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## DISCUSSION DIGEST

Issue: 4 of 2024  
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### Identifying and Addressing the Impacts of the Interlinkages of Chemicals and Climate Change

The UCT Chemical Network (CN) held a discussion on the 21<sup>st</sup> of August 2024, titled 'Identifying and Addressing the Impacts of the Interlinkages of Chemicals and Climate Change'. This was presented by Prof Hanna-Andrea Rother (UCT), Prof Raquel Duarte-Davidson (United Kingdom Health Security Agency – UKHSA), Dr Haydn Cole (UKHSA), and Dr Tom Gaulton (UKHSA). Click to view: [the PowerPoint presentation](#), [discussion recording](#), and [newsletter](#).

### KEY MESSAGES

Chemicals and climate change impact each other and human health through **complex pathways**. Aspects of the life cycle of chemicals (including manufacture, packaging, distribution, byproducts, and use) contribute significantly to greenhouse gas (GHG) emissions and are, therefore, a cause of global climate change. Climate change then results in climatic events such as extreme weather events, sea level rise, and air pollution, which then impacts direct and indirect chemical exposures.

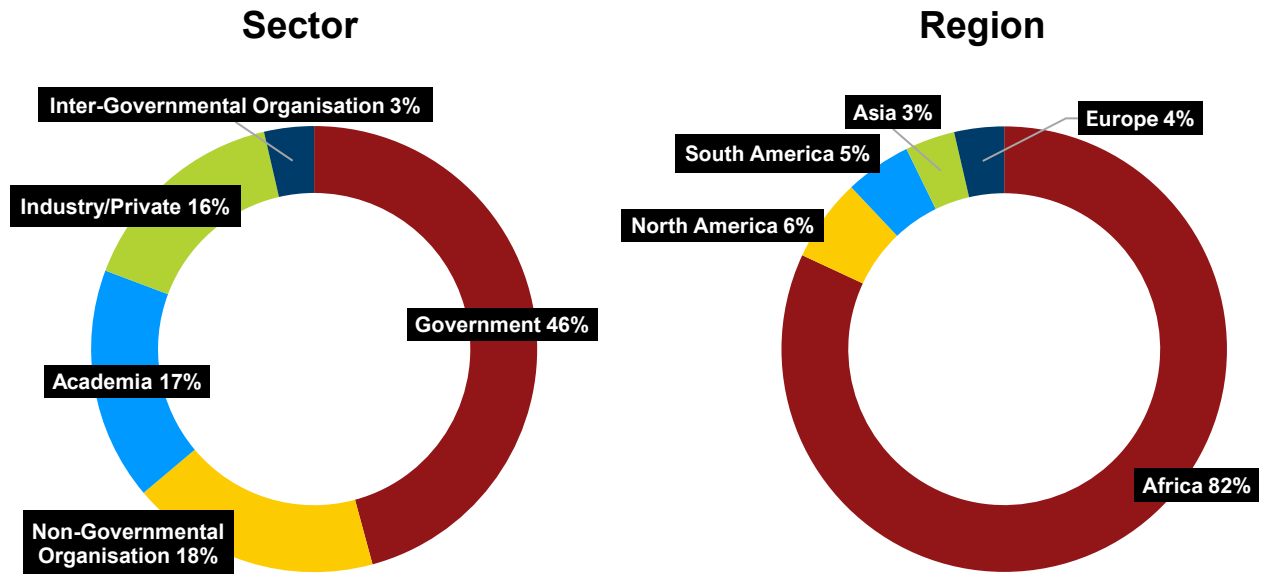
The call to action, as indicated in the upcoming UCT Division of Environmental Health policy brief on chemicals and climate change, includes **reducing the quantity of hazardous chemicals** used and also **reducing their impact on GHG emissions**. **Intersectoral collaboration** is needed for legislation and action to ultimately **protect human health and the environment**.

Multiple chapters of the Health Effects of Climate Change (HECC) in the United Kingdom report, published by the UKHSA, pertain to chemicals, as multiple climate change effects impact chemicals and exposures. For example: **temperature impacts chemical behaviour and their effects** on people; increased **rainfall impacts mobilisation of chemicals**; climate change impacts pests, which might **impact pesticide use**, impacting the food we eat; **wildfires** are increasing, and these release chemicals into the air; and **drought** can impact soil, changing the availability of chemicals in the soil.

**Very little is available in the literature** regarding the risk to health from chemicals due to climate change, as highlighted by a literature review in the report, which provides recommendations for further research. Despite a lack of scientific data, changes in climatic and environmental conditions are likely to affect human exposure to chemicals. **Managing chemical and climate change interlinkages** includes **identifying sources and pathways of exposures**, **characterising the risks**, and understanding **who is responsible** for managing these. Other key actions include building our **knowledge base**, improving **risk assessments**, generating **more data**, understanding **exposure pathways**, conducting **more surveillance**, and improving **integration between different sectors**. It could be useful to prioritise specific chemicals or pathways for research to focus on.



## ATTENDANCE BREAKDOWN



Total number of live participants = 83  
Total number of participants who posted their responses prior = 2

## ABOUT THE PRESENTERS



**Prof Hanna-Andrea Rother** is professor and head of the Division of Environmental Health in the School of Public Health at the University of Cape Town, and honorary professor in the Department of Public Health, Environments and Society, Faculty of Public Health and Policy (PHP), at the London School of Hygiene and Tropical Medicine. She has over 30 years of experience in research, teaching and building capacity, particularly in Africa, on pesticides, risk communication and risk management. She has published widely on the topic and served for twelve years as a World Health Organization (WHO) expert panel advisor on the Food and Agriculture (FAO)/WHO Joint Meeting on Pesticide Management (JMPM). She is also currently an international board member of the European Partnership for the Assessment of Chemicals.

**Prof Raquel Duarte-Davidson** heads the Chemicals and Environmental Effects Department of the UKHSA. Prior to this, she was a Principal Scientist at the Environment Agency, responsible for implementing the Agency's chemical risk assessment policy. In addition, Raquel is the National Focal Point (NFP) for the UK, WHO Europe Environment and Health Process, and the NFP for the WHO Chemical Risk Assessment Network. She heads the WHO Collaborating Centre for the Public Health Management of Chemical Exposures and co-Directs the Health Protection Research Unit (HPRU) on Climate and Environmental Change and Health (ECH) with the London School of Hygiene and Tropical Medicine (LSHTM). She is an independent expert on the European Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) and the chair on SCHEER's rapid risk assessment working group.



**Dr Tom Gaulton** (PhD) works as a Health Protection Scientist in the Chemical and Environmental Effects Department of UKHSA. Tom has over 10 years' experience in public health research on both chemical and biological health threats.



**Dr Haydn Cole** is Group Leader of Chemicals and Poisons in the Chemicals and Environmental Effects Department at UKHSA, responsible for the management and activities of the group, focussing on protecting public health from chemicals and environmental hazards. This includes contributing to UKHSA's capability for emergency preparedness, response and resilience for chemical and environmental hazards and providing evidence-based advice to government to inform policy and health-based guidance, ensuring this is underpinned by an active evidence and applied research programme. Haydn also contributes to international work programs and delivers capacity-building programs in support of UKHSA's global health initiatives. Haydn has experience from across the sectors focussing on chemical risk assessment and risk management.



## CONTRIBUTIONS FROM PARTICIPANTS

*Disclaimer: The information in this digest represents the opinions of members participating from different stakeholder groups expressed during the discussion. The views expressed in this document do not necessarily represent the opinion or the stated policy of the Swedish Chemicals Agency (KemI) or DEH UCT, nor does citing trade names or commercial processes constitute an endorsement*

The key discussion points raised by participants are presented under each question. Throughout the discussion, informal polls were conducted to help encourage discussion among the participants. They do not provide any representative data but rather provide a snapshot of participants' views.

### QUESTION 1

#### What are the sources of chemical contamination, linked to climate change, in your country/region, and priorities?

##### South Africa

- Landfills, and leaching of persistent organic pollutants and mercury into groundwater from improper waste disposal
- Agricultural runoff
- Industrial runoff
- Mining

##### Uganda

- Mostly the agricultural, industrial, and cosmetics and beauty industries
- Improper waste management
- Emerging pests and diseases due to changing weather patterns, increasing the use of pesticides

##### Lesotho

- Plastic and textile firms, agriculture, mining, and obsolete pesticides
- Very poor waste management

##### Benin

- Pollution from cotton production

##### Tunisia

- Improper disposal and management of industrial and household waste

##### Nigeria

- Industrial and agricultural sectors

##### Guyana

- Changes in climate affect pest cycles, resulting in unpredictable infestations, which forces producers to use and overuse pesticides

##### Gabon

- Gas flared by oil companies

##### Zimbabwe

- Mostly industry and improper waste management

##### Eswatini

- Agriculture, poor waste management, and from the industrial sector

##### Madagascar

- Wildfires and agriculture

##### Other

- Higher temperatures may increase the volatility and degradation of certain chemicals, making them more likely to evaporate and spread. This can lead to higher concentrations of airborne pollutants
- Almost any environmental abnormality will lead to more chemical exposure - drought, flood, wildfires, etc.
- Electricity generation – coal power stations



- Some countries might be having unpredictable amounts of rainfall, which washes away the residue of pesticides which keep off insects. The farmer doubles and triples his doses with no attention to development of pest resistance and also safe residue limits at the time of harvest, which exposes the consumer to high levels of toxic chemicals and creates a pesticide resistant insect which causes even more damage

## POLL RESPONSES

### Poll 1. Why do you think climate change and chemicals is an important issue for policymakers to focus on?

- To control the release of chemicals that exacerbate climate change
- It has a negative impact on the health of humans and the environment
- It is an integral part of a circular green economy, and the linkages between the multilateral environmental agreements need to be managed properly to ensure chemicals and their impacts on climate change are mitigated
- Chemical contamination/pollution can have a major impact on climate with both immediate and long-term health consequences
- To increase the awareness on the effects of chemicals on health and the environment, that could exacerbate the effects of CC
- Climate change can exacerbate the release, spread, and exposure to hazardous chemicals. For example, extreme weather events such as floods and storms can cause chemical spills, etc.
- Because there is a significant impact from both sectors, but not enough responsibility is being taken by policymakers
- The need for increased and improved collaborations among relevant stakeholders, i.e., environment, health, agriculture, etc.
- Policymakers can influence and present opportunities to communicate evidence
- Negative impacts on health, environment, economy, and trade
- It exacerbates chemical contamination and affects public health and the environment
- The two cannot be addressed separately as the use of chemicals impacts the other sectors, so there is a need for policymakers to harmonise legislations and policies so that they are comprehensive
- To know where in the lifecycle of chemicals to intervene and how it will improve the reduction of hazardous chemical exposure to both the environment and human beings
- Adverse effects will accumulate over time, so need to be addressed at the earliest, meaning now!
- Impacts ecosystems, food systems, and human health
- Exposes population to food security and safety crises
- Both climate change and chemical pollution can have significant economic costs. Extreme weather events can damage infrastructure, disrupt supply chains, and lead to biodiversity losses

### Poll 2. What are the implications of increasing climate events on chemical exposures?

- In tropical climates, more heating will make already inadequate personal protective equipment (PPE) even more ineffective
- Intensifies the environmental impacts on health, especially of the high-risk populations and communities
- An increase in climate events can exacerbate the spread, concentration, and impact of hazardous chemicals in the environment, posing new challenges to public health, ecosystems, and infrastructure
- Mauritius: as part of small island developing states (SIDS), torrential rain can lead to discharge of chemicals into the sea and cause damage to coral and pollution of the sea, leading to an impact on the marine ecosystem
- Workers are likely to face increased risks related to toxic chemicals due to climate and environmental changes. Numerous health conditions in workers have been linked to climate change
- Chemical exposures will increase
- Increased or spread of further contamination
- Increased run-off of pesticides in flooding, increase air pollution from volatile substances due to higher temperature, increase particulate matter in air carrying pollutants
- The Department of Forestry, Fisheries and the Environment (DFFE) is mandated to give



effect to the right of citizens to an environment that is not harmful to their health or well-being.

- Without water, fertilisers cannot be absorbed. With too much water, soil can be eroded. Leaching can cause contamination of crops, water sources, and soil

**Poll 3. Do the government departments in your country that regulate chemicals also include issues related to climate change?**

Yes	15
No	10
Don't Know	4

## QUESTION 2

### How do we characterise/understand the risk from chemicals due to climate change to humans? Give examples that you are aware of

- Risk is characterised through research, epidemiological studies, environmental monitoring, and modelling techniques
- Modelling is a good way, but evidence is also needed to confirm/validate modelling. However, it is difficult to get enough data even for modelling. It is difficult enough to get data on temperature, but it is more difficult when you look at 1000s of chemicals
- More data is necessary, yes, but it is costly and time-consuming. Precautionary principle, and hazard assessment, are the key
- HECC report chapter 15 describes chemical indicators e.g. bathing water quality, but they need new processing of existing data, updating of reporting systems, or additional data being collected
- The more the climate deteriorates, the more exposed the environment and people will be. For example, if it is very hot, it will be difficult for a farmer to use their PPE
- Studies have demonstrated that ozone depletion will increase cases of cataracts
- Increased use of pesticides in agriculture, including the frequency of application and the volume, might be one of the indicators
- Increases in temperatures, for example, could lead to an increase in toxicity from pesticides, PCBs, etc.
- Climate change has resulted in new pest incursion in the sugarcane sector in Eswatini, which has led to increased use and misuse of pesticides. This exposes too many people to pesticides

## POLL RESPONSES

**Poll 1. List gaps around what you think is needed to characterise human exposure risks linked to chemicals and climate change.**

- Lack of data
- Limited risk assessment models
- Limited research
- There are no specific studies relating climate change to release of chemicals
- Data and information, epidemiological studies
- Disaster management plans should consider mitigation for chemical exposures in extreme weather events
- Attribution of the risk to climate change versus other aspects
- Lack of epidemiological studies and risk assessment
- Scattered research efforts
- Insufficient data on chemical behaviour under climate stressors, insufficient focus on vulnerable populations
- Limited public awareness and education
- Lack of reliable data on chemical disposal and corresponding effects of these chemicals
- The UNFCCC focus more on mitigation action and adaptation action. There is no action directly related to chemicals because this is very complex
- Limited resources
- Lack of policies and legislation
- Environmental data, such as temperature and rainfall, chemical use



**Poll 2. What information do regulators and others need to regulate the interlinkage better (e.g. research opportunities)?**

- Sufficient research data on the linkages and possibly a policy brief to explain it better to policymakers
- Awareness precedes change
- Data showing increase in pesticide use over the years
- Easy language
- Good data is required to fully understand and give guidance to regulators
- Robust environmental monitoring
- Data on exposure
- Environmental impact of chemicals
- Toxicity on chemicals like pesticides on water and soil
- Data including uncertainties of cause-effect relationships
- The understanding of how the systems work to be able to predict and mitigate better
- Health education for regulators, e.g. to understand the climate change effects on endocrine-disrupting chemicals
- Data linking farmer’s pesticide use behaviours with increase in temperature
- Data on the effects on health and environment
- Sufficient, comprehensible data that links increased use of chemicals to the effects of chemical exposures
- A standard procedure to mitigate climate change and chemical exposures
- Data on the significant sources of chemical exposures within the country (e.g. mining, agriculture, industry, etc.)
- Increasing capacity of researchers, collaborative efforts between researchers
- Regulators need data. Evidence from several scientific studies
- Interdisciplinary research
- There is a lot of data being generated but very little data being interpreted and cascaded to the public in the form of awareness

**QUESTION 3**

**How could the risks from the chemicals and climate change interlinkages be managed?**

- Exposure risk can be managed by making the following mandatory for those releasing chemicals into the environment: 1. Prior notice of expected exposure events; 2. Informed consent by adults or for children by their legal guardians
- This should be managed by a data-driven approach backed up by policymakers who have the political will to implement decisions that will alleviate the risks of chemicals and climate change
- Chemicals and climate change interlinkages could be managed through coordinating a national multi-faceted monitoring system for industries, sectors or businesses that are similar. This system could be used to monitor the implementation of a national roadmap with objectives to achieve set reduction targets
- A multi-sectoral approach is key, including transparency (not alarm-raising) to the public by giving access to all relevant stakeholders including the general public so they can see their role in the process
- The chemical industry should pay for independent research
- Prioritising the development of less hazardous chemicals to substitute hazardous chemicals. Green chemistry
- Governments need to set more stringent laws that will control or curb chemicals misuse, disposal, etc., for all sectors
- Awareness-creation and conventions
- Stronger legislation should be introduced to reduce the risks that chemicals may have on climate. Cornubia is a very good example

**POLL RESPONSES**

**Poll 1. For the climate change and chemicals interlinkages, which sector should take responsibility for identifying and managing the health risks?**

Chemical Sector	2
Climate Change Sector	1
Both	19
Others (list in chat)	1



## Poll 2. What measures are already in place or what can be done to reduce risk from the chemicals and climate change interlinkages?

- A national/international stocktaking exercise concerning all aspects of climate change impacts on chemicals could be a way forward
- Polluter pays principle, regulations
- Public awareness on hazardous chemicals
- Registration and reregistration of chemicals and pesticides, education and training, and inspections of storage facilities. Legislation is needed to enforce misuse penalties
- International agreements such as the Vienna Convention and Montreal Protocol
- Fines for spillages, polluter pays principle
- Management of chemicals throughout their life cycle
- National climate change action plans
- In Botswana, our act emphasises the polluter pays principle, but it does come with a number of challenges

## Q&A

Several questions were answered live during the session ([view the recording here](#)), the rest, included in this digest, were answered through typed responses by Raquel.

Question	Response
What are the most effective strategies for monitoring and mitigating chemical contamination in the context of increasing extreme weather events?	Really difficult because extreme weather events are short-lived and by the time we are able to take measurements, the chemical pollutants have moved elsewhere. Modelling may be a way of gaining a better understanding but to model properly we need to have a lot of information on the chemicals at sites etc. Biomonitoring is a way of finding out chemical contamination where chemicals involved are known to accumulate in the body
What are some successful case studies of countries that have implemented policies addressing both chemical safety and climate change?	Net-zero approaches should include impacts of chemicals, but I cannot think of examples where these are done
How can advancements in technology and data analysis improve the management of chemical risks in a changing climate?	Information is required on changes in chemical usage and what the impact of these will have - i.e., move towards 'safer chemicals'. There are concerns that there may be a move towards using more persistent chemicals with increased climate change, but no evidence of this, except that there may be a move towards looking for chemicals that stay longer in the environment. Informing policymakers of these risks is important

## RESOURCES

1. UKHSA, 2023. Health Effects of Climate Change (HECC) Report <https://www.gov.uk/government/publications/climate-change-health-effects-in-the-uk>
2. Pesticide Action Network, 2022-2023 Report. Chemicals and Climate Change: A Vicious Cycle <https://www.panna.org/resources/pesticides-and-climate-change-a-vicious-cycle/>
3. United Nations Environment Programme (UNEP), 2021 Report. Chemicals, Wastes and Climate Change: Interlinkages and Potential for Coordinated Action <https://www.unep.org/resources/report/chemicals-wastes-and-climate-change-interlinkages-and-potential-coordinated-action>
4. UKHSA, 2023 HECC Report. Chapter 12: Impact of climate change on human exposure to chemicals in the UK <https://assets.publishing.service.gov.uk/media/65705ea173913500db03bc1/HECC-report-2023-chapter-12-chemicals.pdf>
5. WHO, 2017. Chemicals Road Map <https://www.who.int/publications/i/item/WHO-FWC-PHE-EPE-17.03>



6. UNEP, 2024. Global Framework on Chemicals

<https://www.chemicalsframework.org/page/text-global-framework-chemicals>

**Chemical Network:** The Chemical Network is a non-partisan online forum established by the Division of Environmental Health (DEH) at the University of Cape Town's (UCT) School of Public Health. It was established as part of a knowledge management and sharing project supported by the Swedish Chemicals Authority (KemI).

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If you have any questions or require clarification on this initiative, please contact UCT at [chemicallistserver@gmail.com](mailto:chemicallistserver@gmail.com). If you are not already a member, join the Chemical Network at: <http://eepurl.com/hf9nwf>

