedicated facilities for COVID-19 case management in Kabul and provinces. For example, in Kabul two major hospitals were solely dedicated; and at least one facility was dedicated for COVID-19 in each of 34 provinces. However, these facilities lacked essential capacity of human resource, equipment, supplies and infrastructure. The system lacked qualified human resource to manage health emergency both in Kabul and provinces. Almost all facilities dedicated for COVID-19 lacked well-equipped intensive care unit (ICU). The ICUs lacked trained human resource, required equipment and supplies. During the peak time in June 2020, supply of oxygen to COVID-19 hospitals turned to a hot issue and many patients lost

their lives due to unavailability of well-equipped ICUs and supplies, like oxygen.<sup>7</sup> The pandemic reveled several facts on hospitals capacity in Afghanistan. Only few hospitals had centralized system of oxygen production, while a vast majority were dependent on external sources, especially the private sector to receive their required oxygen.

It is well-known that control of pandemics is responsibility of the public sector, however, in such disasters, and considering infrastructural and operational capacity of MoPH, it is hard to control the situation. With that in mind, one of the major lessons learnt on service delivery was not using all available resources efficiently from the start of the pandemic in February. The Basic Package of Health Services (BPHS) implementing NGOs were not involved in the fight against COVID-19 at community level. The Community Health Workers linked to BPHS scheme were not involved in the fight, especially in risk communication and referral mechanisms. In addition, the private health sector, being the key player in service delivery was not allowed to provide diagnostic and case management services. Both major actors were involved in the fight in Mid-June, when the MoPH announced its revised policy for fight against COVID-19 during the peak time. Lack of personal protective equipment (PPE) and infection preventions supplies have been the other major issues. Majority of staff and medical doctors did not have access to essential PPE kits making the fight against COVID-19 more challenging and difficult. On testing, in early February, only Central Public Health Laboratory (CPHL) had the capacity to test COVID-19 samples through PCR settings. This capacity was later expanded to regions and in June the private sector was also involved in diagnostic services, which reduced the burden on the public sector. Despite current expansion, the testing capacity is still limited to less than 3000 per day, which does not meet the needs of the public in all over the country. This limited capacity is due to unavailability of enough test kits and required supplies in public laboratories.

#### Major lessons learnt on service delivery – case management and diagnosis

1. The system lacked essential human resource capacity to respond to the pandemic. The staff in Afghan Japan Hospital, which was dedicated to COVID-19 were at least two times changed mainly due to capacity or unavailability of qualified staff. It is highly recommended to start identifying potential human resource COVID-19 second wave and other health emergencies. The selected staff needs to be trained in advance and deployed when needed.
2. Hospital's capacity should be strengthened. Special focus should be on upgrading the ICU facilities of all hospitals. The existing ICU project of the MoPH should be further enhanced and supported. Dedicated human resource for ICU units should be trained.
3. All hospitals should be equipped with central system for supply of oxygen. In case that is not possible in short run, a buffer system for storing adequate oxygen in the hospitals should be in place.
4. Hospitals should be equipped with essential PPEs and infection prevention supplies, and its use should be regularly monitored.
5. MoPH should use proactive strategies to expand testing capacity of the public sector and private sector to ensure on time detection and follow up.

### 3. Human Resource for Health

Human resource is the essential component of the health system. Afghanistan is facing shortage healthcare workers even in normal times. There are only 9·4 skilled health professionals, and 1·9 physicians, per 10 000 individuals in Afghanistan; physicians are disproportionately distributed across the country, with 7·2 physicians per 10 000 people in urban areas and as few as 0·6 physicians per 10 000 in rural areas. According to WHO's Global Health Workforce Alliance, 22·8 skilled health workers per 10 000 people are required for most countries to execute all essential health interventions.<sup>8</sup>

Despite limited capacity and lack of enough protective measures, the medical staff in the sector acted as heroes and fought the pandemic with minimum resource available. A survey conducted by Johanniter found that every 13th infected person works in the health sector. By mid-May, thirteen health workers in Afghanistan had died, and more than 871 tested positive. The survey also found that the knowledge about the new virus was good. However, only 36 percent of those surveyed received training on the Corona virus (SARS-CoV-2) from official bodies.<sup>9</sup>

In addition to knowledge, the health system faced serious shortage of healthcare workers during the pandemic. Even in big cities assignment of qualified healthcare worker in COVID-19 response was a challenge. Majority of the healthcare staff assigned for COVID-19 response hospitals and intervention, were newly graduates from public and private medical schools and health education institutes. The training program for the health staff on COVID-19 was not well organized, and preventive measures were not taken into consideration. This was mainly due to unavailability of PPEs and weak infection control measures in the hospital settings. The staff assigned for COVID-19 dedicated hospitals were changed at least two times, perhaps due to capacity and commitment to work in hazardous settings.

#### Major lessons learnt and recommendations

1. The health system should act proactively right now to identify medical staff for Kabul and provinces. They should be trained well in advance and deployed to the hospitals when needed. At this stage, there is no need for contractual arrangement, however, the system should map the human resource and provide the required training.
  2. During the mapping and before provision of training, the identified medical staff need to commit that they would work in COVID-19 hospitals, and the system should provide stimulus packages. These packages should be well defined in advance. One incentive can be easy access to residency program of the MoPH either as volunteer or paid staff after assignment is concluded. There might be other incentive packages which should be identified.
  3. The system should ensure availability of enough PPE for the medical personal.
  4. Special programs should be introduced for training of special force for ICU management, especially use of ventilators and other advanced equipment and devices for intensive care units.
4. Health Information. Risk communication and Surveillance System

Surveillance system is vital for COVID-19 control and limiting its impact. The surveillance system is used to detect and trace the virus aiming to limit its spread. It also informs the policy makers on magnitude of the problem and its related risk on communities and overall health system.

Immediately after the cases increased, the system assigned rapid response teams with support from donors and international communities. For example, with support from UNDP, WHO and other partners, the system activated rapid response teams in Kabul and other provinces. The aim was to control the spread of the virus and conduct contract tracing at community level. However, due to limited capacity of the surveillance system at the national level, the system missed a vast majority of COVID-19 cases in the country. The system did not have community-based networks and was merely active in big cities with limited capacity.

The system could not manage to efficiently conduct contact tracing, even for cases which were tested positive in the public health laboratories. Once tested positive, the system did not have efficient measures to trace them and provide either home based care or referral services.

Risk communication is one of the major strategies for prevention, control and containment of COVID-19. The system initially applied nationwide risk communication strategies managed and coordinated by assigned committee appointed by the President. Various channels, including mass media, social media, mobile technology and campaigns were used to ensure spreading the message to target population. In the beginning, the messages could work well and led to lock down of cities and suspension of businesses including schools and universities. Despite assignment of high-level risk communication committee, various sources used different strategies and, in few cases, contradicting each other causing uncertainty among the public and affecting social trust. Role of community in containing corona virus is vital. There should be well defined mechanisms for community involvement. Afghanistan health system has a privilege of having community health workers in remote areas, however that strength of the system was never utilized effectively. The system only relied on limited number of rapid response teams and fixed centers at community levels, which in no means could address the needs. Since 80% of the COVID-19 cases are asymptomatic or with mild symptoms, it is recommended to utilize community-based interventions, like home-based care and referral systems with involvement of community health workers. This is important to include community health workers in risk communication, community mobilization and referral services.

#### Major lessons learnt and recommendations

1. To objectively find out about the strengths and weaknesses of the surveillance system, it is recommended to conduct a rapid assessment of surveillance system of the health sector. The rapid assessment will identify the major gaps in the surveillance system of COVID-19 response.
2. Based on guidance from WHO10, we need to strengthen and adopt existing surveillance systems and Include COVID-19 as a mandatory notifiable disease. The system should implement immediate reporting where feasible.
3. It was witnessed that surveillance system was active in very limited settings, it is important to conduct surveillance at different levels of the health care system, including at the private sector and community level.
4. The system could not manage to establish population denominators to aid in data interpretation, there should be immediate interventions to establish population denominators and laboratory testing denominators at national level.
5. The system should establish community-based surveillance system, where CHWs can play a major role in reporting suspected COVID-19 case.
6. The system should enhance its surveillance system at primary healthcare level. Based on the new policy of MoPH on COVID-19, the whole system starting from the health post to tertiary care would be involved in COVID-19 response. This policy intervention should be accompanied by introducing surveillance system at all levels.
7. The system needs to enhance its hospital-based surveillance system. Initially, the surveillance for COVID-19 was activated in COVID-19 dedicated hospitals. Again, with the current policy change, all hospitals in the country should have integrated system to report COVID-19 cases on time.

8. During the pandemic, the system could not apply efficient contact tracing in residential areas and among the high-risk population. This is highly recommended to enhance capacity to apply surveillance system at residential areas using existing resource, like CHWs or community Volunteers. CHWs and communities should be efficiently involved in risk communication efforts as well.

9. The system needs to use innovative technology like mobile phones and generate community friendly applications for surveillance purposes.

10. Risk communication efforts need to be channeled through an accredited source of Ministry of Public health. To avoid uncertainty and enhance public trust, the practices and behavior of the health and governmental officials should be in line with the messages given to the public.

## 5. Medical technology

Healthcare technology plays a vital role in prevention, diagnosis and treatment of illnesses, especially COVID-19. The health system in Afghanistan even in the normal circumstances had limited access to advance healthcare technology. However, the ones needed for COVID-19 and other health emergencies should be identified and procured. The system lacks capacity to assure quality of available technology in the system, and quality control the new ones entering the system. The quality control system lacks capacity to test efficacy of PPE packages provided by various sources, which are essential part of the fight against COVID-19, especially for protection of the healthcare workers. Capacity to use medical technology has been an issue during the pandemic in Afghanistan. As discussed in Human Resource section, majority of the staff hired for COVID-19 response were newly graduates and were not fully aware of the use of technology, especially the ventilators. As per the reports from the intercepts from Afghan Japan Hospital in April, one of the assigned doctors who was newly graduated told that "We don't have any staff that know how to operate the ventilators or intubate patients". This is only an example captured by the media, but this has been a bitter reality during the pandemic. In attrition to low capacity, it was hard to map and verify the number of equipment in the health system, especially the number of ventilators.

## Major lessons learnt and recommendations

1. MoPH needs to initiate a system to ensure availability of updated assets logbook for all equipment disaggregated by provinces. This should also be available for all assets and technology available in the private sector.

2. MoPH may apply strategies to ensure regular calibration of the medical technology used both public and private healthcare sources.

3. Dedicated staff should be well trained in use and maintenance of medical technology, especially use of ventilators, oxygen concentrators and diagnostic facilities.

## 6. Health Financing and Financial Resource Tracking

After the first case was detected in February 2020, the national and international partners pledged to support MoPH in fight against COVID-19. Partners including the World Bank, ADB, United Nations and bilateral agencies pledged to allocate more than 300 Million Dollars for the fight.

These pledges support MoPH to ensure expansion of diagnostic capacity, case management, risk communication, infection prevention and support to frontline workers. This also include construction of new hospitals and upgrading the existing hospital to increase their capacity for effective COVID-19 response.

With all the support provided, the health system has been lacking an efficient mechanism to track the funding sources and expenditures made so far. Majority of these funds have been utilized as off budget, without direct involvement of MoPH financial management system. However, considering the stewardship role of MoPH, the system should have transparent mechanisms to track the expenditure, irrespective of the source of funding.

#### Major lessons learnt and recommendations

1. To ensure transparency and accountability, MoPH needs to introduce a system to provide regular update on amount of fund entering the system and the level of expenditure. There should be dedicated tools for COVID-19 Resource Tracking, where all on budget and off budget resources dedicated to COVID-19 should be reflected.
2. To get trust of the public and donors, the MoPH needs to introduce online tools, where all transactions and expenditures dedicated to COVID-19 to be reflected.
3. Since provision of primary healthcare services is contracted out to NGOs, it is essential to initiate dedicated COVID-19 expenditure tracking mechanism, where all NGOs should provide their updates on expenditure related to COVID-19.
4. The upcoming national health accounts (NHA) report should reflect all expenditures related to COVID-19.

#### Conclusion

With limited human resource and technical capacity, the health sector in Afghanistan managed to meet at least minimum needs of the public during the pandemic. This limited service delivery was attributable to full support of development partners, including UN agencies. The major lessons learnt are related to governance of the operation at the national level. The system should have a well-defined strategy for governance of health emergencies, where the lead agency and the lead roles for related governmental and nongovernmental stakeholders should be defined. The system has been prone to corruption and misuse of resource during the pandemic, it is vital to ensure initiation of transparency measures and accountability framework for all resource allocated and spent during health emergencies, i.e. COVID-19. On service delivery and case management, it is important to use all available resource for effective fight against COVID-19. The health system in Afghanistan is comprised of community-based interventions, which can be efficiently utilized in the fight against the pandemic and other health emergencies. Integration of health emergency response in Basic Package of Health Services (BPHS) would ensure efficiency in the system, as the BPHS facilities are scattered in all over the country with special focus on rural settings. Private sector is a major player in the health sector, which should be given more dominant role in response to the health emergencies. Investment in increasing testing capacity, especially at the provincial level is a requirement, which should be given high priority. Risk communication efforts should be further enhanced. Behavioral change strategies need to be applied to convince the public to change their routine practices causing spread of the coronavirus in the community. The pandemic revealed several deficiencies in the surveillance system of the health sector. The system has not been able to record all positive cases in the country and ensure efficient contact tracing. Due to limitation in technical capacities, the private sector is still not completely reporting its COVID-19 tested and confirmed cases to the system leading to underreporting the real situation in the country. The system should expand community-based surveillance system and efficiently involve the private sector in its reporting obligations.

The system witnessed staff capacity issues both from quality and quantity point of view. The system needs to apply policies to ensure availability of qualified health staff for the fight during health emergencies. There should be identified buffer of trained and specialized human resource for health ready for deployment during health emergencies. The ICU capacity has been an issue. Efficient use of equipment, especially ventilators in the ICU setting was the major challenge. The system should ensure that all staff working in ICU are well trained and have required capacity to manage complicated cases in ICU settings. Supply of oxygen to the hospital turned to a challenging operational issue during the pandemic. The system should ensure availability of centralized oxygen supply system for all hospitals, and there should be available buffer stock safely secured. Availability of essential supplies such as PPEs and disinfectants have been a major challenge in the health sector. This was mainly due to limited availability in the international market. There was limited local capacity in production of PPEs with no capacity in production of disinfectants and hand sanitizers which made the fight more challenging, especially for front line workers. It is highly recommended to support the private sector to invest in production of quality PPEs and disinfectants in the country. It is recommended to compile all lessons learnt from COVID-19 response by different sources and develop a strategy for implementation of recommendations made by observers and implementing partners.

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## Aqu@teach – an open source e-learning course with innovative didactic practices

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Controlled-environment agricultural technologies for food production such as aquaponics are addressing problems like over-fishing in the sea, water scarcity and soil/water degradation caused by intensive farming, the use of antibiotics in aquaculture, and pesticides in field food production. They will probably become even more important in the future due to climate change. The heavy carbon footprint of food production and distribution highlight the need for more local production of food, especially within cities, which would shorten food supply chains and improve the security and resilience of food systems.

Combining two technologies – recirculating aquaculture systems (RAS) and hydroponics – in a closed-loop system, aquaponics requires a low level of resource input, since the plants receive their nutrients from the fish water. However, aquaponic food production is complex, and requires a broad spectrum of knowledge to understand and manage the processes involved, including aquaculture, horticulture, chemistry, biology, food safety, and engineering. The Aqu@teach project aimed to address that need, by developing the first ever aquaponics curriculum specifically for higher education students. The curriculum was designed to equip students with expert knowledge and skills, as well as digital, entrepreneurial and transferable skills. It was developed by an Erasmus Strategic Partnership for Higher Education between the University of Greenwich (UK), the Zurich University of Applied Sciences (CH), the Technical University of Madrid (ES), the University of Ljubljana and the Biotechnical Center Naklo (SI). Given the multidisciplinary nature of aquaponics, the curriculum can be taught as an optional module in a wide variety of degree courses, including agriculture, agronomy, horticulture, aquaculture, ecological engineering and environmental health studies.

Aqu@teach is intended for tertiary level teachers who want to introduce basic aquaponics to their students. It provides educators with a flexible toolbox which they can use to suit their needs, and can be taught either using blended learning – combining digital media and the Internet with classroom formats that require the physical co-presence of the teacher and students – or as an instructor-led, cohort-based e-learning course. The Moodle files, as well as the accompanying documents, have been released with Creative Commons NonCommercial-ShareAlike licenses, which means that educators can alter the contents as they see fit, including translating them into languages other than the ones in which they are currently available: English, Spanish, German and Slovene. This flexibility was designed in to ensure that the curriculum can be adopted as widely as possible.

All of the resources – the e-learning modules, textbooks, module guides for students, curriculum guides for teachers, best practice guide for teaching aquaponics, and toolbox of innovative didactic practices – are publicly and freely available from the project website: <https://aquateach.wordpress.com>

Aqu@teach was co-funded by the Erasmus Programme of the European Union (Erasmus Strategic Partnership for Higher Education 2017-1-UK01-KA203-036663).

## **The Catalytic Effect of COVID-19 on Hand Facilities for Hand-Hygiene Investments in Academic Institutions - The Case of University of Botswana**

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### **Introduction**

The Coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 (World Health Organization, 2020). Botswana registered her first case of Covid-19 on March 30 2020 (Reuters, 2020). As of October 17, 2020, 5242 cases were reported in Botswana with 20 deaths and 905 recoveries (World Health Organization, 2020).

Among the COVID-19 prevention and control measures, WHO recommended frequent hand hygiene with water and soap or use of alcohol-based hand sanitizers. Hand hygiene is historically central to personal hygiene, religious and cultural customs (Best and Neuhauser, 2004). In recent years this practice has been identified by health authorities as the single most effective way to prevent the transmission of the diseases (CDC, 2000). In healthcare settings millions of nosocomial infections have occurred on a yearly basis killing thousands of patients (CDC 2006).

### **Knowledge and Practices on Hand hygiene**

Surprisingly research has showed that persuading both health professionals and the public has been a challenge over the years (Tibbalis, 1996, Datta et al, 2011). Studies on knowledge attitudes and practices among University students in Africa and other regions of the world have shown that poor knowledge and poor hand hygiene practices among the participants (Ariyaratne et al., 2015; Sultana et al., 2016, Afolabi et al 2016).

Hand hygiene knowledge and practices still remain poor among University students even in the period of COVID-19. A recent study carried out in Uganda has shown that only 8% and 29% of the participants had good knowledge and attitude respectively with 20% only practicing good hand hygiene (Nuwagaba et al., 2020).

**The COVID-19 Catalytic Effect on Hand hygiene Facilities and Health Promotion at the University of Botswana** In preparation for the re-opening of the University of Botswana after easing of lockdown restrictions, an assessment of all facilities was conducted taking into account the new risks posed by exposure to COVID-19 in the University facilities.

The exercise was carried out to ensure the University compliance with the Ministry of Health and Wellness (MoHW) protocols i.e. promoting basic hygiene measures to reduce chances of contracting the COVID-19 virus. Preventive measures included washing hands with clean water and soap for at least 20 seconds and or where there is no water using of alcohol based hand sanitizer.

The assessment revealed that whilst all Halls of Residence, lecture rooms, offices and laboratories had access to hand washing facilities such as sinks and clean running water, hand soap or sanitizer dispensers were extremely limited particularly in older facilities. Instructions on hand hygiene to prevent infections including COVID19 prevention measures were inadequate. Some of the hostels had no functional ablutions.

The COVID-19 pandemic highlighted the importance of water, hygiene and sanitation as a sustainable option to reducing infections. For the first time, the University involved the Department of Environmental Health to carryout health and safety inspections of all facilities. The reports from the inspections were used as a basis for planning and improving hand hygiene measures within the University in preparation for the reopening of the University after the first COVID-19 Lockdown. The Department of Campus Services worked around the clock to ensure that ablution facilities were repaired before the University reopened. Key among these was to ensure that hand soap dispensers were installed in all areas where there is clean water i.e. ablutions, laboratories. Alcohol based hand sanitizer dispensers were installed in strategic areas across all campus facilities where there is no water i.e. building entrances and passages.

**Conclusion:** Whilst the COVID-19 pandemic has come with negative economic, social and economic hardships (Gautam and Hens,2020), it has on the other hand created an opportunity for improved, sanitation and hygiene services within the University of Botswana. The sustenance of the investments made in hygiene and sanitation will not only prevent COVID-19, but will have long-lasting impacts in the overall University health status. It is however important to maintain hygiene promotion activities as well as to monitor student practices, behaviors and perceptions.

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## CONSTRUCTION OF FOOD PREPARATION AND STORAGE FACILITY

### Introduction

Food safety plays an important role in human health. Implementing good and safe practices to avoid foodborne illness and outbreaks, people would have a long and healthy life. According to United Nations, 2020, food safety has a critical role in assuring that food stays safe at every stage of the food chain - from production to harvest, processing, storage, distribution, all the way to preparation and consumption.

Furthermore, about 600 million cases of foodborne illnesses are reported annually due to unsafe food which is a threat to human health and economies, disproportionately affecting vulnerable and marginalized people, especially women and children. In addition, an estimated 3 million people around the world die every year from food and waterborne disease.

Hazard Analysis and Critical Control Points which is a systemic, risk-based approach to preventing the biological, chemical, and physical contamination of food in production, packaging, and distribution environments should be highly considered. This concept is designed to counter health hazards by identifying potential food safety problems before they happen, rather than inspect food products for hazards after the fact.

In South Africa the total morbidity and mortality in schools from Food Poisoning from 2014 to 2019 was 1238 and 9 respectively.

The South African Institute of Environmental Health in collaboration with the Swiss Embassy in South Africa, together with the Mphaphuli Development Trust had a consultative meeting with the University of Venda on the 1st February 2019, aiming at initiating community projects in Limpopo Province in the Vhembe District.

Vhembe District is located in the northern part of the Limpopo Province, it borders with Zimbabwe and Botswana in the north-west and Mozambique in the south-east, through the Kruger National Park. It comprises of 4 sub-districts, namely Musina, Mutale, Thulamela and Makhado. The District has a population of 1 387 625, with a population density of 54.2 persons per km<sup>2</sup> and falls in the socio-economic quintile 2, amongst the poorer districts and has an estimated medical scheme coverage of 6.4%. Vhembe is one of the 11 National Health Insurance (NHI) pilot districts.

The University has been incorporated to play a role as some of the identified projects would need thorough research. The students will be able to conduct research where they will be developing themselves while at the same time benefiting the community.

The South African Institute of Environmental Health Council appointed Mr. David Nemakonde as the Project Manager and mandated him with the task of identifying the project, its location, drawing a project plan and its implementation.

## **Project**

As a result, members of The South African Institute of Environmental Health – Vhembe region in Limpopo, South Africa, led by David Nemakonde, identified a school in a rural village called Mukoma-a-si-na-nndu outside Thohoyandou town after realising that the school was preparing food in a dilapidated shack and they didn't have food storage area. Looking at the environment, the risk of food borne disease infections were very high as food safety practices and hygiene were not adhered to.

On the 8<sup>th</sup> March 2019, Mr. Nemakonde visited the Lukhaimane Primary School and met with the school management. The enrolment numbers at this school was 178 learners, with six staff members, two parents responsible for cooking meals for the learners. The school is also benefitting from the National School Nutrition Programme, a Government programme that provides one nutritious meal to all learners to improve their ability to learn. During the visit, it was found that food was being prepared in a dilapidated wood and iron shelter and this was not ideal for food preparation. This was a no fee-paying school and its fund allocation from government cannot be able to erect a proper structure for food preparation.

The other area of concern was the overgrown grass that puts the safety of learners at risk. The Management indicated that they do not have equipment to maintain the grounds. This school was identified as a point of establishing environmental health project with the aim of addressing challenges that the school was experiencing.

Because the school had no financial muscles to construct food storage and preparation facilities, Environmental Health Practitioners went all out to seek for donation. Local business people were approached and they contributed towards the development of the project namely:

**Tru-tombstones:** 10 bags of cement

**Maanda-ashu :** 1 load of river sand and 1 load of building sand

**Venda Jamaat Muslims :** 2 x three plates gas stoves, grass cutter, and electrification materials both to the tune of R10 000.00

**Vhavenda Bricks :** 1 000 bricks

In addition, national office of the South African Institute of Environmental Health was approached to assist in searching for prospective donors. Fortunately, they managed to secure funding from Aspen Pharmacare with an amount of R50 000 (\$3 286.41) for the project to kick-start.

### **Construction**

As the school is situated in a rural area, community structures were consulted for the smooth running of the project and labour was sourced from the same area as a way of local economic empowerment.

Construction was started on 22 January 2020 and by 24 February 2020 it was completed. Due to lack of funding, Environmental Health Practitioners decided to do the painting on their own.

### **Commissioning**

As part of the commission of the project, food handlers were trained on environmental hygiene, food safety and hygiene by Environmental Health Practitioners. Due to covid-19 pandemic lockdown, official hand-over which was already planned and finalised, was cancelled as all gatherings were no longer allowed. The school was given go ahead to make use of the facilities.

The South African Institute was really proud about the work done by Environmental Health Practitioners in completing their first community project on their own with the help of business and the community.



**The dilapidated shack which was in use**



**Environmental Health Practitioners do the painting**



**Completed project**

# Sausage mislabelling – A Pilot Project in Tasmania, Australia

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**ABSTRACT:** This pilot project aimed to collect base line data for the mislabelling of beef sausage and presence of meat species not declared on the ingredients label. Samples were collected from all known retail outlets selling sausage in the Glenorchy Local Government Area. These samples underwent PCR analysis for the presence of DNA from chicken, cattle, sheep, pig horse and fallow deer. Forty per cent of samples contained types of meat not declared on the ingredients label. Mislabelling of sausage occurred in almost half of the samples; labelling compliance is an area for future study in Tasmania, Australia. Meat species information is important to people who suffer allergies or who have religious prohibitions for particular foods.

**Keywords:** *sausage mislabelling, meat speciation, environmental health.*

## 1. INTRODUCTION

### 1.1. Background to this study

Under the Tasmanian Food Act 2003, foods must be correctly labelled. Consumers purchasing food from retail outlets rely on the information provided on the packaging when making choices, particularly when managing religious or health concerns. Poor consumer confidence in products can affect financial markets, and with them the profitability of the food industry. In 2013 the United Kingdom became more aware of food fraud following the “horsegate” scandal. Major supermarket chains, including Asda and Tesco were implicated in selling mis-labelled beef products containing horse meat. Subsequent investigations implicated international homewares store Ikea, which was selling beef meatballs containing both horse and donkey meat. Food fraud in the UK is potentially costing consumers as much as £1.17 billion every year (Financial Times 24/03/2016).

While there is growing concern internationally with food mislabelling, in Australia, we are largely unaware if there is a problem, or the extent of it (Spink & Moyer, 2011; Moyer, DeVries & Spink, 2017). Substitution of ingredients or poor management of cross contamination risk is a concern to government regulators, but the public perception of this problem in Tasmania is likely to be low. Recent of food mislabelling have been reported in the media nationally. In September 2016 Aldi, a large supermarket chain in Australia was implicated in a food fraud matter. The Canberra Times (reported 10/11/2016) stated Aldi supermarket had sold nearly 190 000 units of adulterated oregano products over a one year period. The products were mixed olive leaves, a cheaper product as a substitute for oregano.

The extent of mislabelling in the Australian island state of Tasmania is unknown. The present inquiry aims to provide base line data, from which a larger State wide survey would later be conducted. Sausage has been chosen for this study as there is previous comparison data and the potential for other species of meat to be introduced. Mechanisms for food mislabelling with sausages include the unintentional cross contamination or introduction of other species during processing and poor handling practices. This is in addition to deliberate meat substitution, for convenience or for economic gain. Two previous surveys undertaken in Tasmania in 2008 had identified an issue with the mislabelling of beef sausages containing meats other than those listed on the ingredient label.

## **2. AIMS**

1. The principal aim is to collect data in order to capture the prevalence of mislabelled sausage within the City of Glenorchy.
2. Further, the survey aims to investigate food substitutions, to determine whether this is the result of is the result of a deliberate act of deception for financial gain, or is a consequence of poor food handling leading to cross contamination.

## **3. METHODS**

The project was developed by Glenorchy City Council. Glenorchy has a population of approximately 45,000 people and is located near Hobart, the capital of Tasmania. Sampling occurred in March 2017.

Ten known retailers of beef sausage within Glenorchy were visited on the same day, and purchases of beef sausage, preferably with flavouring were made. A staff member at each retail outlet was interviewed to find out the process for making sausages. Flavoured product choice was intentional, noting flavourings are used to mask alternative ingredients. The product samples were stored in commercially available, domestic insulated containers packed with ice then frozen in accordance with laboratory instructions before being couriered to the interstate laboratory.

The samples were treated by extraction of genomic DNA by standard methods, QIAGEN Dneasy DNA Tissue Extraction. Extracts were quantified by spectrophotometry for quality and quantity, and analysed by Polymerase Chain Reaction using QIAGEN Mericon Animal Identification Kits for the presence of DNA from *Gallus gallus* (Chicken) *Bos taurus* (Cattle), *Ovis aries* (Sheep), *Sus scrofa* (Pig) and *Equus ferus caballus* (Horse) with a limit of detection of 0.1%. Endpoint analysis was undertaken to confirm the identity of the PCR results. Extracts were further analysed by Polymerase Chain Reaction for the presence of DNA from *Gallus gallus* (chicken), *Bos taurus* (cattle), *Ovis aries* (sheep), *Equus ferus caballus* (horse) and *Dama dama* (Fallow Deer). Melt Curve analysis was undertaken to confirm the identity of the PCR results.

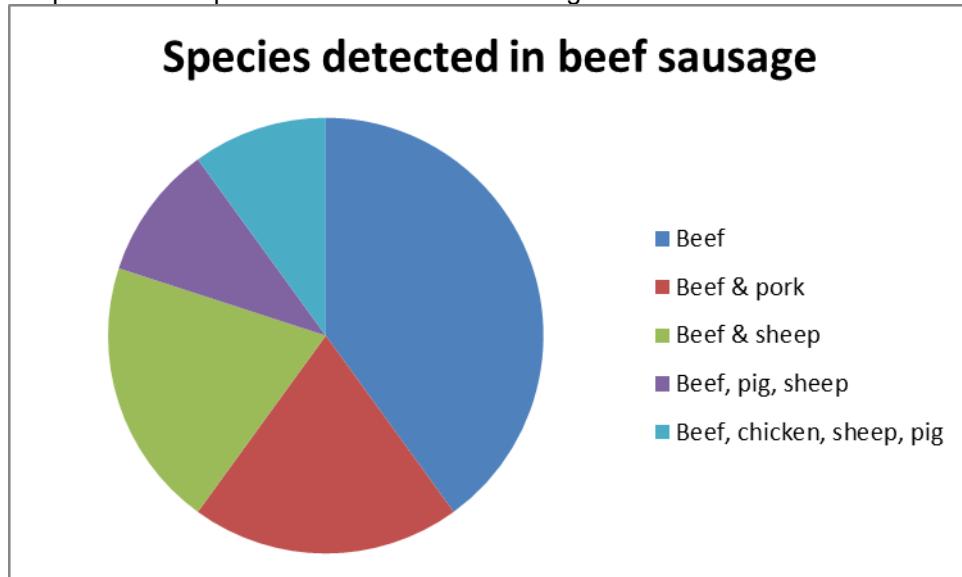
## 4. RESULTS

Table 1 – Results

Reference	Meat Species analysis	Contents matched ingredients?	Correctly labelled	All contents handled onsite?	Results interpretation
Name					
GCC1/2017 Epping	chicken beef Sheep pork	Yes, "meat"	Yes	No	Correctly labelled only due to "meat" as generic ingredient
GCC2/2017 Beef, herb & garlic	beef sheep	No	No	Yes	
GCC3/2017 Tomato, Onion & beef	chicken beef sheep	No	No	Yes	Butcher advised no risk of cross contamination
GCC4/2017 Epping	beef	Yes, "meat"	Yes	No	
GCC5/2017 Thin beef	beef sheep pork	No	No	Yes	Butcher advised sausage should only contain beef
GCC6/2017 Award Winning Beef & Swiss Brown Mushroom	beef	Yes	Yes	No	
GCC7/2017 Thin beef	beef pork	No	No	Yes	Butcher telephoned in late August 2017 to advise casings are pig based
GCC8/2017 Traditional beef	beef	Yes	Yes	Yes	
GCC9/2017 Caramelised Beef & Onion	beef pork	Yes	Yes	No	Chosen to see if other species present
GCC10/2017 Beef	beef	Yes	Yes	No	

Results are summarized in Table 1. No horse meat or venison was detected in any of the samples. Graph 1 shows the variety of species of meat which was found in the beef sausage. Some of the samples complied with labelling law only because of the generic use of the term "meat" to describe contents.

Graph 1 – Meat species detected in beef sausage



While beef sausage was requested, two premises (GCC1/2017 and GCC4/2017) sold “Epping Sausage”. This type of sausage presents as a regular type BBQ beef sausage, but is not called a “beef” sausage and this was indicated on the label. While GCC1/017 contained a collection of varied meats (chicken, beef, sheep and pork), GCC4/2017 only contained beef. Both premises took care to point out that, even though we requested a beef sausage, the Epping sausage would be provided to us. This is likely because each premises was aware that we were Environmental Health Officers undertaking testing of their sausage. “Meat” is a permitted generic name in the *Food Standards Code*. Therefore GCC1/2017 was labelled correctly and lawfully.

The butcher who provided sample GCC7/2017 telephoned Council in late August to query their results. They chose to advise us, at this time, that the sausage casings they use are pig based. This may account for finding pork in their sample.

Fallow Deer (*Dama dama*) is an introduced species to Tasmania. It is the only deer species on the island. It is illegal to commercially harvest deer meat in Tasmania, so any venison found in sausage would need to have been imported into the state.

None of the collected samples tested positive for venison. The Laboratory indicated problems with the venison analyses, namely cross-reactivity and multiple profiles in the deer assay samples. The unusual results “...may be due to some cross reaction with one or more unknown species present in the samples, or it may not – we don’t know and cannot be sure of the reason.” (pers. Comms Aug 2017). The Laboratory was unable to sequence the samples as they were admixtures of multiple species. There are no identified taxonomically related species to Fallow Deer, the only type of deer on the island of Tasmania. Also, the likelihood of another species in each of the ten samples would be unlikely. Therefore, the ten samples are deemed not to contain venison.

## 5. DISCUSSION

This study identified mislabelling of sausages based on meat speciation testing.

In total, 60% of the samples of beef sausage contained species of meat other than “beef”. Overall, four of the samples (40%) were incorrectly labelled, with ingredients not matching species found in the sausage. A further two samples (20%) were correctly labelled only because they included the generic term “meat” on the label. The question of if this was deliberate is more difficult to answer. The laboratory was chosen (only two laboratories in Australia are able to undertake this type of testing) because it indicated it could provide what percentage of the sample was each species of meat. However, this data was not provided to us in the analysis. The meat assay test was able to report present or absent at a threshold level of 1%. This excludes any background DNA contamination, but

does not indicate how much of a sample is made up of different species. Therefore we can surmise that the DNA detected was not background amounts, but of enough quantity to be added to the sausage mixture. However, accidental mishandling or deliberate contamination is not ascertainable from these results.

### **5.1. Limitations of this study**

The commercial cost of analyses was significant, and sourcing the necessary PCR analysis was limited to a handful of National Association of Testing Authorities (NATA) accredited laboratories in Australia who provide this service.

The sampling was undertaken only in one Local Government Area, Glenorchy. It is unknown if the City of Glenorchy is representative of the State of Tasmania, or more widely in Australia.

The time between dispatching the samples and receiving was five months (i.e. March 31<sup>st</sup> 2017 to August 4<sup>th</sup> 2017). This impacted our follow up of the butchers with mislabelled samples. The delay was due to a combination of adverse seasonal weather (Cyclone Debbie), available staff resources at the laboratory and difficulty conducting the venison (*Dama dama*) analysis.

The project aimed to uncover contamination from deliberate substitution. This would have been measured by the amount of non-beef meat in each sample. Unfortunately, the results data did not enable a judgement to be made as to whether intent to defraud existed as compared and contrasted to background contamination ordinarily expected in a butchers shop. Further consideration of this problem and how it might be addressed in future studies will be important for future surveys.

We were unable to test for Tasmanian Wallaby (*Thylogale billardierii*), a possible source of adulteration, due to the cost of developing an assay. It would be valuable to test for wallaby as it is prolific in Tasmania and may be entering the food chain as a cheap substitute for beef. Consideration of multiple Local Government Areas across Tasmania covering the cost of development of an assay would be worthwhile for future meat speciation surveys.

### **5.2 Comparison to previous Tasmanian studies undertaken**

A survey conducted by five Southern Tasmanian Councils in October 2008 showed seventy seven per cent of beef sausages tested contained meat other than beef, contrary to their label (Media release Kingborough Council, 31/10/2008). This followed a survey in June 2008 by four Tasmanian City Councils which found one hundred per cent of sausages contained meats other than those indicated on the label. In Glenorchy, four of the four samples failed in the June round and three out of three samples failed in the September round.

It was not clear from the 2008 survey if the mislabelled beef sausages were a result of deliberate misleading practices for economic gain, accidental incorrect labelling or cross contamination from poor food handling practice. Discussions with Environmental Health Officers involved in the 2008 surveys show that there may have been less deliberate substitution and more mismanagement and contamination of the bucket meat scraps are placed in. The meat in the bucket was then used to make sausages which subsequently did not meet the labelling requirements. Clearly the rationale would not be valid should wallaby or horse meat be identified in sausage products sourced from butchers who do not stock these meat types. This survey did not find any horse contamination, nor did it test for wallaby as previously identified.

### **5.3 Contravention of law**

The Tasmanian *Food Act 2003* has provisions for mislabelling of food for sale. It may be argued that the mislabelling of some of the samples is misleading or is likely to mislead especially for consumers who purchase the food relying on the label for accurate ingredients listing. It may be argued that the labelling on the sausage is “falsely described”. The *Food Act 2003* requires;

"18. Misleading conduct relating to sale of food

- (1) A person must not, in the course of carrying on a food business, engage in conduct that is misleading or deceptive, or is likely to mislead or deceive, in relation to the advertising, packaging or labelling of food intended for sale or the sale of food.
- (3) A person must not, in the course of carrying on a food business, sell food that is packaged or labelled in a way that falsely describes the food.
- (f) The food is not of the nature or substance represented by the manner in which it is packaged, labelled or offered for sale."

The generic descriptor of "meat" in Standard 1.2.4 of the *Food Standards Code* allows manufacturers to label a beef sausage which contains a variety of species of animal to lawfully comply with ingredients listing. "Meat" as a generic term may mean a mixture of types of animal which may be misleading to the consumer. Species information is important for people who suffer allergies or who have religious prohibitions around eating certain types of meat. In other jurisdictions such as Canada, species of meat contained in a product must be listed.

## 6. CONCLUSION

Public awareness regarding the mislabelling of food in Tasmania is likely to be low. Yet, forty per cent of beef sausage samples contained species of meat not declared on the ingredients label in this study. This is consistent with other international studies findings. The generic term "meat" may be legally correct, but still be misleading to the consumer who is eating a mixture of animal species in their beef sausage. The correct and complete identification of species on labelling provides important information for consumers, especially for people who suffer allergies or who have religious prohibitions for particular foods. The species of meat contained in a product should be listed on the ingredients label, as applies in other international jurisdictions.

This study confirmed mislabelling and misrepresentation of beef sausage products does occur in Tasmania. The question of intentional substitution with cheaper ingredients (economically motivated food fraud) or mishandling during processing remains unanswered. Horse meat and venison meat was not found in any sample products; Tasmanian wallaby was unable to be tested for.

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*This study was funded by Glenorchy City Council and the Department of Health and Human Services Tasmania.*

**Excerpt from: *A Bright Future for Planetary Health* by Samuel Myers and Howard Frumkin in Planetary Health: Protecting Nature to Protect Ourselves**

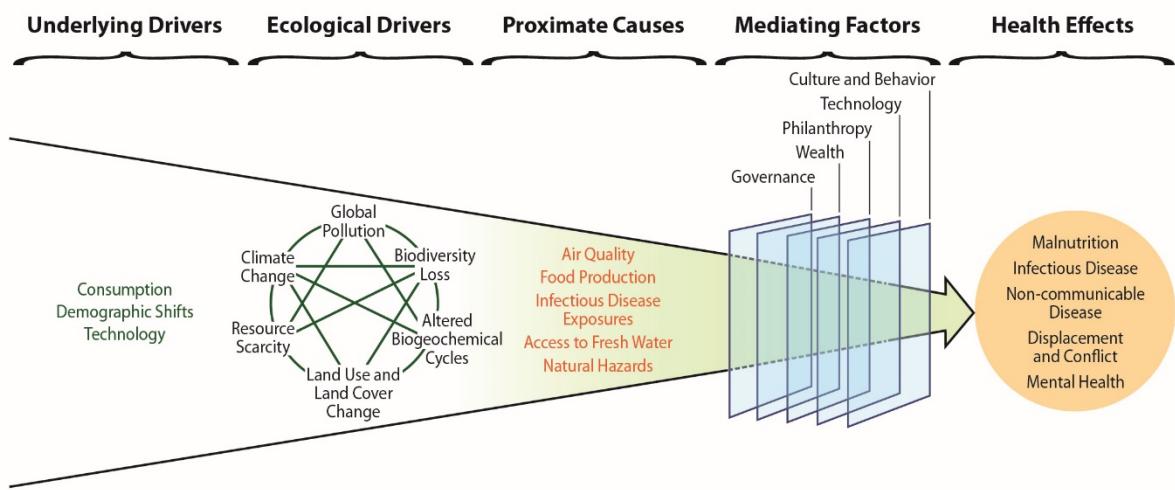
On September 23<sup>rd</sup>, 2019, sixteen-year-old Swedish climate activist Greta Thunberg addressed world leaders who had come together for the UN General Assembly. “This is all wrong,” she told them. “I shouldn’t be up here. I should be back in school on the other side of the ocean. Yet you all come to us young people for hope? How dare you! You have stolen my dreams and my childhood with your empty words. And yet I’m one of the lucky ones. People are suffering. People are dying. Entire ecosystems are collapsing. We are in the beginning of a mass extinction. And all you can talk about is money and fairytales of eternal economic growth. How dare you!” She continued: “You are failing us. But the young people are starting to understand your betrayal. The eyes of all future generations are upon you. And if you choose to fail us, I say we will never forgive you. We will not let you get away with this. Right here, right now is where we draw the line. The world is waking up. And change is coming, whether you like it or not.”

And so here we find ourselves at a pivotal moment in human history. After millions of years of biological evolution and thousands of years of social evolution we have, in the blink of an eye, multiplied our numbers and our consumption of resources to the extent that we imperil the natural systems that support us and all living beings. Our wealth, health, education, and opportunities exceed anything we have experienced before, but they have been carried forth on the groaning back of a crumbling biosphere. Our current trajectory leads to ecological collapse and the unravelling of our many gains. Now the eyes of all future generations are upon us, and, within a few decades, we must chart a new course from extinction to renaissance. We are a community forged in urgency.

In the face of these challenges, hope can seem elusive. Many earth system trends are grim, the popular and scientific literature is full of apocalyptic scenarios, and progress to date has been slow. But as Thunberg and so many in her generation are emphasizing, we have a choice. Within our reach is a future that sparkles with promise, in which humanity has never been healthier, better educated, or happier, and in which opportunities are more accessible than ever before to people of every gender, race, ethnicity, and religion.

The chapters of this book have presented core elements of a world that we would be proud to bequeath to Greta Thunberg and her generation, and that they might be glad to inherit. In it, the

human population has stabilized and then started to decline as a natural result of the demographic transition. Food is produced much more efficiently, with lower inputs of land, water, agrochemicals, and energy. Energy is produced renewably in a post-combustion world in which CO<sub>2</sub> levels are beginning to decline. People are living mostly in cities designed to optimize their health, both physical and mental, encourage social connectedness and minimize their ecological footprints. With each passing decade there is more room, not less, for the rest of the biosphere. Human wellbeing is on the rise, and we are living in harmony with the natural world.



**Figure 1.4**

Schematic illustrating impacts of anthropogenic change on human health. Driven by rapid population growth, even steeper growth in per capita consumption, and technologies with large environmental impacts, the scale of human activity now outstrips our planet's capacity to absorb our wastes or provide the resources that we are using sustainably. As a result, we are transforming and disrupting most of our planet's natural systems. Those disruptions interact with each other in complex ways to alter the fundamental conditions for human health and wellbeing and, ultimately, affect nearly every dimension of human health.

## **South Africa's Minamata, an analysis of the Thor Chemicals saga 1989 – 2020**

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### **Abstract**

This study analysed historical data collected over thirty years to evaluate the extent of environmental contamination and health risk associated with mercury (Hg) pollution attributed to Thor Chemicals, South Africa. Data from several sources were pooled to describe pollution trends over time. Total Hg levels directly below the plant remain extremely high and a cause for concern. Mercury levels in fish have increased significantly from 1999 to 2009 ( $p=0.0001$ ) and the consumption of Catfish poses a risk to local communities with median values of 1.15 µg/g, it is very likely that Hg levels in fish have increased over the last decade as no recent data are available. In 1999 all human and animal hair samples were below 0.5 µg/g. However, by 2010 levels had increased significantly ( $p=0.016$ ) among people living near the Inanda Dam (median 2.46 µg/g), as well as near the plant (median 2.63 µg/g in 2020). Immediate environmental remediation is required, and the remaining stockpile of Hg needs to be disposed of. Current fish Hg levels need to be established to develop fish consumption guidelines. A comprehensive environmental epidemiological study with a focus on pregnant women and children is needed to develop appropriate health protection interventions.

**Keywords:** 1; Mercury 2; Thor Chemicals 3 Environmental health risk

### **1. Introduction**

Thor Chemicals (Pty) Ltd commissioned a Mercury (Hg) incinerator in the Cato Ridge area of Kwa Zulu – Natal in 1986. The plant processed mercury waste received from around the world and by 1989 it was reported that Hg had contaminated the Mngceweni River, which is a tributary of the u'Mgeni River that flows through a densely populated rural environment known as “the valley of a thousand hills” for approximately 35 km to the Inanda Dam, the drinking water supply of the Durban metropolitan area. Communities residing in the valley rely on the river system as a source of drinking water, fishing and the watering of their livestock [1]. Several studies of environmental contamination in the area have been published over the last three decades [1-6], yet the issue remains unresolved. More recent data (unpublished) shows that pollution is now more widespread due to decades of neglect and failure to take appropriate remedial action. The exposed population, particularly the most vulnerable, the unborn foetus and young children, are at risk of suffering health effects due to environmental Hg exposure. The aim of this study was to use combined data to re-evaluate the extent of environmental contamination and health risk associated with mercury pollution attributed to Thor Chemicals to support a call for urgent action.

Green Peace sponsored a study in 1991 [1] that clearly demonstrated Hg levels decreased with distance from the Thor Chemicals plant and control area samples were an order of magnitude lower than those collected directly below the Thor Chemicals boundary. The authors concluded that Thor Chemicals was the undisputed point source of contamination and that future sediment transport would impact the downstream river system and ultimately the Inanda Dam. They advised that fish in

the area should be monitored as a public health measure, the impact on ground water be assessed, and that environmental remediation be implemented urgently. The authors also recommended health monitoring of the local communities and further research to assess Hg accumulation in aquatic plants, fish, animals and humans. However, nothing was done to address the issue.

In 1996 a pilot project [2] assessed Hg levels in water, soil and vegetation along the Mngceweni River and the Inanda Dam. This study confirmed that sediment and soil in the vicinity of the plant remained contaminated thus highlighting the urgency for an in-depth investigation that led to a PhD study in 1999. Extensive sediment sampling confirmed again Thor Chemicals as the point source of contamination as established seven years earlier with results close to the plant more than 490 times greater than the mean Hg levels of control samples. However, at that time soil contamination was still confined to the immediate vicinity of the plant. The median total Hg level of u'Mgeni River fish was 0.36 µg/g and fish from the Inanda Dam, more than 30 km downstream had a median level of 0.19 µg/g, although they were larger fish on average. The median total Hg level in fish from the control area was 0.07 µg/g. Despite a clear trend that showed fish closer to Thor Chemicals had higher Hg concentrations, this difference was not statistically significant ( $p = 0.47$ ). Algae, bovine and human hair samples all returned results below the level of detection. A series of recommendations were passed on to the authorities; these included the need to monitor fish from the area, and to inform the local community of the potential hazards of daily fish consumption, as well as the need to do health surveillance and environmental monitoring into the future while remediation options are explored [2]. However, these recommendations were not acted upon.

More than a decade later in 2010 research was published that focused extensively on sediment samples ( $n=37$ ) collected in the same study location as the 1999 study. However, fish sampling was restricted to the dam ( $n=10$ ) with none collected in the uMgeni River. A significant number of hair samples ( $n=86$ ) were obtained from three villages, close to the Inanda dam, which is more than thirty kilometres away from the source of contamination. Mercury concentrations in sediment ranged from <0.1 to 897.5 µg Total Hg/g, (mean 52.83 and median 0.09). All samples with elevated Hg were collected from the Mngceweni River, in close proximity to Thor Chemicals and 62% of these ( $n=13$ ) exceeded Hg levels that require remediation with 54% classifiable as chemical waste. Mercury concentrations in carp and catfish ( $n=10$ ) ranged from 0.26 to 1.78 µg Total Hg /g (mean 0.67, median of 0.55) [5]. Hair mercury concentrations ranged from <0.1 to 54.8 µg Total Hg/g. These findings are a cause for concern as in 1999 no Hg was detected in hair [2] and it appears as if the contamination had spread as far as the Inanda dam, 30 km from the source of pollution. In spite of health-related recommendations to the authorities, no action was taken to remedy the situation. A separate study conducted during the same timeframe was published in 2011 and the authors confirmed again that total Hg in sediment was higher closer to the Thor Chemicals plant, and that the site remained a potential Hg pollution source. The authors recommended that a Hg monitoring program be established to assess the bioavailability of resuspended Hg from sediment [6], yet again, nothing was done to remediate the contamination.

A suspicious fire in August 2019 raised concern about the Thor Chemicals saga again. Since the company had been banned from processing mercury in the 1980's drums of untreated waste had accumulated on the premises and options to dispose of this now unstable stockpile were estimated to cost approximately 300 Million South African Rand [7]. This "convenient" fire triggered an investigation by The South African investigative journalism television series, Carte Blanche, who collected more samples during 2020 confirming that Hg contamination was now more widely distributed. These results were included in an aggregate data set to determine how pollution in the area has become more widespread over the period from 1999 to 2020.

## 2. Methods

Data from research papers published in 1991, 1999, 2001, 2010, and 2011 [1,3,4,5,6], along with unpublished Hg results collected in 2020 were aggregated and converted to ( $\mu\text{g}$  Total Hg/g). Data obtained in 1996 [2] were excluded from the analysis as units were reported in  $\mu\text{g}/\text{cm}^3$  and could not be converted. Results below the level of detection (LOD) were adjusted as recommended by Hewett [8] by dividing the LOD with the square root of 2. The data that was comparable across this three-decade time span was limited to sediment, fish (carp and catfish), human and animal hair samples. An aggregate data set was compiled and stratified according to distance from the point source as;

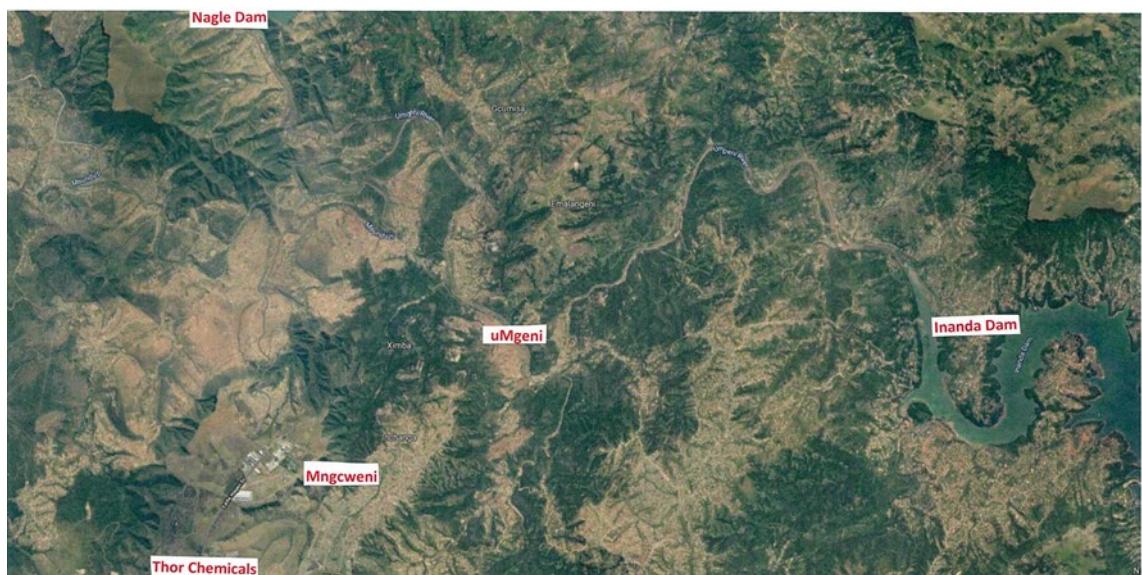
- Zone 1: from Thor Chemicals, along the Mngeweni River to the uMgeni River confluence.
- Zone 2: from the Confluence of the rivers to the Ndunaizi Village and the Inanda Dam.
- Zone 3: the Inanda Dam area.
- Control samples were collected from an unnamed tributary of the Mngeweni, the settlement of Fredville, and the area upstream from the Mngeweni / Umgeni confluence to the Nagel Dam.

Statistical analysis was conducted using raw sample data, however, in instances where these were not available summary statistics were used. A one-sample t-test of mean Hg concentrations in zone 3 fish was used to assess trends over time (1999-2009). A one sample Wilcoxon signed-rank test of median Hg concentrations in zone 3 carp and catfish (1999) was compared to the 2009 reference values of 0.34 and 1.15  $\mu\text{g}$  Total Hg/g respectively. Two-way ANOVA was used to test the mean Hg concentration differences between Carp and Catfish in zone 2 and 3 and one-sample Wilcoxon signed-rank tests were used for analysis of changes in animal and human hair Hg levels from 1999 – 2020.

Sediment data obtained in Zone 1 included samples that were collected at the Thor Chemicals boundary fence and from an earth dam receiving storm water runoff from the plant, these extremely high values were analysed and discussed separately (Thor Chemicals boundary). The 2010 study [5] did not report individual sample results for zone 1 ( $n=13$ ) and the mean and median for this zone was extremely high (154.22 and 92.27  $\mu\text{g}/\text{g}$ ), including a maximum value of 897.51  $\mu\text{g}/\text{g}$ . It can be determined from the sketch map provided in the published manuscript [5] (p.473.) that four of the samples were collected from the Thor Chemicals boundary area. Given the standard deviation of 242.99, range (0.08 – 897.51) data from this study were regarded as too variable and inconsistent with other studies to be included in the analysis. Conversely, the zone 1 sediment data published in 2011 [6] were orders of magnitude lower than those reported by other authors. Mercury levels in this publication were presented graphically; the mean value was estimated from a published figure as approximately 0.073  $\mu\text{g}/\text{g}$ . [6] (p.1082.). According to a sketch map of the 2011 sample locations, all zone 1 samples were obtained beyond the mid-point of the zone, closer to the uMgeni River with none collected close to the plant [6] (p.1081.), thus this estimated mean value (0.073  $\mu\text{g}/\text{g}$ ) more closely resembles the minimum of 0.08  $\mu\text{g}/\text{g}$  reported in 2010 [5], which was likely collected in the same part of zone 1 near the Mngeweni, uMgeni River confluence. The zone 1 data for the 2011 study was excluded from the analysis as it was not deemed comparable to the sampling strategy employed in the other studies. Fish samples ( $n=3$ ) collected in 2011 were also not included in the comparative analysis as they were of a different species (Tilapia) as opposed to Carp and Catfish [6].

The 1999 thesis [3] indicated sample collection points on topographical maps while the 1991, 2010 and 2011 studies [1,5,6] included sketch maps that were used to classify data geographically. In 2020 sample positions were pinpointed using global positioning system (GPS) coordinates. Sample positions were identified using google maps as shown in Figure 1 and stratified into the zones described earlier for statistical analysis.

Figure 1: Google earth image of the study area



Source: Google Maps, available at <https://www.google.com/maps/@-29.6505701,30.7415954,14697m/data=!3m1!1e3>

### 3. Results

All mercury levels are reported as  $\mu\text{g}$  Total Hg/g.

#### 3.1 Sediment

In 1999 a composite sample with a mean level of 54  $\mu\text{g}/\text{g}$  was regarded as an outlier when reporting contamination levels in zone 1. This sample was collected near the Thor Chemicals premises, however, not close enough to be classified as a boundary sample. Inclusion of this value in the calculation of the mean for the remainder of zone 1, or to estimate contamination at the boundary was deemed inappropriate [2]. Based on the exceptionally high Hg levels reported in 1991 [1], 2010 [5] and 2020 (unpublished) at the Thor Chemicals boundary, the aggregate data for zone 1 in this analysis were stratified to include an additional category of boundary samples. The mean boundary levels decreased over time from 1764  $\mu\text{g}/\text{g}$  in 1991 to 897.51  $\mu\text{g}/\text{g}$  in 2010 and 551  $\mu\text{g}/\text{g}$  in 2020. For the remainder of Zone 1 the results were extremely variable and were influenced by their relative proximity to Thor Chemicals with mean values of 12.9  $\mu\text{g}/\text{g}$  (1991); 0.525  $\mu\text{g}/\text{g}$  (1999) and 14.59 (2020). The average of all combined control samples collected upstream was 0.069  $\mu\text{g}/\text{g}$ .

#### 3.2 Fish

River fish, Carp ( $n=4$ ) and Catfish ( $n=3$ ) were collected in zone 2 in 1999 with median levels of 0.345  $\mu\text{g}/\text{g}$  and 0.4  $\mu\text{g}/\text{g}$  respectively. No additional river fish samples were available for analysis. In 1999 Carp ( $n=5$ ) and Catfish ( $n=5$ ) from the Inanda dam (zone 3) had median levels of 0.08  $\mu\text{g}/\text{g}$  and 0.13  $\mu\text{g}/\text{g}$  and in 2010 these had increased significantly ( $p=0.0001$  – species combined) to 0.34  $\mu\text{g}/\text{g}$  and 1.15  $\mu\text{g}/\text{g}$ . Control samples Carp ( $n=5$ ) and Catfish ( $n=5$ ) obtained upstream from the study area in the Nagle dam returned median results of 0.44 and 0.13 respectively.

### 3.3 Human hair

In 1999 all human hair samples ( $n=14$ , includes 5 controls) were found to be below 0.5  $\mu\text{g/g}$ . However, by 2010, zone 3 median levels ( $n=17$ ) had increased significantly ( $p=0.016$ ) among people living in the Mshazi village near the upper reaches of the Inanda Dam (2.46  $\mu\text{g/g}$ ) as compared to controls ( $n=7$ ) with a median value of 0.037. In 2020 samples collected from people living near the Thor Chemicals plant ( $n=6$ ) returned a median value of 2.62  $\mu\text{g/g}$ .

### 3.4 Animal hair

All livestock hair samples ( $n=11$ , includes 4 controls) obtained from the tails of cattle in 1999 were below the level of detection of 0.5  $\mu\text{g/g}$  while in 2020 the median level in animals near the Thor chemicals was 2.63  $\mu\text{g/g}$ .

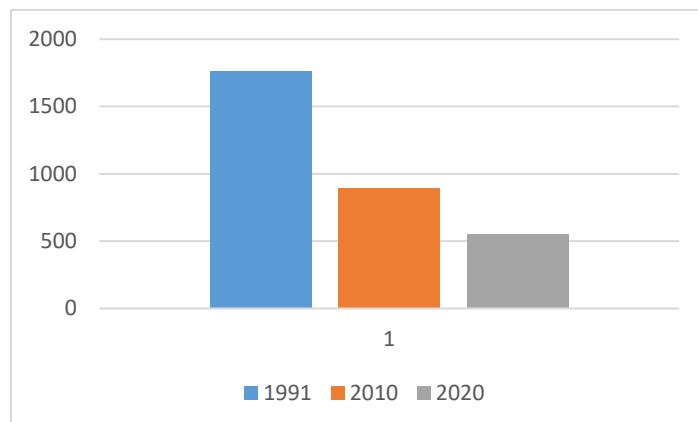
## 4. Discussion

Several scientific studies have investigated the Thor Chemicals Hg pollution issue since 1991 [1-6]. Although all studies were conducted in the same region, they did not follow a standardized sampling protocol.

### 4.1 Sediment

Thor Chemicals was first identified as the point source of environmental Hg pollution in 1991. Although it is not possible to pinpoint the exact location where boundary samples were collected it is shown in figure 2 that Hg pollution in the area directly below the plant appears to have decreased over the last thirty years as it has become mobilized in the environment, yet the levels remain extremely high when compared to the default guidance value of 0.15  $\mu\text{g/g}$  applied in Australia and New Zealand [9], and the need for immediate remediation in the area below the plant is still an urgent issue as mercury is likely to be mobilized from this point source for many more decades.

Figure 2: Sediment mercury levels at the Thor Chemicals Boundary in  $\mu\text{g total Hg/g}$



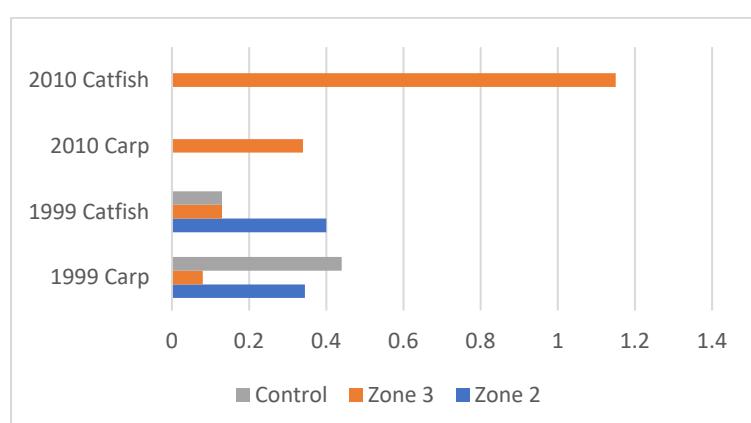
For the remainder of Zone 1 the mean values reported in 1999 are much lower than those collected in 1991 and 2020, this is probably attributable to variations in sample locations along the Mngeweni River, number of samples collected in close proximity to the plant, and seasonal fluctuations that could impact Hg mobilisation. Future sampling should be conducted according to a standardised protocol with samples collected at the same points. Zone 2 and 3 appears to not be affected to the same extent as zone 1, however no recent data from these zones are available.

#### 4.2 Fish

Median total Hg levels for fish samples are shown in Figure 3. A concerning trend is the apparent migration of Hg to the Inanda dam. In 1999 higher median Hg levels were reported in both species of uMgeni River fish, as compared to the Inanda Dam, this despite the river fish being smaller in size [3]. Subsequent data published ten years later shows that zone 3 (dam fish) were significantly more contaminated than they were in 1999 ( $p=0.0001$  combined fish species) [5]. It is therefore likely that Hg in sediment has been transported to the impounded waters of the Inanda dam during periods of high flow. It is also possible that uMgeni River fish, contaminated with mercury, may migrate downstream to the dam transferring pollution to the larger predatory fish in this zone. Catfish are more likely to be affected by Hg pollution than Carp ( $p=0.027$  and  $p = 0.031$  respectively), with an increase of 0.077 µg/g between the species, probably due to differences in habitat and feeding habits.

In 2010 the consumption of catfish posed a significant risk to local communities, the median level of 1.15 [4] exceeded the upper limit of 0.46 µg/g which is classified by the US Food and Drug Administration (FDA) as fish pregnant women should avoid [10]. The median Hg level in carp (0.34 µg/g) in 2010 [5] was within a range recommended for no more than 1 serving per week (0.23 - 0.46 µg/g) [11]. Unfortunately, no zone 2 data were reported in 2010 and no recent fish data were available. This analysis relied on samples collected in 1999 and 2010. It is highly likely that Hg levels in fish have increased over the last decade and obtaining current fish data is a priority.

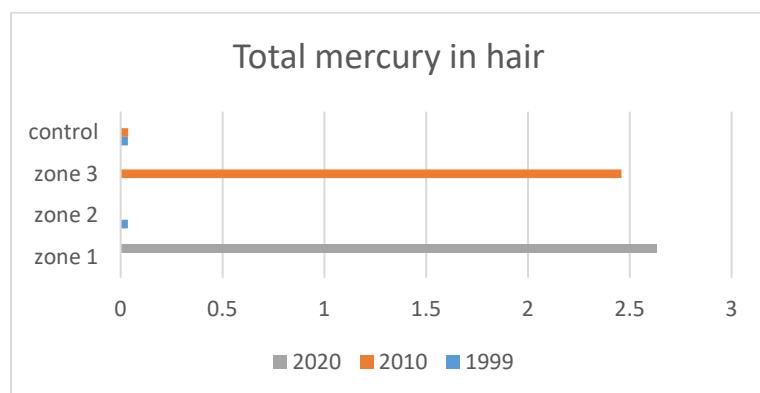
Figure 3: Mercury levels in fish µg total Hg /g



#### 4.3 Human hair

As shown in figure 4, by 2010 hair Hg levels had increased significantly in the lower part of the study area in zone 3 among people living near the Inanda Dam ( $p=0.016$ ) with a median of  $2.46 \mu\text{g}/\text{g}$ , this finding is consistent with fish data [5]. The 2020 results also show elevated total mercury levels in hair obtained from zone 1 (median  $2.62 \mu\text{g}/\text{g}$ ) among people living near the Thor Chemicals plant, a community that would also have been impacted by the 2019 fire [6]. This is a cause for concern as the current recommended limit of mercury in hair is  $1 \mu\text{g}/\text{g}$  [12].

Figure 4: Mercury levels in human hair total Total  $\mu\text{g Hg/g}$



#### 4.4 Animal hair

All samples collected in 1999 were below the level of detection  $<0.5 \mu\text{g}/\text{g}$  [3]. However, by 2020 there appears to be significant contamination among local livestock ( $p=0.047$ ). This finding is of concern as goats and cattle are not carnivorous and it is hypothesized that their main route of absorption may be through their watering habit of wading into the dam, stirring up sediment as they drink. The potential spread from animals to humans via milk or meat is unknown and warrants further investigation.

### 5. Conclusions

There are several studies that have been published over the last thirty years that clearly establish Thor Chemicals in Cato Ridge, South Africa as a point source of Hg pollution. The soil and river sediment directly below Thor Chemicals remain highly contaminated and a recent fire at the plant in 2019 has most likely introduced an additional pollution burden into the immediate environment. An issue of concern is the fact that Hg appears to be finding its way 35km downstream to the impounded waters of the Inanda dam where Hg levels in fish and humans have been increasing over time. Eco-toxicological data of biota in the ecosystem provide further evidence of the mobilization and methylation of Hg in the environment.

### Recommendations

1. Fish sampling needs to be prioritized as the most recent samples referred to in this study were collected in 2010. Comprehensive fish consumption guidelines need to be developed based on current fish Hg levels, stratified by species and location.
2. Using current fish Hg data, a health education program must be developed and rolled out in the affected communities warning people, especially pregnant women, of the dangers of

fish consumption, particularly catfish. People also need to attempt to water their livestock in places where the animals cannot wade into the water, thus stirring up sediment.

3. Immediate urgent remedial action must be taken to remove all Hg remaining in the soil close to the boundary of Thor Chemicals (now Guernica). Sediment in zone 1 needs to be examined to explore comprehensively the extent of Hg contamination and appropriate remediation strategies need to be investigated, preferably in-situ. Sample locations should be established at the boundary and at regular intervals along the Mngeweni River and GPS technology should be used to pinpoint sample locations to enable future monitoring to collect replicate samples according to a standardized protocol that can be used to determine the effectiveness of remedial actions.
4. Environmentally responsible disposal of the remaining stockpile of Hg waste needs to be implemented as an urgent priority.
5. A comprehensive environmental epidemiological study needs to be conducted to establish the extent of Hg uptake among the local population with a focus on pregnant women and children.
6. A detailed study of Hg levels in livestock (including chickens) needs to be conducted in order to calculate permissible daily or weekly consumption guidelines for milk and meat and the population should be issued with adequate dietary advice if deemed necessary.

## **Declarations**

### **Ethical Approval and Consent to participate**

Not applicable

### **Consent for publication**

All authors consent to the publication

### **Availability of supporting data**

Not applicable

### **Competing interests**

Not applicable

### **Funding**

None

### **Authors' contributions**

Conceptualization, Oosthuizen and Albertyn-Christie; methodology, Oosthuizen.; investigation, Oosthuizen and Albertyn-Christie; writing—original draft preparation, Oosthuizen; writing—review and editing, Albertyn-Christie &Fu; statistical analysis, Fu.

### **Acknowledgements**

none

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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## Environmental Health and COVID19

According to the World Health Organization (WHO), Environmental Health, which is celebrated worldwide on September 26, addresses aspects of health and quality of life determined by environmental factors, whether physical, chemical, biological, biomechanical or psychosocial, also referring to the theory and practice of assessment, prevention, mitigation and control of factors that present in the environment can adversely affect human health. WHO estimates that about 23% of deaths worldwide are associated with environmental issues per year.

Environmental Health workforce guarantee that the environment around us, at home, workplace, school, place where we go shopping or where we will simply look for some form of fun, is safe, hygienic and healthy. These professionals, when working in the field, have a superior knowledge of local customs; they are familiar with the risks and know how to get the "message" across. Deep down they act locally thinking globally.

We are going through difficult times, the WHO declared, on January 30, 2020, that the outbreak of the disease caused by the new coronavirus (COVID19) constitutes a Public Health Emergency of International Importance - the highest level of alert of the Organization, as foreseen in the Regulation International Health. On March 11, 2020, COVID19 was characterized by WHO as a pandemic and we still cannot predict when it will end.

As it could not be the World Environmental Health Day this year, its motto is "Environmental Health, a key public health intervention for the prevention of pandemic diseases".

Environmental Health professionals from all over the world are busy, at the forefront of this struggle, in order to prevent the spread of the SARS CoV2 virus, playing a multiple role and that varies from country to country.

The health crisis we are currently experiencing is directly linked to the lack of prevention and the failure to meet the objectives we have set for Sustainable Development. In fact, we all know that we have always cohabited with viruses and bacteria. In well-preserved habitats, with a great diversity of species that live in balance, the viruses are distributed among the different species and are "remote" from humans. But this is the real problem, environmental issues are the order of the day, we have an increasingly polluted planet, with poor air quality, particularly in large cities. We are a consumer society that needs more and more, than nature can give us.

In this different year of 2020, Planet Earth has lived on "credit" since August 22nd. A little later than in previous years, due to the "lockdown" that the World had to make. This means that we have exhausted the natural resources available for 2020 and we are demanding that the Planet continue to provide us with everything we consider important even if it is at the expense of the nature that surrounds us and which is no longer able to regenerate.

When nature is altered or destroyed, or when we hunt or feed on wild species, as the situation that caused the SARSCoV2 virus to appear, we bring the virus closer to us, increasing the risk of transmission to man.

For the first time, in January 2020, participants in the annual assessment of the World Economic Forum considered that the environmental rich are those most likely to affect the world, considering that nature protection has to be included in the economic recovery.

This Pandemic is not part of a unique event, but of a pattern that reflects the damage we are doing to the habitat where we live. We have to be resilient and preserve our forests, our animals, in short, our ecosystems.

I conclude, to paraphrase Dr. Tedros, Director General of WHO, at the 73rd World Health Assembly "Pandemic is a reminder of the intimate and delicate relationship between people and the Planet. All efforts to make our world safer are doomed to fail, unless they address the critical interface between people, pathogens and the existential threat of climate change, which are making our home less habitable."

## National Environmental Health Association



While Environmental Health Professionals around the country are encouraging and often enforcing social distancing efforts to reduce the spread of COVID-19, the National Environmental Health Association (NEHA) is convening virtual connections with three major partners to fight against foodborne illness. Together, with the Conference for Food Protection, the Association of Food and Drug Officials, and the National Association of County and City Health Officials, our we have formed the Retail Food Safety Regulatory Association Collaborative (Collaborative). Funded by the U.S. Food and Drug Administration (FDA), the Collaborative exists to leverage resources and strengths of the Associations to advance retail food initiatives and activities resulting in a reduction of foodborne illness. We develop tools and promote food safety initiatives, and tie directly into the New Era of Smarter Food Safety Blueprint, FDA's 10-year plan to improve food safety.

Our objectives include but are not limited to increased adoption of the current FDA Model Food Code, enrollment and engagement in the Voluntary National Retail Food Regulatory Program Standards, broader application of risk-based inspection methods, implementation of intervention strategies by regulatory and industry communities, and improved communications about the success and value of retail food protection programs.

Foodborne illness is preventable. We are working together, for the first time in a concentrated effort to collectively support initiatives that fight against foodborne illness. The “Stronger Together” concept used to support efforts to flatten the curve of COVID-19 can and will be applied to combat foodborne illness in this innovative and collaborative venture.

For more information on our Collaborative’s efforts, please contact Terryn Laird, Public Health Communications Specialist, National Environmental Health Association at [tlaIRD@neha.org](mailto:tlaIRD@neha.org).

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### NEHA 2021 Annual Educational Conference (AEC) & Exhibition Three-Part Virtual Series

Theme: Together a Safer and Healthier Tomorrow

<https://www.neha.org/neha-2021-annual-educational-conference-aec-exhibition-three-part-virtual-series>

## Canadian Institute of Public Health Inspectors (CIPHI)



CIPHI represents and unites Environmental Public Health professionals across the country, and advances the profession and standards of practitioners through advocacy, education, and a professional competency program. In Canada, Environmental Public Health professionals receive certification (CPHI(C) designation) through CIPHI's Board of Certification after completing a three-part process: completion of an undergraduate degree through a program approved by the Board; completion of a twelve-week practicum; and successfully completing an exam process, consisting of both written and oral components. Environmental health professionals are employed at the municipal, provincial, and federal levels in Canada, providing education, advice, and regulatory enforcement in the areas of food safety, drinking water quality, air quality, solid and liquid waste disposal, emergency management, communicable disease control, climate change, resource development, healthy built environments, and many others.

Since 2017, the CPHI(C) credential has been linked to CIPHI's Continuing Professional Competency program: practitioners must complete eighty professional development hours throughout the year, and failure to comply could result in, after a progressive compliance process, ceasing of membership. For individuals certified after 2017, failure to maintain membership in CIPHI makes them ineligible to use the CPHI(C) credential and therefore precludes them from practicing as environmental health professionals in most jurisdictions in Canada. As such, CIPHI has successfully created a certification process that ensures the ongoing education, development, and professional standards of any individual holding the CPHI(C) credential.

CIPHI holds annual Educational Conferences, with the 2019 event being hosted by the Nova Scotia & PEI branch in Dartmouth, Nova Scotia. The theme of this year's conference was "Exploring the Edge", which provided attendees with an opportunity to hear speakers from all aspects of the profession discuss emerging topics of concern in environmental public health, and innovative ways in which the profession has applied new learnings, research, and technology to achieve desired outcomes. These annual conferences also give CIPHI members from across Canada an opportunity to form inter-jurisdictional professional relationships and communities of practice, strengthening the profession as a whole.

Aligning with the same “Exploring the Edge” theme, CIPHI recognized Environmental Public Health Week from September 23 to September 27, coinciding with World Environmental Health Day. Environmental Public Health Week is a core component of CIPHI’s advocacy platform and gives practitioners an opportunity to engage with the public and elected officials to highlight the importance of environmental public health. The 2019 campaign included television spots where members were able to explain and describe their work; proclamations from municipal and provincial governments; a graphics campaign including posters, social media banners, and email signature blocks; and direct communication between CIPHI Executives and the public.

With both the annual conference and Environmental Public Health week focus on new and emerging topics, 2019 has highlighted CIPHI’s commitment to ensuring environmental public health professionals in Canada are prepared and trained to respond. Newly emerging trends in foodborne illness outbreaks, the use of technology and social media for public health interventions, and a focus on “upstream” approaches including healthier built environments are all ways that CPHI(C) holders are being challenged and responding with adaptive strategies. As an example, advancements in technology and cost reduction has led to whole-genome sequencing being adopted by communicable disease investigative teams in multiple provinces, which has added accuracy and precision to how sources of outbreaks are identified globally: cases can more quickly be linked to one another and to specific etiological agents, which in turn can be linked to specific sources.

Climate change and the environmental emergencies that occur as a result of it have been increasingly important topics in Canada and will continue to be an area where environmental health practitioners are engaged to protect the health and safety of Canadians. Through training, education, and advocacy, CIPHI helps to ensure that its members and those holding the CPHI(C) credential are prepared to face the challenge. More information on the mission, vision, and mandate of CIPHI can be found on our website, <http://www.ciphi.ca>.

*Casey Neathway is the President of the B.C. and Yukon Branch of the Canadian Institute of Public Health Inspectors. He is also a Regional Manager of Environmental Public Health Services with the First Nations Health Authority in British Columbia, Canada.*



### Philip Swain LFEHA – National President EHA Ltd

My name is Philip Swain and I am the EHA National President of Environmental Health Australia, a position I am humbled to hold. These are challenging times and I am enjoying working with a talented and committed group of environmental health professionals at the National level, to enhance and grow the organisation.

#### *EHA involvement*

I first joined the Board of the Australian Institute of Environmental Health (WA Division) in 1990, later in 1992 becoming a National Councillor and Director of the then company. I have been involved with AIEH and then EHA since that time, on and off. I was privileged to be elected President of the WA Division of AIEH in 2004 a position I held for 3 years. Since then I have concentrated my efforts at the National level, as I see a National profile and advocacy at the National level as extremely important for the profession. I have participated in numerous working parties, committees, boards and special interest groups throughout my career in environmental health. I currently Chair the accreditation panels for environmental health courses at the Universities around Australia which has been a rewarding but challenging time. And extremely important work for the profession going forward.

#### *Where do you work?*

I currently work in a variety of local governments in mostly Regional WA. I set up my own consultancy business in 2007 and I have worked in this way ever since. I have found the realistic pragmatism and unique challenges of regional work interesting, and at times challenging. I currently do work for three (3) local governments in the Mid-west and Pilbara of Western Australia, a sparsely populated area of just under half a million square kilometres. Until recently I also worked in the Shire of Ngaanyatjarraku, located in central Australia and home to 10 indigenous communities. Indigenous health was challenging but somewhat frustrating and the issues you deal with are very much grass roots environmental health. Disease prevention including trachoma (Australia is the only developed country to still have incidence of Trachoma) and rheumatic heart disease are the sorts of priorities for the communities, so you do feel that you are making a real difference when we have successes.

#### *How long have you been an EHO?*

Since last century! I was a Cadet Health Surveyor in the early 1980's and studied part time for my undergraduate degree at Curtin University in Western Australia. It wasn't an easy pathway in those days as the course wasn't really structured for part time study. I persevered and completed my degree in 1987. And was appointed to a Regional Environmental Health Service in 1988. I returned to the Metropolitan area of Perth in 1989

and worked for many years at several local governments becoming a Manager and later Director of Community Services at the City of Nedlands in 2005.

***What interests you most about EH?***

My premier interest is in the application of science to public policy and I think EHO's too often sell themselves short in this regard. We too often get labelled as enforcement officers and whilst our statutory roles are important, educating the public and our communities about the science behind the things we do and enforce, and sometimes challenging it, to me is our most important role. EHO's better understand science in the public policy context than most professions and especially at local government level, where I have worked the most.

***What are your other interests?***

I played a lot of amateur Aussie rules footy when I was younger. I am still playing Masters for a local team in Perth called the Western Whalers, which is a bit indicative of the physiques nowadays, but great fun. I also surf when I get a chance and love a bit of cycling. My other personal interests include art and architecture and I completed a second undergraduate degree in Environmental Design (Architecture) in 2010, which was a bit of an indulgence, but very challenging and rewarding. I also play a bit of guitar for relaxation and play guitar for a very average garage band, when we all manage to get together.

## **Julie Barratt – Incoming President CIEH**

I am delighted to be the President of CIEH. I have a long association with the organisation, having joined as a student and have remained in membership for all of my environmental health career and was very closely involved with it during my legal career, as well as spending the last 15 years, working as Director CIEH Wales. Being President is the pinnacle of my career and I am proud to take up the reins from Dawn Welham, who has done a sterling job during her tenure in the post, and from all of the Presidents who preceded her.



That having been said, I would have much preferred to be taking over at a less intense time. The Covid19 pandemic has become front and central to everything that EHPs, whether in local government, within commercials companies, the NHS or in private practise are having to manage. It would have been nice to start my presidency by doing what I had planned to do, engaging in raising the profile of EHPs and the huge value of the work that they do, encouraging people to consider environmental health as a career and lobbying the governments of England, Wales and Northern Ireland to promote public and environmental health initiatives. I am still committed to doing all of those things, but I suspect that immediately is not the time. The white noise around Covid19 would drown out all of that information and the energy required to promote it would be wasted. It has been said that every challenge is an opportunity, therefore I will be using the Covid 19 outbreak as a vehicle to highlight the value of the work that EHPs have done in helping to control the outbreak. EHPs have been deeply involved in contact tracing, working with businesses whether internally or externally to ensure that they are COVID-19 compliant and can continue to trade, making sure public places are as safe as they can be and providing consistent and reliable advice. I propose to make sure that all of the largely unrecognised work, quietly and competently done is showcased, and the actual value of that work is known. EHPs have been front and central but invisible, I plan to raise our visibility because the public and politicians don't value what they don't see.

I know that EHPs are frustrated by the lack of recognition for the work that they do. It's certainly the case that when environmental health is working its invisible. We only become visible when something goes wrong and we are called in to sort out the food poisoning outbreak, the workplace accident , pollution incident or housing issue. When such things happen the role of the EHP and the skills, knowledge and insight that we bring are recognised and valued, but memories are very short and we are forgotten again once the incident is resolved. I want to raise the profile of what we do and highlight the fact that when things are going well and safely its not just good fortune it's usually because EHPs are making sure that is the case. The things that people value buy take for granted, clean air, safe food, clean drinking water and so on are not a given, they are the result of what we do, and we need to start making sure people know, understand and appreciate that. One of the consequences of invisibility is that environmental health as a career is not on people's radar. So many of the EHPs I speak to came to environmental health because they had a relative or friend who was an EHP or by complete accident. Research I did when working showed that students who were told about environmental health as a potential career were very engaged by the idea, but very few had heard about it. As part of raising the profile of EHPs and what we do I'd like to raise the profile for environmental health as a career choice, to encourage the sustainability of the profession in the long term.

Devolution has brought a number of challenges to the UK, with the devolved governments in Scotland, Northern Ireland and Wales legislating for their own countries in respect of public health. I think this allows us to learn from each other – supporting each other where gains are being made and then shamelessly using the gains made in once place to support the same gains being made in the others. Public health is too big and too important to be parochial, and by working separately and together we can achieve more than we can in isolation. I hope that CIEH, REHIS and EHAI can use our influence to support each other to the benefit of all of the citizens of the UK and Ireland.

Three ambitions, which between them should keep me busy! I'm encouraged by the support and encouragement I have had from members prior to taking up the post, I shall certainly be taking up the offers of help and hope that working together I can make some meaningful progress towards the ambitions I have set out.



# MALAYSIAN ASSOCIATION OF ENVIRONMENTAL HEALTH

## THE COVID-19 ACTIVITIES OF ENVIRONMENTAL HEALTH OFFICERS AND ASSISTANT ENVIRONMENTAL HEALTH OFFICERS IN MALAYSIA



Malaysia's preparedness and planning began in December 2019, when they first received information from the Chinese authorities that there were cases of acute respiratory illness.

Aided with previous experience from Middle East Respiratory Syndrome related Coronavirus (MERS-CoV), the 2002-2003 Severe Acute Respiratory Syndrome (SARS) epidemic and experienced contact tracing teams, Malaysia was able to initiate a speedy response and contained the pandemic with very low daily reported cases of 1 to 2 digits only and a low number of death cases of around 100 only since the first reported cases in February through the 1<sup>st</sup> and 2<sup>nd</sup> wave of the COVID-19 pandemic

However, since the middle of September, due to a slack in the observation of the SOPs in certain part of the country during the Sabah State Election, Malaysia is now facing the 3<sup>rd</sup> wave of the pandemic where the number of daily cases had risen to an average of 600 cases per day, forcing the government to enforce the Conditional Movement Control Order in the states of Sabah, Selangor and Kuala Lumpur.

With this sudden increase of cases, the health services capacity is overwhelmed with critical shortage of manpower especially the front-liners like the EHOs and AEHOs. The Malaysian Association of Environmental Health (MAEH) is now calling for volunteers among its members to answer the call of the government to assist in controlling this pandemic.

There are more than 5000 EHOs employed in the Ministry of Health and about



2000 EHOs in the Local Authorities. All these officers are gazetted as Authorised Officers under the Prevention and Control of Infectious Disease Act 1988.

Among the responsibilities and duties of the EHO's during the COVID-19 Pandemic are:

- ❖ Screenings of travellers at the borders (air, land and sea)
- ❖ Investigation of reported cases and identifying new clusters of from index cases
- ❖ Conducting contact tracings of all positive cases.
- ❖ Monitoring of Quarantine centres (EH requirements)
- ❖ Monitoring of persons under surveillance (PUS) or self-quarantined at their homes
- ❖ Supervising mass disinfection in premises and public areas
- ❖ Supervising the burials of all death due to COVID-19
- ❖ Enforcing of the requirements of Lockdowns (Movement Control Order Phases)
- ❖ Food safety monitoring in food premises and quarantine centres
- ❖ Monitoring the compliances of SOPs during the various phases of Movement Control Orders
- ❖ Enforcement of the Prevention and Control of Infectious Disease Act 1988.
- ❖ Conduct prosecution for COVID-19 related offences under the Act



## Responsibilities And Duties of The EHOs During The COVID-19 Pandemic



Monitoring  
compliance  
of  
SOPs at a wet  
market



Inspecting food  
premises for SOP  
compliance





Monitoring person under self-quarantine at home



Inspecting documents for SOP compliances

## Responsibilities and Duties of The EHOs During The COVID-19 Pandemic



Coordinating activities in Outbreak Operation Room



Supervising mass disinfection activities

## Responsibilities And Duties of The EHOs During The COVID-19 Pandemic



Supervising burial  
of COVID-19 victim



Screening incoming  
travellers at the  
border



Inspecting  
compliance of SOPs  
at worksite

For The Wellbeing of Mankind





### In the Front-line against COVID-19; EHOs in Malta

In these unprecedented times, everyone hails front-liners in the fight against COVID-19. Doctors, nurses, and other allied health professionals are the ones mentioned most. However, few mention the variety of roles of the EHOs in this pandemic.

In view that in Malta, Environmental Health Officers and Practitioners that are employed with Government fall under the Superintendent of Public Health and also because our roots are deeply entrenched in the public health system of our country, the involvement of the EH profession during the COVID-19 pandemic was inevitable. Needless to state that our involvement was not easy and the fear of the unknown, brought about some internal disagreement about our role. Let's not forget that this pandemic is unmatched and although EHOs were also involved during swine flu, etc nothing can compare to COVID-19 in our lifetime.

Here in the smallest EU member state, EHOs were in the beginning involved in quarantine checks only. Originally, we only started doing surprise visits in residences to verify that quarantine was being observed. EHOs also started manning an email account created for the purpose for people to report any breach in quarantine. Hundreds of emails were handled and are still being handled. As the pandemic evolved and government issued regulations under the Public Health Act to close down non-essential services and shops, EHOs were again in the forefront to enforce these closure orders. As soon as cases started to drop, and measures being eased, the Superintendence introduced a myriad of protocols for all sectors which changed periodically. Again EHOs were and still are monitoring that mitigation measures were being maintained. In the meantime, whenever cases were reported and contact tracing indicated that positive people visited a shop or a business in the past few days, EHOs enforced the supervision of disinfection of these premises.

The Travel ban was also lifted in Summer and a number of countries were being identified as medium risk (called Amber Countries), which meant that passengers coming from such countries had to present passenger locator forms, health declaration and a PCR test at the Airport. EHOs were engaged for about three months to monitor such passengers and identify which passengers had to be swabbed at the Airport. EHOs also identified passengers coming from countries where the travel ban is still on. As the mitigation measures changed, EHOs roles changed as well. At the moment, apart from the quarantine checks on positive people, contacts and certain travelers, wearing of masks, ban on bars and nightclubs, limiting number of people on groups, are the rule of the day for our EHOs

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Almost the whole EH workforce in Malta has at some point or another or is still working on COVID-19, be it on mitigation measures, quarantine checks, passengers, etc. COVID-19 completely changed our lives and roles. Those few that were not completely involved, need also to be mentioned as they made sure that the other essential EH roles such as public health investigations, food borne or legionella related investigations, food recalls and administrative roles kept ongoing.

Today, the majority of EHOs are proud of their involvement in COVID-19, and MEHOA has been in the forefront to try and promote our profession even in these difficult times. MEHOA wishes to thank IFEH for their support and finally all EHOs for their sterling work. EHOs are the silent heroes.

## Interview with Richard Sprenger, Chairman at Highfield.

### How has Highfield adapted to the COVID-19 pandemic?

Qualify at Home is a service Highfield was testing long before the pandemic, but COVID-19 gave us the impetus to roll the service out worldwide in March 2020. Initially, Qualify at Home was designed to modernise our offering to training providers, streamlining administration, and providing instant learner results. When the pandemic hit, trainers across the globe found that face-to-face courses had to be suspended, leaving their learners in limbo.

By launching Qualify at Home we were able to help our customers adapt to training and assessing learners in a way that eliminates the risk of transmitting the virus and kept their business alive. We've also been able to allow learners direct access to our suite of international qualifications when they don't have the ability to access learning and qualify through an approved training provider.

### Which Highfield qualifications do you have e-learning available for?

Training providers and unaided learners can choose from Highfield's award-winning e-learning courses, either as a standalone short-course or as part of a blended approach for longer courses and qualifications. Course topics include allergens, asbestos awareness, conflict management, customer service, fire safety, first aid, food safety, HACCP, health and safety, infection prevention and control, manual handling, and personal development for employability.

### What is e-assessment?

Highfield Works is Highfield's e-assessment and online assessment tool. It works by allowing all qualification assessments to take place online, at a time and place convenient for training providers and learners. Highfield Works helps training providers manage learner assessments more effectively by using its interactive browser-based dashboard, reducing the need for administration and paperwork, and providing instant learner results.

### How does remote invigilation work?

Learners select an isolated area to take their assessment, where they will not be interrupted, and log on to our digital invigilation platform with their unique credentials. To prove they are complying with regulatory conditions; the learner uses their smartphone and webcam to film around their environment and show they are alone and have no learning aids. They will then be required to place their smartphone in an area that films them through to the completion of their assessment. Our Highfield invigilators evaluate each candidate's performance and look out for the tell-tale signs of cheating. The process has proven we can quickly identify any dishonest actions made by a learner sitting their assessment.

### How successful has Qualify at Home been?

Thanks to Qualify at Home, hundreds of training providers have ensured their learners, even those in isolation, continue learning and qualifying throughout the COVID-19 pandemic. Many see this as the way forward for their business after experiencing the benefits of reduced paperwork, eliminating venue costs and the ability to expand their offering to learners anywhere in the world. To date, over 9000 online exams have been conducted and invigilated by the Highfield team.

Where can our readers find out more? More information can be found on our website [www.highfieldinternational.com/qualify-at-home](http://www.highfieldinternational.com/qualify-at-home) Alternatively, readers can email [customerservices@highfieldinternational.com](mailto:customerservices@highfieldinternational.com) to speak to a member of our team and discuss how the Qualify at Home suite can be tailored to meet their exact requirements.

# TURN HOME WORKING INTO HOME LEARNING AND QUALIFYING

Highfield's digital portfolio can help you keep your business on the front foot during the **COVID-19 crisis**. Offer your learners and clients, even those in isolation, an alternative with this complete 4 steps '**Qualify at Home**' suite.

## The 4 steps '**Qualify at Home**' suite

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## **Professional organisations open to EH members**



John Snow House,  
59 Mansell Street, London  
E1 8AN

<https://www.rsph.org.uk/>



Royal Society of Medicine  
1 Wimpole Street London  
W1G 0AE

<https://www.rsm.ac.uk/>



Institute of Food Science &  
Technology 5 Cambridge Court  
210 Shepherds Bush Road  
London  
W6 7NJ

<https://www.ifst.org/>

Izv.prof.dr.sc.Sanja  
Kalambura, prof.v. .  
Prodekanica za znanost i  
kvalitetu Veleu ili te Velika  
Gorica

Zagreba ka cesta 5, 10410  
Velika Gorica



mail:sanja.kalambura@vvg.hr  
web: www.vvg.hr

### Crisis of Waste management and studying in COVID era

Sanja Kalambura, PhD, professor asoc.

We are aware of the fact that we are a consumer society and that we are struggling to give up the blessings of this world and the 21st century. A once almost unimaginable situation for someone to simply lock you up in your four walls has happened to us. Social networks are full of tips on how to overcome this crisis in the context of how to spend time with family members, children, and yourself. What to cook and how to exercise. It seems simply unreal.

In the background of everything in one sector of our economy, the eternal question of what and how to deal with what we do with waste is on the margins again. The current COVID-19 pandemic thus raises questions and challenges regarding municipal waste management procedures, with particular emphasis on safety and health measures for utility company employees as well as citizens. The fact is that this pandemic will slow down a lot of activity in the waste management sector as well, but in the future we should focus on making the system we are building flexible for extreme situations like this. The question remains how ready we are for such and similar situations. Analyzing the waste management system in Croatia and our infrastructure, which in some parts of our country is quite modest, the question arises whether we can learn something from this situation. Do we have the capacity, desire and will of the public to finally understand what kind of crisis response system we have, especially with regard to the safe disposal, recycling and recovery of th waste?

Certainly, this situation will open many questions in the waste management sector. But above all, it is necessary to maintain a scientific approach in this obvious transition period, apply sanitary measures, centralize the system and consider how and in what way to build a more resistant system to new viruses and invocations in the future, not forgetting the circular economy. In terms of education and development of study programs, internationalization and training of online learning, we are aware of the fact that this is a new turn in thinking, implementation and the entire educational process. Perhaps this situation forces us to move in the direction of developing PBL methods in education and to improve existing study programs by solving problem tasks.

## University of Applied Sciences Velika Gorica (UASVG)

UASVG started to operate in 2003 with five professional three-year study programmes: Humanitarian demining, Pyrotechnology, Computer Systems Maintenance, Motor Vehicle Maintenance and Aircraft Maintenance. It was the first private university of applied sciences from the field of technical sciences in the Republic of Croatia. The founder of the UASVG is the City of Velika Gorica. The basic function of the studies is to implement the teaching activities of the approved programme and to encourage the development of all scientific-professional teaching disciplines that are represented or ought to be represented on the study, based on the science and the profession, and with the intent to approach the level of standards worldwide.

### Study at UASVG

University of Applied Sciences Velika Gorica offers study programmes that are interesting to the young people from Europe, as well as from other parts of the world. From the very beginning the University of Applied Sciences has been developing mentorship approach based on the understanding and better relations between students and professors.

### What are the advantages you have as a student at UASVG

High-quality acquisition of knowledge and skills in modern equipped premises, practical classes organised in cooperation with the industry, and a number of other possibilities for successful study are some of the advantages of the University of Applied Sciences Velika Gorica. The UASVG programmes have been adjusted to actual labour market needs.

### Undergraduate professional study programme:

Management in Crisis Situations is a study programme intended for decision makers and/or people who provide professional support to decision makers in legal entities and units of local and regional administration, state administration units, and especially the protection and rescue system in the police and the army. Disasters, as specific crisis states, occur when accidents or crises caused by forces of nature (floods, fires, earthquakes) or human activity (environmental impacts, terrorism etc.) affect people to such an extent that the affected population cannot control the course of events and successfully deal with the inflicted blows, losses and damage. The frequency and severity of disasters can be greatly reduced, or the effects mitigated if more attention is paid to the forecasts, observations, planning the provision of aid and general preparedness for adequate crisis or disaster response in case it occurs. The competences of graduated experts from this study programme include planning and implementation of preventive measures to prevent and mitigate the effects of crises or disasters in business enterprises or human environment in general, as well as the provision of professional assistance and coordination of professional teams and equipment after a crisis or a disaster.

It is the only such study programme in Croatia and in the entire South-eastern Europe, which qualifies future experts for the needs of the crisis management system and the system of protection and rescue. By graduating, the students acquire knowledge and skills for independent solving of crisis management problems for preventive action, managing the process of collecting and processing information, proposing procedures and solutions, and performing the management process.

Professional title upon graduation: professional baccalaureus/baccalaurea engineer of Management in Crisis Situations

Abbreviation: bacc. ing. admin. chris.

ECTS credits: 180

Specialist diploma professional study programme:

Crisis management is a study programme intended primarily for persons who are involved in protection and security aspects of crises in the activities of legal persons, industry, local and regional administration bodies, and government administration bodies. Upon graduation the students acquire specialist knowledge and competences for independent solving of problems in crisis management, managing processes and management systems of security and protection in public and private sector, especially in industry at the national and international level, as well as harmonizing the activities with the system of managing the functional activity of the organisation.

Professional title upon graduation: professional specialist engineer of Crisis management

Abbreviation: exp. spec ing. admin. chris.

ECTS credits: 120

Contact

University of Applied Sciences Velika Gorica  
Zagreba ka 5  
10410 Velika Gorica, Croatia

Phone: 01/62 22 501

e-mail: [info@vvg.hr](mailto:info@vvg.hr)

Web site:<http://www.vvg.hr>

Facebook <https://www.facebook.com/veleucilistevg>

Youtube video

[http://www.vvg.hr/index.php?option=com\\_content&view=article&id=1275&lang=hr](http://www.vvg.hr/index.php?option=com_content&view=article&id=1275&lang=hr)

Google map

[http://www.vvg.hr/index.php?option=com\\_contact&view=contact&id=1&Itemid=543&lang=hr](http://www.vvg.hr/index.php?option=com_contact&view=contact&id=1&Itemid=543&lang=hr)



## Ulster University Students' Covid Response 2020

Environmental Health have a vital role to play in disease pandemics making it more important than ever that training and development of future Environmental Health Practitioners (EHP's) continues, strengthening the workforce for the future.

Ulster University (UU) is one of the 7 CIEH accredited undergraduate Environmental Health degrees in the UK. In March 2020 faced with a worsening situation of covid-19, Ulster University made a decision to suspend face to face lectures with material to be made available online over the remainder of the semester. This decision was made in advance of a national lockdown and giving students and lecturers just 2 days notice and over the St Patrick's day holiday.

With lecturers having only minimal experience of delivering online teaching and students with little experience with an online learning experience, both students and lecturers embraced the challenge. Class meetings were held first to reassure students and answer queries. Teaching then continued based on the usual timetable but delivered live online which gave structure and stability. Assessments also continued albeit with a few changes to adapt to the remote situation and address any technology and connectivity issues.

The Environmental Health lecturers were impressed by student's adaptability and their dedication to their studies. Submitted work was of a high standard and importantly for the final years, they were able to complete their degree with no further delay. Whilst they haven't yet had a formal graduation ceremony, the lecturers did manage to organise a 'leaver's party' online.

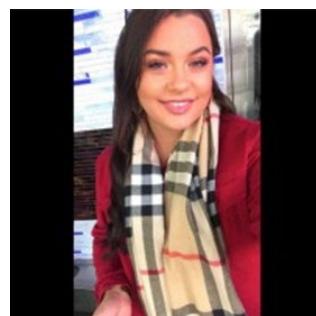
Final years were naturally concerned about the job market and the impact of Covid just as they were finishing their degree and starting their professional careers, but it can now be happily reported that many have successfully gained professional employment such as Emma Welsh

"I was completing my final year when the covid-19 emergency meant we went into lockdown. Final year is stressful normally but the quick switch to online and not seeing friends was unnerving. However, the supportive teaching team meant we were able to complete the year. I also continued as an essential Care Worker during this time. I am proud to graduate with a first-class honours degree in Environmental Health and have secured an Environmental Health Officer post at Belfast City Council."



Ulster University also has a close relationship with local councils and industry and placement forms an important and integral part of the course. During the Covid-19 pandemic many of our Environmental Health students were already using their knowledge and skills to make a difference as Maura Robinson and Emmet Deery (now in their final year) can explain

Maura Robinson: "I was completing my placement year in McCloskey International in 2019/20 focusing on HSE (health, safety and environment). McCloskey International are a world leading industrial company producing high performance mobile crushing and screening plants. During the COVID-19 crisis I played a key role in identifying appropriate measures in the production facilities and putting them in place to ensure the safety of the workforce and prevent any possible transmission of Covid-19." Maura continues to work part time at McCloskey Engineering during her final year and has secured employment with them on graduation



Emmet Deery "I was also on placement year in 2019/20 in a key food production facility. Ensuring safe food supplies is essential in any pandemic or emergency. I was in a team that continued to ensure the safe production of food in a very challenging environment as well as ensuring safeguards and social distancing measures were in place."

Emmet has also secured a place on a graduate programme on completion of the course



There are so many other stories from UU students that have been or are currently on placement from carrying out covid risk assessments, implementing covid safeguards in workplaces, carrying out covid compliance checks, dealing with covid notifications within workplaces, etc.

Some of the final year students have also stepped up to the mark and registered for the Environmental Health Together register, a national register aimed to enable local

authorities (LAs) to be able to access the help they desperately require to combat the coronavirus pandemic.

Ulster University has continued with online teaching and learning for the 2020/21 academic year. While it has been weird and there have been a few hiccups along the way, Ulster continues to teach environmental health. Once again, the lecturers have been impressed by the student's dedication to the course and their learning and the standard of coursework submission. However, it is agreed that lecturers and students are both looking forward to face to face teaching again, to being on campus and to getting a real university experience. Most importantly the lecturers can't wait to meet the year 1's that started the course online in September 2020 and the year 1's can't wait to meet each other.

While technology continues to get many organisations through this pandemic and some of this will remain as a tool for use, there is a recognition that we miss each other, and it is both easier to learn and teach when we are in the same room.

The Environmental Health Team at Ulster University are always proud of their students and their achievements. This year they all really showed the skills and abilities as Environmental Health Practitioners during the crisis.

For more information on the Environmental Health course:

<https://www.ulster.ac.uk/courses/202021/environmental-health-19168>

contact [l.shaw@ulster.ac.uk](mailto:l.shaw@ulster.ac.uk)





## ULSTER UNIVERSITY

### BSc (Hons) Environmental Health (with Diploma in Professional Practice)

Environmental health professionals are at the forefront of designing and improving the public's health and wellbeing.

1. Have you ever wondered what happens behind the scenes of restaurants, shops, businesses and government?
2. Would you like a knowledge of issues such as food safety, health and safety, housing, public health or pollution?
3. Do you want a degree that leads to a career where you are out of the office meeting people and dealing with different challenges each day?
4. A degree that has very good employment prospects, locally and internationally, in well paid graduate jobs?
5. Would you like to study on a course that provides this, plus lots more?

Then come and study Environmental Health at Ulster.

Our graduates are equipped to find employment in a wide range of environmental health activities across public, private and voluntary sector organisations. Environmental Health Practitioners (EHPs) can take their skills into a huge variety of roles. It is a career where you are dealing with different challenges every day.

This BSc (Hons) Environmental Health programme has great strength in delivering the practical and academic skills required for a career in environmental health including problem solving, communication, research and management skills. It also aims to facilitate the development of your own personal, communication and intellectual abilities.

The course includes the core subjects of food safety management, health and safety at work, environmental protection, housing and public health. The areas of sustainability, quality of life, health inequalities, law and spatial planning are also integrated throughout the programme.

The BSc Environmental Health course is accredited by both the CIEH and IOSH. The course scores consistently high for student satisfaction ( 93% student satisfaction ) with 95% of graduate in work or further study 15 months after graduation. To find out more visit [www.ulster.ac.uk](http://www.ulster.ac.uk) or contact Lindsay Shaw, Course Director, at email [l.shaw@ulster.ac.uk](mailto:l.shaw@ulster.ac.uk)

### **MSc – Global Strategy in Environmental Health and Sustainability (Distance Learning)**

This new programme focuses on the global role of environmental health in protecting communities and delivering a healthy, sustainable future. A perfect choice if you are passionate about the future health and well-being of our planet and its inhabitants.

Delivered entirely by distance learning, as part-time or full-time options, it will enable you to study at a time and pace of your own choosing, engage with, and learn from, a diverse pool of peers. The core principles of environmental health are embedded throughout the programme, aligned to the CIEH Professional Standards Framework, and directly linked to the attainment of UN Sustainability Goals. It will equip you with the critical thinking and problem-solving skills necessary to make a real impact in this field. Throughout each element we link the cross-cutting themes of strategy, policy and intervention.

You will be equally at home in a strategic or operational role, in a local or global setting. Through an engaging on-line environment, you will cover topics including food safety and security, environmental protection, sustainable technologies, emergency planning, resilience, housing and communities, international and human rights law. Your research module will focus on the production of a journal article.

This MSc will be attractive for personal and professional development reasons. It will be equally attractive as a route to a rewarding career.

To find out more please visit [www.ulster.ac.uk](http://www.ulster.ac.uk) or contact Mr Robert Cameron, Course Director, at email [rj.cameron@ulster.ac.uk](mailto:rj.cameron@ulster.ac.uk)



Flinders  
UNIVERSITY

START DATES: MARCH 2021 | JULY 2021

# LEAD YOUR CAREER

## STUDY MASTER OF ENVIRONMENTAL HEALTH

**STUDY CAN BE 100% ON-LINE, 100% FACE-TO-FACE, OR A COMBINATION.**

The Master of Environmental Health (MEH) at Flinders University aims to provide you with the professional qualifications to enter or enhance your career opportunities in the area of environmental health. This course provides you with advanced knowledge in the theory and application of environmental health and environmental health risk assessment.

The Master of Environmental Health is a 2-year course, available full-time or part-time. It caters for national and international students through the teaching of globally-relevant concepts and offers the opportunity to undertake risk assessment and applied research in an environmental health area within Flinders University or your existing workplace.

This course is fully accredited by Environmental Health Australia (EHA). Thus, graduates have the potential to gain employment anywhere in Australia or in overseas countries that recognise EHA approved qualifications.

**NO. 1 IN  
SOUTH AUSTRALIA**

**in Health Services & Support for full-time  
employment (postgraduate).\***

\* The Good Universities Guide 2020, public SA-founded universities only.

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COURSES/POSTGRADUATE-ENVIRONMENTAL-HEALTH](http://FLINDERS.EDU.AU/STUDY/COURSES/POSTGRADUATE-ENVIRONMENTAL-HEALTH)**



# CREATE SAFER AND HEALTHIER COMMUNITIES

Looking for a thought-provoking and dynamic work environment to help create safer and healthier communities?

Western Sydney University students are leaders in the field of Environmental Health.

With flexible online learning, and practical real world experience our students are equipped with the skills and knowledge needed to investigate Environmental Health issues such as water contamination, food safety, air quality, infectious disease, disaster and emergency management, project planning and scientific research.

Help make a positive contribution to the health of communities, give us a call on **1300 897 669** or visit [westernsydney.edu.au/future/study/courses/  
undergraduate/bachelor-of-science.html](http://westernsydney.edu.au/future/study/courses/undergraduate/bachelor-of-science.html)





Cardiff Metropolitan University has been delivering environmental health and public health qualifications for over 40 years. University employability statistics show that within six months of completing one of our undergraduate programmes 85% of our graduates have entered professionally relevant employment in both private and public sector roles.

We host the following programmes:

**BSc (Hons) Environmental Health** – with unique triple accreditation by the CIEH, Institution of Occupational Health, Safety and Wellbeing (IOSH) and Institute of Environmental Management and Assessment;

**MSc Applied Public Health** – developed in line with the Public Health Skills and Careers Framework for new entrants into the profession or those wishing to develop their careers;

**MSc Occupational Health, Safety and Wellbeing** – accredited by IOSH and available as a distance learning qualification whilst you are working full time;

**MPhil/PhD/Professional Doctorate degrees** – with three experienced supervisors focusing entirely on these areas.

**To find out more visit [www.cardiff met.ac.uk](http://www.cardiff met.ac.uk) or contact our enquiries team on (+44) 02920 416044, [courses@cardiff met.ac.uk](mailto:courses@cardiff met.ac.uk)**

**Faculty of Health Sciences,  
University of Ljubljana**

Univerza v Ljubljani  
Zdravstvena fakulteta



doc. dr. **Andrej Ovca**, dipl. san. inž.

*Oddelek za sanitarno inženirstvo / Department of  
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Slovenian association of public and environmental health professionals has reviewed activities through which their members fulfil their mission in the field of pandemic prevention at various professional fields and in different institutions of their employment. Our colleagues from the field selflessly shared their experiences during the COVID-19 epidemic (which is currently in middle of second wave) in Slovenia. Through their responses four major areas of their engagement were identified.

First group (employed at National institute of Public Health) is in charge or is collaborating as a member of interdisciplinary groups which plan and recommend general and specific hygienic and technical measures for epidemic management on a national level.

Second group (Employed in hospitals, nursing homes, kindergartens, food companies, companies providing service in the field of health and safety at work, drinking water supply and waste management public companies) implement these measures in individual facilities and working processes.

Third group executes various tests and measurements for their clients.

Fourth group inspects compliance with measures or recommendations as a part of official control at municipal and national level.

According to the collected responses, effectiveness of Slovenian public and environmental health professionals is reflected in the extraordinary ability to cooperate with others, either within the profession either in working groups with members of other professions.

Those of us employed at the faculty (besides transferring the pedagogical process to the virtual environment) provided professional support to all colleagues from practice who turned to us. Since the declaration of the epidemic in Slovenia, we carefully monitor the development of events at home and abroad, so that we will be able to prepare our next generations of sanitary engineers for this kind of challenges.

Our Faculty (Faculty of Health Sciences, University of Ljubljana) gives each year awards for the best final research work of students at each of the research fields. In the field of sanitary engineering programme master's thesis entitled "Fast fashion – health and social aspects on consumption habits and attitudes toward second hand clothing among adolescents" was awarded. (see photos





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[www.pubhealth.ku.dk](http://www.pubhealth.ku.dk)

"Experience from recent major disasters, changes in the humanitarian field, the changing nature of conflict, and climate change impact all have made it clear that a holistic approach to disasters and crisis management is needed to substantially reduce losses and deal with new challenges the current system seems ill equipped to respond to. A coherent and holistic approach to disaster risk management is not without challenges. Decisions have to be based on a politically, economically, socially, culturally, and environmentally sustainable foundation and rooted in sound development policies. Risk reduction needs to underpin and guide decisions in Preparedness, Response and Recovery planning and programmes. Professionals with an adequate knowledge base and the right skills are invaluable if these challenges are to be met.

In response to this demand, the University of Copenhagen is offering a one year master programme, based on the above philosophy – a Master of Disaster Management.

To apply, please visit [www.mdma.ku.dk](http://www.mdma.ku.dk). You can contact us on e-mail [mdma@sund.ku.dk](mailto:mdma@sund.ku.dk)

UNIVERSITY OF COPENHAGEN  
FACULTY OF HEALTH AND MEDICAL SCIENCES

# MASTER OF DISASTER MANAGEMENT

A shared professional approach to humanitarian action and disaster risk management



**BECOME A HUMANITARIAN AID PROFESSIONAL**

Experience gained from recent major disasters, changes in the humanitarian field, the changing nature of conflict, and climate change impact have all made it clear that a holistic approach to disasters and crisis management is needed to substantially reduce losses and deal with new challenges to which the current system seems ill-equipped to respond.

The Master of Disaster Management (MDMa) is a research-based, cross-disciplinary postgraduate programme in the field of disaster risk management with the aim of fostering professionals who can formulate effective responses to complex practice and policy issues and thereby substantially reduce disaster losses.

The programme covers the three main processes of disaster risk management – reduction, response and recovery, and emphasizes that disaster risk reduction needs to underpin and guide decisions in preparedness, response and recovery planning.

The holistic approach of the Master of Disaster Management programme provides a solid basis for professional aid workers. The programme consists of lectures, team case assignments, field trips and individual assignments that combine practice-based competencies with the latest research and knowledge of disaster risk management.

The combination of science and hands-on learning allows a comprehensive understanding of disaster risk management processes. This enables a more strategic and tactical approach to be taken to ensure the best possible solutions for obtaining appropriate disaster response, recovery and risk reduction.

**LEARNING OUTCOMES**

**The programme will provide you with a mix of practice-based competencies, in-depth scientific knowledge and effective negotiation skills.**

As a graduate of this programme, you will be able to:

- understand the complexities of health, socio-economic, political, physical and environmental vulnerability in disasters
- identify scientific challenges, analyse and assess risk capacities and vulnerabilities and design appropriate evidence-based interventions
- communicate effectively with affected populations and other stakeholders in disaster management planning and operations
- develop and maintain interdisciplinary and cross-cultural collaboration in complex and unpredictable situations.



*"I strongly welcome this effort of professionalising – in all meanings of the term – the work of managing and delivering humanitarian aid and disaster relief."*

- Poul Nielson, Former European Commissioner of Humanitarian Aid and Development.

#### FOUNDED IN GLOBAL PROCESSES

The Master of Disaster Management is a research-based postgraduate programme, designed in accordance with the Hyogo Framework for Action (2005–2015), the Sendai Framework (2015–2030) and the Sustainable Development Goals (2016–2030).

#### PARTICIPANTS

This programme is relevant for those from a wide variety of disciplinary backgrounds – risk managers, engineers, doctors, nurses, military officers, social scientists, logisticians and journalists, to mention but a few. Enrolment requires a Bachelor degree and at least two years of work experience within the humanitarian field.

#### STUDY FULL-TIME OR PART-TIME

The Master's programme can be completed as 1 year's full-time study or up to 3 years on a flexible study (part-time) arrangement. You can sign up for the full programme or individual courses.

#### CONTACT

For further information and enrolment, visit **mdma.ku.dk** or write to **mdma@sund.ku.dk**



UNIVERSITY OF COPENHAGEN  
FACULTY OF HEALTH AND MEDICAL SCIENCES

# HEALTH IN EMERGENCIES AND REFUGEE HEALTH

Course for humanitarian professionals



## HEALTH IN EMERGENCIES AND REFUGEE HEALTH

<b>Course duration</b>	9 weeks of blended learning in spring semester
<b>Credit</b>	5 ECTS (European credits) at Master's level
<b>Language</b>	English
<b>Participants</b>	Professional postgraduates holding a Bachelor degree, at least two years of work experience and English proficiency

### COURSE CONTENT

This course offers an overview of issues involved in providing health interventions in emergency settings; the epidemiology of excess mortality and morbidity; the agreed guidelines and the role definitions among local, national and international actors. Both conventional wisdom and divergent views will be presented.

### LEARNING OUTCOMES

After completing this course, you will be able to design and develop appropriate public health management strategies for humanitarian response including planning, coordination,

monitoring and evaluation. Check the full set of intended learning outcomes online.

### TIME AND PLACE

The course consists of 7 weeks of part-time online learning followed by 2 weeks of full-time, face-to-face studies at University of Copenhagen, Denmark.

### INFORMATION AND REGISTRATION

Read about exact course dates, deadlines and the application procedure on the course website:  
[mdma.ku.dk/health](http://mdma.ku.dk/health)  
 Contact: [mdma@sund.ku.dk](mailto:mdma@sund.ku.dk)

## MASTER OF DISASTER MANAGEMENT

Become a professional disaster risk management specialist. The Master of Disaster Management provides you with solid interdisciplinary knowledge and skills that meet the needs of modern emergency management and disaster response. Health in Emergencies and Refugee Health is an elective course in the Master's programme.



UNIVERSITY OF COPENHAGEN  
FACULTY OF HEALTH AND MEDICAL SCIENCES



# SHELTER AND SETTLEMENTS IN DISASTERS

Course for humanitarian professionals

**SHELTER AND SETTLEMENTS IN DISASTERS**

**Course duration** 8 weeks of blended learning in spring semester

**Credit** 5 ECTS (European credits) at Master's level

**Language** English

**Participants** Professional postgraduates holding a Bachelor degree, at least two years of work experience and English proficiency

**COURSE CONTENT**

Current humanitarian shelter and settlements standards, principles and approaches are the basis of this course. The common phases of the emergency cycle are embraced: emergency shelter, transition shelter, early recovery and reconstruction. The course covers different shelter and settlements challenges in accordance with local needs and builds on local resources as part of building-back-better strategies.

The course content is designed to equip you to effectively respond to humanitarian shelter and settlements crises. The focus is on linking emergency shelter and shelter in recovery in both natural disasters

and conflicts. The course teaches common humanitarian assistance methods, guidelines and standards based on a rights-based approach as led by the international humanitarian organisations.

**LEARNING OUTCOMES**

After completing this course, you will have acquired knowledge, tools and analytical skills to address shelter in disasters from relief to recovery. This will enable you to plan and coordinate shelter needs assessments; and develop strategies and implement plans together with shelter mandated international and national organisations in both natural disasters and conflicts. Check the full set of intended learning outcomes online.

**MASTER OF DISASTER MANAGEMENT**

Become a professional disaster risk management specialist. The Master of Disaster Management provides you with solid interdisciplinary knowledge and skills that meet the needs of modern emergency management and disaster response. Shelter and Settlements in Disasters is an elective course in the Master's programme.

**TIME AND PLACE**

The course consists of 4 weeks of part-time online learning followed by 2 weeks of full-time studies at University of Copenhagen, Denmark and 2 weeks of part-time online work to finish a written assignment.

**INFORMATION AND REGISTRATION**

Read about exact course dates, deadlines and the application procedure on the course website: [mdma.ku.dk/shelter](http://mdma.ku.dk/shelter)  
Contact: [mdma@sund.ku.dk](mailto:mdma@sund.ku.dk)



UNIVERSITY OF COPENHAGEN  
FACULTY OF HEALTH AND MEDICAL SCIENCES

# VULNERABILITY AND RISK ASSESSMENT METHODS

Course for humanitarian professionals



## VULNERABILITY AND RISK ASSESSMENT METHODS

**Course duration** 4 weeks in spring semester

**Credit** 5 ECTS (European credits) at Master's level

**Language** English

**Participants** Professional postgraduates holding a Bachelor degree, at least two years of work experience and English proficiency

\*Flights, travel insurance, accommodation, subsistence and vaccinations.

### COURSE CONTENT

This course focuses on the entire vulnerability and risk assessment process, from using different methods to analyse risk to evaluating their results. The concept of vulnerability is vital in this context, as it allows us to understand why some individuals or systems are more at risk than others, thus widening our scope of possibilities for risk reduction. IFRC's Vulnerability and Capacity Assessment (VCA) tool is applied for a case study during the field trip. The course provides a solid basis for disaster risk reduction planning.

### LEARNING OUTCOMES

After completing this course, you will be able to perform vulnerability and capacity assessments of both chronic vulnerabilities and those related to extreme events and hazards. The course will enhance your skills in disaster risk reduction planning along with decision analysis and planning for uncertainty. Check the full set of intended learning outcomes online.

### TIME AND PLACE

The course consists of 3 weeks of face-to-face studies including a field trip in a South-Asian country (India, Nepal or Sri Lanka) followed by 1 week for a written assignment (online). The initial 3 weeks of studies

### MASTER OF DISASTER

#### MANAGEMENT

Become a professional disaster risk management specialist. The Master of Disaster Management provides you with solid interdisciplinary knowledge and skills that meet the needs of modern emergency management and disaster response.

Vulnerability and Risk Assessment Methods is an elective course in the Master's programme.

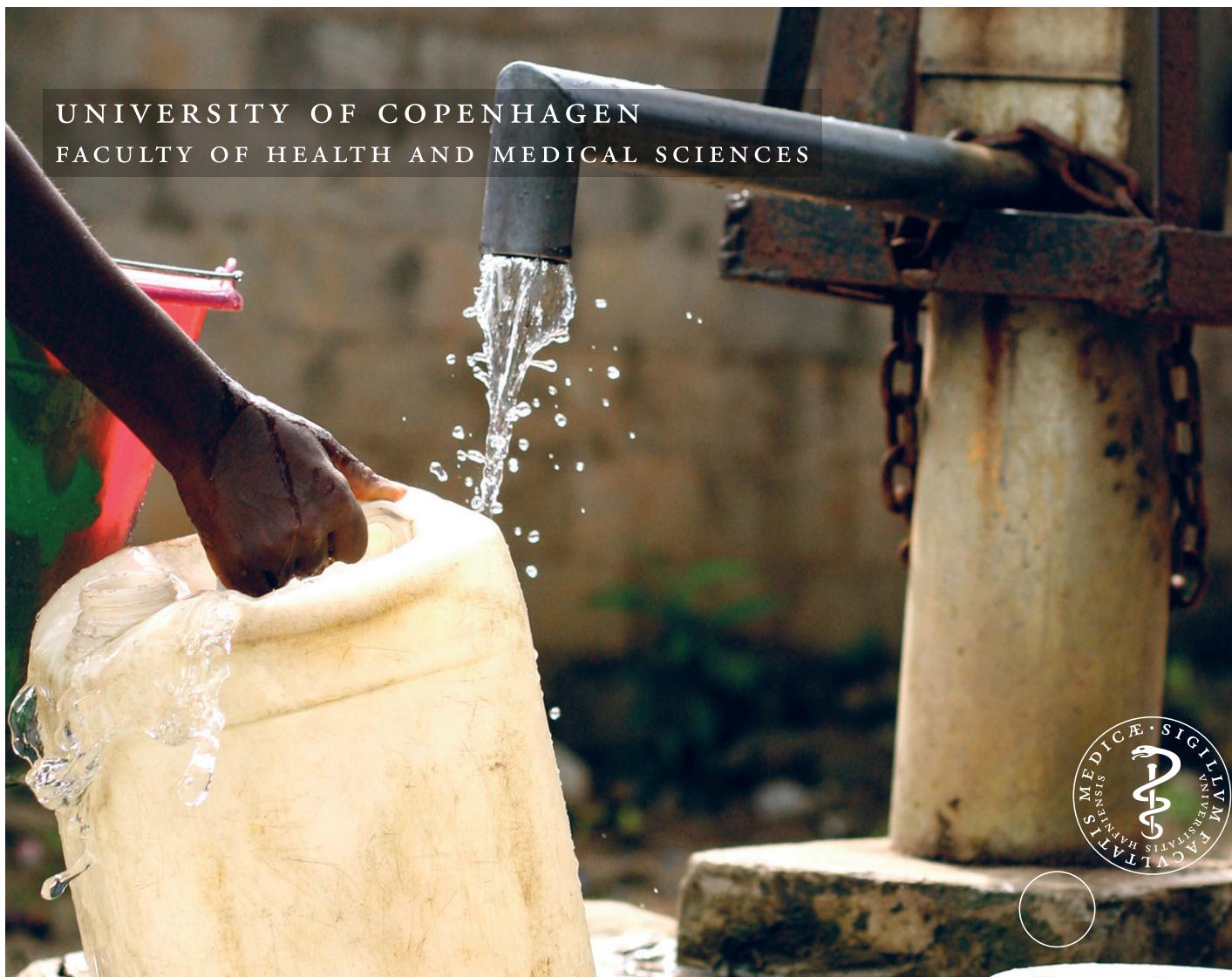
include 1 week of training and lectures followed by 1 week of fieldwork and a final week of visits to different organisations working in the field of disaster risk reduction.

### INFORMATION AND REGISTRATION

Read about exact course dates, deadlines and the application procedure on the course website: [mdma.ku.dk/vulnerability](http://mdma.ku.dk/vulnerability)  
Contact: [mdma@sund.ku.dk](mailto:mdma@sund.ku.dk)



UNIVERSITY OF COPENHAGEN  
FACULTY OF HEALTH AND MEDICAL SCIENCES



# WATER SUPPLY AND SANITATION IN EMERGENCIES

Course for humanitarian professionals

## WATER SUPPLY AND SANITATION IN EMERGENCIES

<b>Course duration</b>	5 weeks of blended learning (4 weeks online and 9 consecutive days on campus) in spring semester
<b>Credit</b>	5 ECTS (European credits) at Master's level
<b>Language</b>	English
<b>Participants</b>	Professional postgraduates holding a Bachelor degree, at least two years of work experience and English proficiency

### COURSE CONTENT

This course will provide you with state-of-the-art theoretical and practical knowledge of water and sanitation issues in emergencies, enabling you to work in the WASH sector. It will focus on fundamental information needed about the disaster, combining this with latest disease transmission knowledge, enabling you to identify socio-cultural, geographical and technical appropriate sustainable solutions for water and sanitation interventions.

All theory is combined with practical exercises to get you familiar with field equipment, such as chemical water quality analysis, water tank construction, water pumping,

different water treatments and latrine construction.

### LEARNING OUTCOMES

After completing this course, you will be able to approach and prioritise water supply and sanitation in emergencies with foresight, and make appropriate decisions to prevent disease outbreak. Check the full set of intended learning outcomes online.

### TIME AND PLACE

The course consists of 4 weeks of online learning followed by 9 consecutive days of full-time, face-to-face studies at University of Copenhagen, Denmark.

## MASTER OF DISASTER MANAGEMENT

Become a professional disaster risk management specialist. The Master of Disaster Management provides you with solid interdisciplinary knowledge and skills that meet the needs of modern emergency management and disaster response. Water Supply and Sanitation in Emergencies is an elective course in the Master's programme.

### INFORMATION AND REGISTRATION

Read about exact course dates, deadlines and the application procedure on the course website: [mdma.ku.dk/wash](http://mdma.ku.dk/wash)

Contact: [mdma@sund.ku.dk](mailto:mdma@sund.ku.dk)





National Executive Officer PO  
Box 2222  
Fortitude Valley BC QLD 4006

E: [national@eh.org.au](mailto:national@eh.org.au)

### **Seasonal message from the EHA President (reproduced from EHA National Newsletter)**

After a very difficult nine months the borders around Australia have started coming down with most community spread of COVID19 brought under control. Australia has had a number of false starts in this regard and the recent outbreak in South Australia highlights how vulnerable we all still are. Australia has demonstrated that the virus can be contained, and its potential consequences minimised if the insights of medical, scientific, public, and environmental health professionals are at the forefront of decision making. The achievement in Victoria by all involved has been extraordinary, given the extent of community transmission only a few of months ago.

As I write this, the first vaccine to be registered in a western country has today been approved in the United Kingdom. One can only hope that this and other vaccines bring some control of COVID19 within the United Kingdom and particularly the United States, in coming weeks and months, as the public health management of COVID19, in the latter, has been disastrous. Hopefully, there will also be some release of vaccines in Australia shortly and I encourage everyone to explore the facts around the vaccines and promote their use as we hopefully move toward herd immunity in the new year.

As we move into the festive season, I hope that all environmental health professionals around the country, and our members especially, have the opportunity to get back to some traditional roles and broadcasting more positive messaging to the wider community. As our involvement with Food Safety Week last month highlights, our work with food safety is never finished and, especially with warmer weather and the festive season, the public needs constant reminders to prevent food poisoning outbreaks.

On the conference front, we have set dates for the National Conference in the Blue Mountains in New South Wales, 18th-21st October 2021. Abstracts can be submitted online until 28th May 2021 and I encourage all Members to consider submitting a paper, if you have an interesting project or programme that you have been, or are, involved in.

I wish everyone a safe and happy festive season, hopefully spent with friends and family after a very challenging year. Please stay safe and we'd love to hear from you if you have stories or anecdotes from the current crisis or any other environmental health activities in your country. If you can contribute, please contact the EHA National Communication Officer, Samantha Smith E: [samantha.smith@eh.org.au](mailto:samantha.smith@eh.org.au)

Philip Swain LFEHA  
National President



Congratulations to Dr Byleved who received the Environmental Health Australia's National, and most prestigious award, the Margaret Hind Memorial Award for 2020. As National President, I sincerely regret my inability to present this award, with the ceremony it deserves, at this year's National Conference in New South Wales, which has been postponed due to the COVID-19 pandemic.

The Margaret Hind Memorial Award is granted annually for outstanding commitment to the Environmental Health Industry with integrity, work ethic and achievement. Margaret Hind passed away in January 2015 during her employment with Environmental Health Australia as Executive Officer of the New South Wales, Queensland and Tasmanian Associations. Margaret had an incredible impact on the industry during her 10 years service to Environmental Health Australia.

I am indebted to former New South Wales State President and former National Director, Jody Houston and Chief Medical Officer, Dr Kerry Chant who have conjointly presented this award in my absence. I would like to acknowledge Dr Byleveld's commitment to environmental health over a long and distinguished career including, but not limited to;

1. Most recently, exemplary leadership during the COVID-19 pandemic, including being a dependable professional inside the New South Wales pandemic response team. As a Public Health Emergency Operations Centre COVID-19 surge team leader, Dr Byleveld has been integral in supporting the Chief Health Officer and communicating and sharing information. This work has included complex daily reporting, analysing technical data and sharing information with the Public Health Units. He has worked on mass gathering planning, including exemptions, and again supporting the Public Health Units.

2. Pre-pandemic, Dr Byleveld lead a highly specialised team looking after the safety of drinking water in the state of New South Wales, as an authority on water and environmental health risk management and;

3. Served in multiple international humanitarian responses from refugee crises in Lebanon and Bangladesh to the floods in Pakistan and typhoons in the Philippines. In response to the Syrian crisis, Dr Byleveld was deployed for 6-months in Lebanon which resulted in improved water, sanitation and hygiene for 350,000 refugees.

As an exemplar for the profession, Dr Byleveld has used his unique combination of strategic thinking and skilled communication, with a humble, helpful and courteous demeanour, even under extreme pressure.

It gives me great pleasure to acknowledge Dr Paul Byleveld, as the 2020 recipient of the Margaret Hind Memorial Award.

Yours in Environmental Health,

Philip Swain LFEHA National  
President Environmental  
Health Australia



## **SHOALHAVEN COUNCIL'S ENVIRONMENTAL HEALTH TEAM SECURES EXCELLENCE AWARD FROM EHA(NSW) - AUSTRALIA**



Shoalhaven City Council's Environmental Health Team has been named Environmental Health Team of the year at the Environmental Health Australia (NSW) Inc. Excellence Awards for their outstanding contribution to ensuring a healthy, safe and attractive natural, built and social environment in the Shoalhaven.

Shoalhaven Mayor Amanda Findley is delighted with the announcement of the award and notes this is outstanding and a very much deserved recognition of the extraordinary work the Environmental Health team have done in response to the challenges the Shoalhaven has experienced this year.

The team are responsible for a broad range of activities to make sure the air we breathe, the water we swim in and our natural environment stays healthy.

I applaud all that the team have done to keep our community safe following the bushfires, floods, wind damage and during COVID. These natural disasters and the pandemic have impacted all of us. This team has been at the frontline day and night throughout all off these events.

During last summer's bushfires Council's Environmental Health Officers (EHOs) helped with key emergency management tasks like water quality assessments around sewer pump stations as well as getting generators through road blocks to help food businesses to manage power outages and prevent food spoilage.

Following the fires, Council's EHOs were first responders' - attending people's properties to check on their health and safety alongside Rural Fire Service (RFS) and Police officers.

As integral members of the Hybrid Building Impact Assessment Teams (BIA), EHOs helped complete over 5,000 building impact assessments in about six weeks. This was the first time Council EHOs had worked alongside RFS and Police officers as members of a hybrid BIA team. This approach was so successful in the Shoalhaven it was adopted by Eurobodalla and Bega Council areas.

EHOs were also involved in activities like preventing sediment and ash movement into waterways, aerial food drops and installing wildlife feed stations and night cameras as well as monitoring air, land and water quality. The Environment Recovery Action Team were also involved in sourcing funding for bushfire affected waterways, fire trail maintenance and asset protection works as well as processing waste from 295 homes with an impressive 93% recycle rate.

During the floods in February the team assisted with flood preparedness and water quality monitoring and after the floods evaluated caravan parks' Flood Emergency Management Plans.

In April 2020 once food businesses could re-open, Shoalhaven City Council EHO's were again at the forefront providing advice and education to food businesses.

The team has also created the Shoalhaven Builders Guide to provide effective and realistic advice on good building site practices to minimise impacts on waterways and the wider environment.

## Articles/ publications etc that may be of interest to IFEH members

### Investigation into preparations for potential COVID-19 vaccines

<https://www.nao.org.uk/wp-content/uploads/2020/12/Investigation-into-preparations-for-potential-COVID-19-vaccines.pdf>

### The Hurricanes Eta and Iota – Central America

Summary of Environmental Issues, produced by the WWF Environment and Disaster Management Program, can be found at <http://envirodm.org/post/hurricanes-eta-and-iota-in-central-america-summary-of-environmental-issues>.

Planetary Health: Protecting Nature to Protect Ourselves is a first text book of the new field of planetary health. This field is focused on the urgent global health challenges associated with humanity's extensive transformation of Earth's natural systems including climate change, biodiversity loss, changes in land use, growing scarcity of freshwater and arable land, and global pollution of air, water, and soil. The book starts with an exploration of root causes including rapid growth in the human population and global consumption patterns. It provides short primers by global experts on each of these areas of global environmental change and then turns to how these environmental changes are impacting nearly every dimension of human health, with chapters focused on food and nutrition, infectious disease, non-communicable diseases, mental health, and displacement and conflict. After exploring the diagnosis, the second half of the book focuses on the rich terrain of solutions with chapters focused on energy systems, urban design, manufacturing, the chemical industry, business and economics. After a chapter on the ethical dimensions of planetary health, Planetary Health closes by presenting an aspirational vision for a bright future: what the world could look like if we get things right.

The book is edited by Samuel Myers, Principal Research Scientist at the Harvard TH Chan School of Public Health and Director of the Planetary Health Alliance, and Howard Frumkin, former Dean of the University of Washington School of Public Health.

## Newsfeeds and information sources open to EH members

(Please share via the editorial team any sources you have found that are not on this list)

### Food Safety

foodnavigator-usa.com

foodsafetynews.com

joe@foodlegal.com.au

### Development Aid/info/jobs

coleacp.org/

devex.com

### Global perspectives

worldhealthupdates@who.int

### Journals/ research

marketing@lancet.com

ukehrnet.wordpress.com

### National / Regional information

foodauthority.nsw.gov.au/

### Academy of Higher Education

communication@advance-he.ac.uk

### ENVIRONMENT-DISASTERS list

[https://www.jiscmail.ac.uk/cgi-bin/WA-JISC.exe?  
SUBED1=ENVIRONMENT-DISASTERS&A=1](https://www.jiscmail.ac.uk/cgi-bin/WA-JISC.exe?SUBED1=ENVIRONMENT-DISASTERS&A=1)

### Health & Safety (UK)

<https://www.hse.gov.uk/index.htm>

### Public Health England

<https://www.gov.uk/government/organisations/public-health-england>

### Sphere Project

[spherestandards.org](http://spherestandards.org)

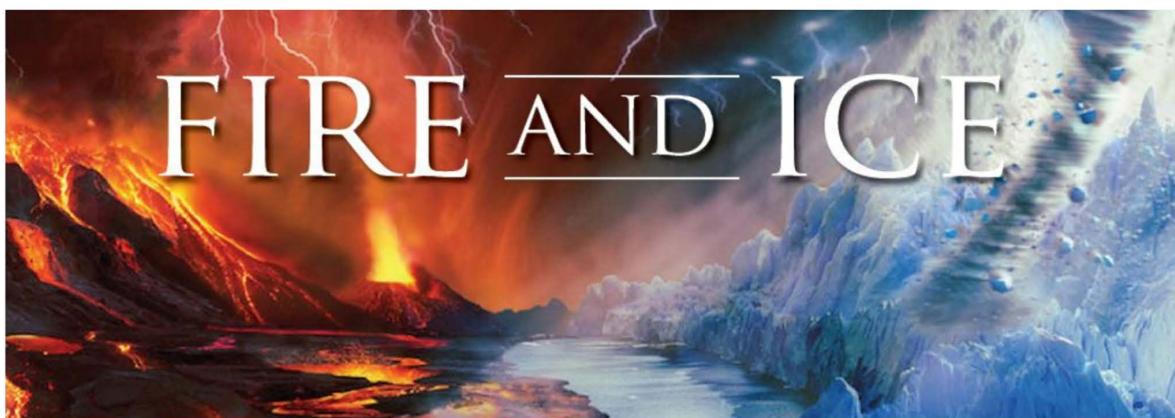
RESEARCH FOR HEALTH IN HUMANITARIAN CRISES <https://www.elrha.org/>

## Disaster Management/Risk Reduction courses around the world

(Please provide the editorial team with details of any DM/DRR courses you are aware of for inclusion in future IFEH magazines - with web links)

The UWI, Mona has an office of Disaster Risk Reduction.

OpenWHO is WHO's interactive, web-based, knowledge-transfer platform offering on-line courses to improve the response to health emergencies. OpenWHO enables the Organization and its key partners to transfer life-saving knowledge to large numbers of frontline responders. <https://openwho.org/>



## 45th Annual EHA National Conference October 18th - 21st 2021

The theme, 'Environmental Health – Fire and Ice" correlates directly with the Blue Mountains environment. The conference will bring together presenters from a variety of disciplines across the broader Environmental Health profession both domestically and internationally, to share their expertise and experiences in relation to the theme and the environmental health community.

The aim of the conference is to explore the challenges of environmental health and to discuss emerging industries and technologies that will impact on environmental and public health. The conference will present an opportunity for environmental health professionals to extend their skills and knowledge, network with their peers and explore opportunities for future collaboration.

We would like to receive abstracts that have a direct correlation to the theme and the impact on:

- COVID 19
- Global environmental and public health
- Emergency Management
- Communicable Disease and Vector Control
- Sustainability
- Hazardous Wastes / Contaminated Sites
- Waste Management
- Improving Environmental Health Practice
- Drinking Water and Wastewater Management
- Aboriginal and Torres Strait Islander Environmental Health
- Food Safety and Consumer Protection
- Climate change
- Water Management

For full details visit the EHA website: <https://www.ehansw.org.au/events/event/45th-eha-national-conference-2021-blue-mountains>

## Welcome to Tartu and 4<sup>th</sup> IFEH World Academic Conference on Environmental Health

Tartu, the second biggest city in Estonia, is called a City of Good Thoughts (<https://tartu.ee/en>). Tartu is also known as a student city – this is why it is a place for good thoughts.



Although the thoughts are great, Tartu itself is rather small, but very cozy. Tartu has a population of around 100,000 and an area of 38.8 square kilometers, lying 185 kilometers south of Tallinn, the capital city of Estonia. One of the city's symbol is the Emajõgi River that flows for the length of 10 kilometers within the city limits and adds colour to the city.

In Tartu you can find different styles from medieval times to present-day modern architecture that are complemented with cozy cafes and unique restaurants and urban nature. The smart city project SmartEnCity has started (<http://tarktartu.ee/eng/>) with the goal to make the city environment smart and sustainable, to inspire people to make environmentally conscious decisions and to be easily replicable in other European cities as well. Tartu is also a cradle of Estonian culture – from here the national university originated and the first newspapers and cultural societies started their work. In the year 1869, the first Estonian national song festival took place in Tartu and the first professional theatre (Vanemuine) began its work here in 1870.

### ***What could be better place for an academic conference to take place?***

Tartu is also home for Tartu Health Care College which has an honour to host the 4<sup>th</sup> IFEH World Academic Conference on Environmental Health from **4<sup>th</sup> to 8<sup>th</sup> May, 2021**. The topic of the conference is "**The real situation in environmental health – challenges and solutions“**.

Situation in Environmental Health is ever-changing, especially nowadays with many new challenges such as globalization, consumerism, climate and demographic change etc. We face new geographic scale of diseases, obesity in some areas as well as famine in others, we waste water in some countries in times of draught in others. Everyone of us in every corner of the world has different challenges and milestones. **Let's put the real environmental health situation on the scale and see how we could overcome these challenges, survive and thrive in these changing times. Let's do it TOGETHER!**

During the conference you have a great possibility to participate in different important workshops for environmental health teachers and researchers.

## **Conference workshop I “Lets research together!”**

The aim of the workshop is to collaborate and find partners for different applied researches.

**Please send us your ideas for researchers and inform us about good examples from your institutions (deadline 1 April 2021)!** For example we are hoping to find partners for following research fields:

- **Drinking water**

To stay alive humans need water, which is essential macronutrient (adult needs water 28-35 ml/kg per day) and must be safe for consumers. We get water from foods and drinks (for example drinking water, juices, tea, coffee, ect.). People get drinking water from private wells, public water supply and bottled water. According to Estonian Health Board most of Estonian public water supply consumers using drinking water that meets the quality requirements, never the less bottled water consumption is rising every year. Tartu Health Care College has applied research named „Estonian people’s drinking water consumption habits“. The aim of the study is to find out drinking water consumption habits, preferences and subjective assessment of the potential health impacts of bottled water in Estonian population.

- **Sex & Drugs & Rock & Roll (risk-behaviour at music festivals)**

Alcohol/drug consumption, smoking and human immunodeficiency virus prevalence are quite high in Estonia. The aim of the study is to estimate the use of narcotic substances, alcohol and cigarettes, and sexual behaviour at music festivals.

- **Occurrence of pediculosis in pre-school children and parents` awareness of it**

Pediculosis is a health concern in Estonia and among other countries around the world. The prevalence of the disease varies by country, but most of them acknowledge that the problem is actual and getting rid of the parasite is more difficult as it seems firstly. Estonian Health Board refers to the annual growing prevalence of lice in Estonian kindergartens.

The aim of the research is to find out the occurrence of head lice infestation in pre-school children and their parents awareness about the disease.

- **Psychosocial factors and emotional well-being of kindergarten and school teachers**

Working in kindergarten and schools sets teachers high emotional and social demands that could cause stress, and burnout. Therefore it's important to ensure that there's no overwork done by the good and committed practitioners. The aim of this study was to determine the psychosocial hazards at workplace and emotional well-being of kindergarten teachers in Valga county, Estonia.

- **Musculoskeletal disorder among health care workers**

According to the European Agency for Safety and Health at Work, musculoskeletal disorders are the most common occupational diseases in the European Union and workers in all sectors and occupations can be affected. The aim of the study is to find out musculoskeletal disorders among healthcare workers and the effect of ergonomic intervention.

### **Conference workshop II “Let’s teach together!”**

We are living in changing world. In spring 2020, we faced the reality where distant and e-learning was the only option. **Let’s share ideas, create international joint-subjects and raise the level of knowledge! Please send us your ideas for joint-subjects (themes) and inform us about good examples from your institutions (deadline April 1<sup>st</sup> 2021)!** For example, Tartu Health Care College would like to collaborate in teaching (international e-courses):

- psychosocial and physiological hazards,
- ergonomic working environment (musculoskeletal disorders),
- global health and environment,
- epidemiology, communicable diseases and non-communicable diseases.

### **More information about our college and the conference can be found:**

Homepage: <https://www.nooruse.ee/ifeh>

Video: <https://bit.ly/32BmX3Z> and <https://bit.ly/2GbUIWQ>

Facebook: <https://www.facebook.com/events/1244735952555912/>

Contact: [conference@nooruse.ee](mailto:conference@nooruse.ee)

### **ORGANISING COMMITTEE MEMBERS**



Kristi Vahur, MPH (public health), lecturer

Research fields of interest: environmental and occupational health



Ave Kutman, *MSc* (ergonomics), assistant

Research fields of interest: occupational health, work safety, health protection in child and social care institutions



Inga Ploomipuu, *MSc* (chemistry), lecturer

Research fields of interest: environmental health, environmental chemistry, toxicology, psychosocial risks



Anna-Liisa Tamm, PhD (sport sciences), head of department of physiotherapy and environmental health

Research fields of interest: public health, nutrition, physical activity



Tartu Health Care College – conference venue