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Innovation, Adaptability & Sustainability to Protect Health

- the case of communicating chemical risks

SPH Research Day 2025
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Introduction

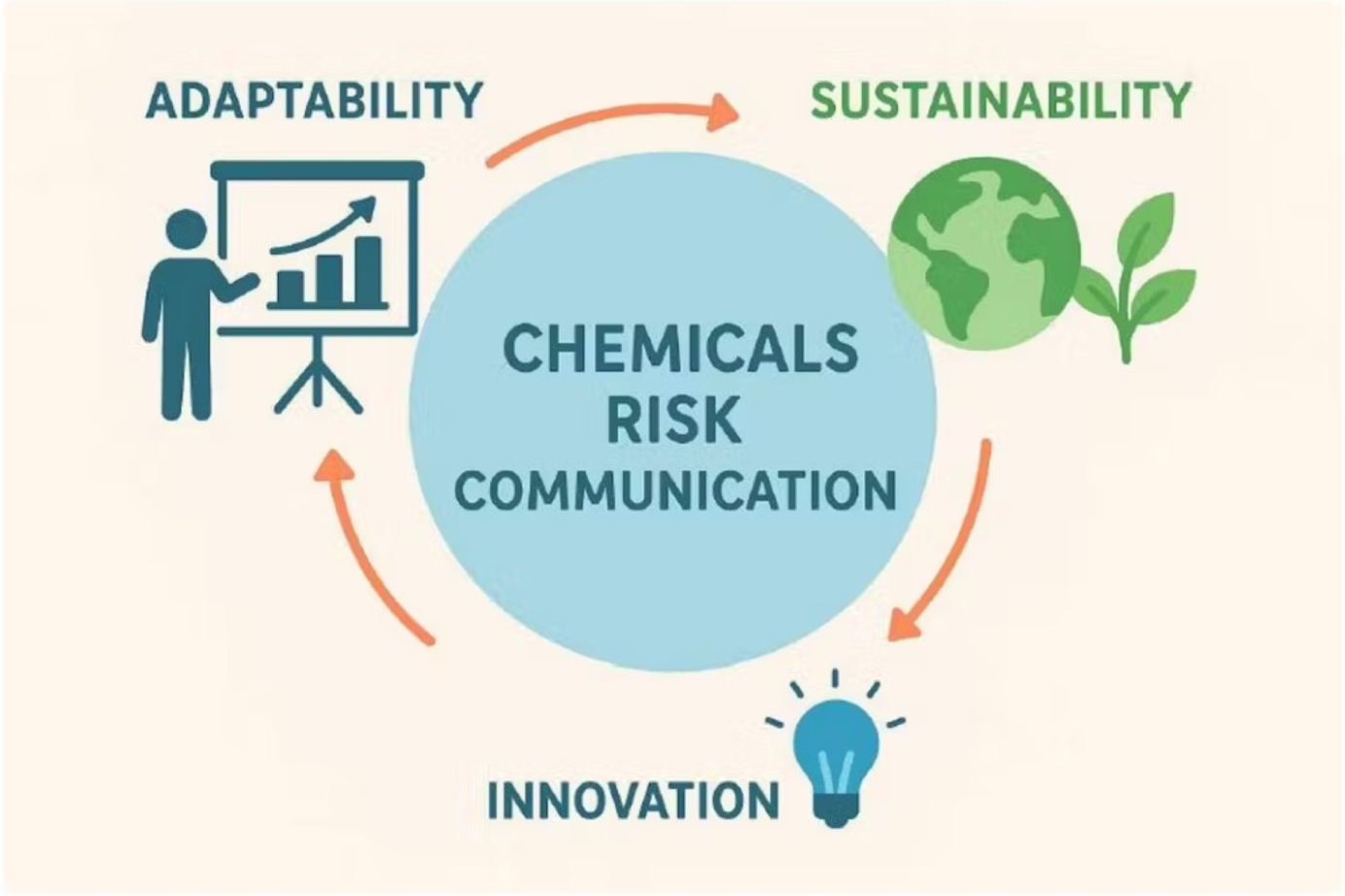
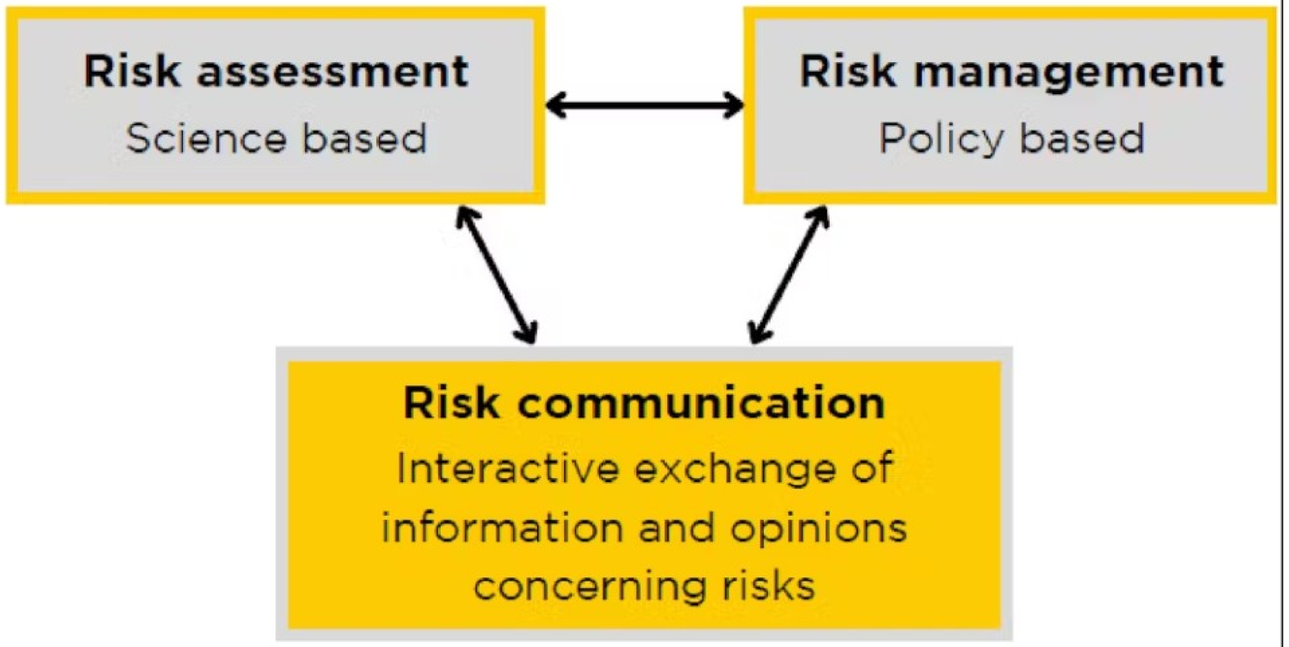


Figure 2: Risk Communication as an integral component of risk analysis



Risk is a function of **Hazard** and **Exposure**
R = f(H x E)

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Communicating and Comprehending Chemical Hazards and Risks:

Challenges and Opportunities in Low- and Middle-Income Countries

Factsheet

Elements of Chemicals & Waste Control System

Legal Framework

Sustainable Financing

Data & Information

Hazard & Risk Assessment

Risk Reduction

Enforcement & Compliance

Risk Communication

Adapted from an illustration by Maja Modén

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Executive summary

Communicating health and environmental hazards and risks associated with chemicals is crucial in achieving the sound management of chemicals and waste (SMCW), protecting human health and the environment, and promoting risk prevention and reduction. A common statement is "we need to improve awareness-raising" to prevent negative health and environmental impacts from chemical exposures. However, regular and consistent chemical risk communication is rarely planned for or sustainably financed. Government agencies in low- and middle-income countries (LMICs) face several challenges in chemical risk communication. These include the absence of dedicated financial resources, a lack of capacity and skills, and the staff needed for risk communication, as well as difficulty closing the knowledge gap between experts and the public. This factsheet guides regulators and decision-makers in LMICs on implementing and financing various communication strategies. The focus is on communication that prevents emergencies, manages crises, and reduces accidents and poisonings that result in death or chronic health effects, while also promoting transparency and regular communication with at-risk populations.

What is hazard versus risk communication?

To **communicate a risk**, there must be a hazard, a potential threat to health and the environment. Risk is the function of hazard and exposure—**R = f(HxE)**. **Figure 1** illustrates the difference between a hazard and a risk. This factsheet focuses on chemical risks and hazards.

Therefore, **hazard communication** is linked to a chemical's inherent toxicity. Once the hazard has been classified, different communication vehicles are used, predominantly on the chemical label (e.g., hazard/precautionary statements, signal words, pictograms), to convey information about the hazard to the regulator or end-user. The World Health Organization (WHO) classifies the acute toxicity of pesticides in the WHO Recommended Classification of Pesticides by Hazard and guidelines to classification, 2019 (https://www.who.int/publications/i/item/9789240005662).

Figure 1: Difference Between Hazard and Risk

Source: UCT, Division of Environmental Health. Factsheet 2022 https://bit.ly/3VksuXG

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Goal of Risk Communication Key and Varies

- Key to **identify goal** of the RC transaction
- **Common goals**:
  - To inform/"educate" (awareness raising)
  - To affect behaviour change (PPE use)
- **Purpose impacts on the RC process** and tools

Right-to-Know => Access to info

Box 1: Purpose and Objectives of RC

Goals of chemical RC can include:

- **Promote an understanding of risks**, risk assessments, threats, and hazards.
- **Provide skills** on how to prevent chemical exposures, emphasising that personal protective equipment is often the least effective approach.
- **Provide reassurance**, taking into account the dominant risk perceptions of the public or target audience.
- **Encourage** people to adopt risk-reduction behaviours and reduce or eliminate the risk to their lives.
- **Promote credibility** in institutions that deal with risks.
- **Involve the public in risk management decision-making, planning, and enable a two-way dialogue** and understanding between stakeholders.

Source: Adapted from WHO, 2021

What are the elements of a "good" Chemical Risk Communication Approach?

Adaptability (flexibility & responsiveness)

- Audience tailored (**simple language vs technical**)
- Cultural fit (**local languages**)
- Two-way feedback (**incorporate risk perceptions; build trust**)

Sustainability (long-term & systemic approach)

- Capacity building (**promote comprehension**)
- Integration into existing systems (**sound/enforced legislation**; **trusted messengers**)

Innovation (engagement & technology)

- **Trust** building to reduce misinformation (**counter industry narratives**; influencers [**faith based leaders, doctors**]
- Technology-driven comprehension mechanisms (**online; ehealth**)

Why is Risk Communication in Chemical Risk Prevention & Management Important?

- ✓ **Low dose exposure risk and cumulative & combined exposures extremely high**
- ✓ People are unaware of acute and toxic health risks from pesticide exposure & prevention measures
- ✓ **All pesticides toxic; no such thing as a "safe" pesticide**

Multiple & Extensive Pesticide Use in South Africa

Agriculture • Crops; horticulture; weed control; chicken feed fly control	**Public Health** • Malaria; community pest control
Borders • Mosquito control on airplanes, phytosanitary & foot/mouth disease control	**Public spaces** • Schools, hospitals, office buildings, public buildings (supermarkets, restaurants) land fills; weed control on pavements
Domestic • home & garden use; lice shampoo; paints, hand wash	**Transport** • Land & sea movement of pesticides; treated boat hulls
Forestry • Treated timber; alien invasive vegetation removal	**Veterinary purposes** • Livestock; domestic pets
Leisure areas • Hotels, golf courses	**Unregistered uses** • Street pesticides; self harm; problem animals; homicides; warfin in street drugs
Laboratories • Research; export residue testing	**Migratory Pest Control** • Quelea birds; locusts
	Rother, H-A SAMJ 2012

Which of the following pesticides have you ever used?

Bin Kill

Tabard

Blue Death

Rattex

Doom

Peaceful Sleep

Never used pesticides in home or on body.

3 44

Industry Facebook Posts

=> focus on efficacy of product and promoting sales; not health risks

- Acorn Group of Companies
- 17 December 2020 ·
- More friends and family get togethers are around the corner, make sure to keep the flies and bugs out of your bin with the Vapona Bin Kill. Proven to last up to 90 days!
- https://acorngroup.co.za/vapona-2/
- #HappyHolidays #BinKill
- **See less**

Vapona Bin Kill:

Turning your trash bin into a no-fly zone. Because flies need rejection too! Our cutting-edge formula not only kicks flies to the curb but leaves them questioning their life choices.

"**Dichlorvos** [**organophosphate**] attacks an important enzyme in the **nervous system** of insects and humans. People can get sick from breathing too much pesticide vapor in the air.

Early symptoms of overexposure in people include headache, lack of appetite, nausea, vomiting, and difficulty breathing. The pesticide can cause more serious nervous system symptoms if exposure continues.

Children have higher breathing rates than adults and may absorb more of the chemical vapor."

Source: https://doh.wa.gov/community-and-environment/contaminants/pesticides/pest-strips

Minister of Health Motsoaledi said:

that organophosphates are generally **not meant for domestic use** and normally applied in agricultural settings. That they are "much more lethal and can cause irreversible damage". 28 Oct, 2024

Banned for household use: EU, Philippines, India, Bangladesh, Cambodia

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Peaceful Sleep Liquid Refill 35ml convenient and easy-to-use. The refill fits into the Dual-purpose Plug-in Unit is used to clear a room from mosquitoes. Trusted Protection Day and Night. Peaceful Sleep Vapour unit will protect you from mosquitos for up to 45 nights – when used 10 hours per night.

Follow these simple directions: Switch on the unit and forget about it – Peaceful Sleep will do the rest.

Ingredients declaration
Prallethrin (Pyrethroid) 9 g/l

Registration number
Registration Number: L 6130 Act 36 of 1947

SAFETY INFORMATION
DANGER!

- Flammable liquid and vapour
- Toxic if inhaled
- Toxic to aquatic life with long lasting effects.

PRECAUTIONARY STATEMENTS
Avoid release to the environment.
Collect spillage.
Dispose of contents and container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

WARNING!
Poisonous if swallowed.
Keep out of reach of children, uninformed persons and animals.
May cause irritation of the skin, eyes and mucous membranes and skin sensitisation.
In case of poisoning, seek medical advise and make this container available.
Keep away in a locked cupboard and wash hands after use.

PRECAUTION:
Obtain special instructions before use.
Wash hands with soap and water after handling mats.
Do not cover or place the electric unit on unprotected, painted or polished surface.
Be sure that which is given on the unit.
Ensure that the vapouriser unit is not in close proximity to curtains, upholstery, fabric or any combustible material.
Do not touch the vapouriser unit with wet hands or metallic instruments.
Replace the liquid only when the vapouriser is unplugged.
Remove or cover aquariums and tun off the pump in the aquarium before using the product
Never use the liquid bottle for any other purpose than intended.
Dispose is a safe manner.
Do not smother or cover the vapouriser.
Do not use continuously in insufficiently ventilated rooms

"From Spray Can to Cultural Icon: The Rise of Doom in South Africa": Advertisement as RC tool

- *Name 'Doom' is synonymous with insecticide.*
- *"For over sixty years, Doom has been a **trusted name in South African households**, renowned for its fast and deadly action against pests."*
- *"Its **reputation for effectiveness** has been a cornerstone of its enduring popularity."*
- *"Doom's advertising campaigns have played a significant role in its success. Notably, the '**You Should Have Used Fast Deadly Doom' campaign** resonated with consumers by highlighting the product's efficacy in a relatable manner. Such campaigns have not only promoted the product but have also embedded it into the cultural fabric of South Africa."*

Featured article April 14, 2025 in **startup mag**; https://startupmag.co.za/2025/04/from-spray-can-to-cultural-icon-the-rise-of-doom-in-south-africa/

Startup Mag Article continued…

Lessons for Aspiring Entrepreneurs

Understand Your Market*: Doom's success underscores the importance of* ***knowing your audience and delivering products*** *that meet their specific needs.*

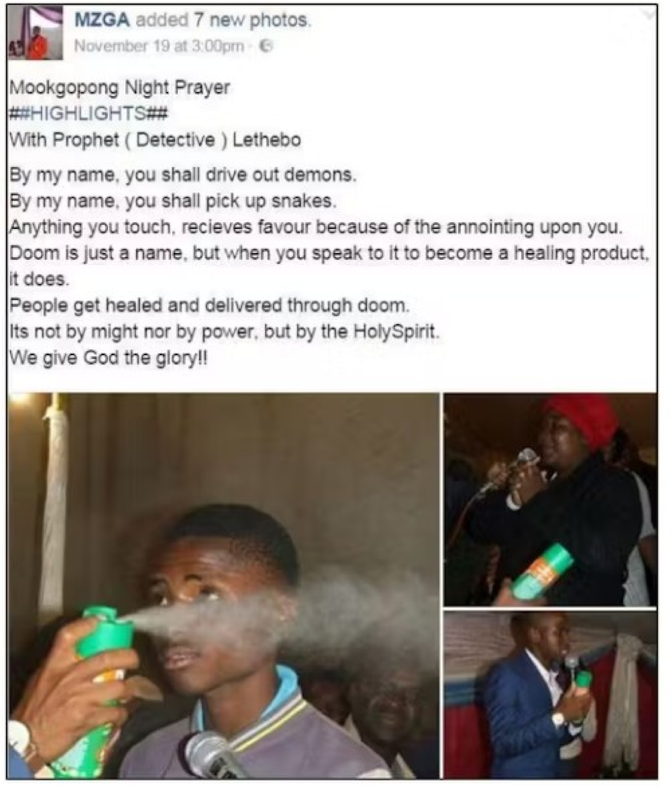
Innovative Marketing*: Creative and culturally resonant advertising can elevate a product from a household item to a* ***cultural icon****.*

Product Diversification*:* ***Offering a range of products*** *to address various consumer needs can broaden your market reach and enhance brand loyalty.*

Doom's journey from a simple insecticide to a staple in South African homes…..

Doom as “cultural icon” leads to hazardous/illegal uses not listed on the label

South Africa’s Doom Paster



Other off-label uses:

- ❑ Cleaning counters
- ❑ Removing oil stains (solvents)
- ❑ Removing label glue (solvents)

Doom Online Sales Info

- ✓ Keep out of reach of children, uninformed persons, and animals
- ✓ Contents flammable and under pressure, do not puncture or incinerate the can
- ✓ Do not spray near open flames, or directly onto electrical equipment
- ✓ Do not leave on hot surfaces, e.g. stoves, radiators or in direct sunlight
- ✓ Temperatures higher than 50o C may cause the container to burst
- ✓ **May cause irritation of the skin, eyes, mucous membranes and cause skin sensitisation**
- ✓ Avoid **excessive** inhalation
- ✓ **Do not use in the presence of persons with a known sensitivity to pyrethroids**
- ✓ **Avoid contact with skin, eyes, and clothing**
- ✓ In case of contact**, wash thoroughly with soap and warm water**
- ✓ **Do not spray** onto food utensils, or **food preparation surfaces**
- ✓ Remove pets and cover fish tanks before spraying
- ✓ Avoid wetting plastic, rubber, and asphalt surfaces, such as tiles and floor coverings
- ✓ Do not spray on rugs, carpets, curtains, wallpaper, or similar materials that may stain
- ✓ **If misuse results in accidental illness,** consult a doctor immediately
- ✓ Store in a cool, dry place
- ✓ Keep out of reach of children, **uniformed persons** and animals

Doom Safety Data Sheet Info

Section	Key Points
Supplier / Emergency Contacts	Tiger Consumer Brands – Tel: 086 010 1107; **Poisons Information Helpline: 0861 555 777**
Hazards / Identification	**The product is a poison. Avoid contamination of food** and feed stuffs.
First-aid Measures	– Skin contact: wash with soap & water – Eyes: flush with water for ≥ 15 minutes – Ingestion: seek medical attention immediately – Inhalation: avoid excessive inhalation
Fire Fighting Measures	Use water spray jet, CO_2, foam, or dry chemicals. Wear protective clothing and self-contained breathing apparatus. Emits toxic/irritating fumes when burning.
Handling & Storage	**Keep away from food**, drinking water and animal feed. Store in ventilated places, away from flames/sparks. Avoid direct sunlight.
Exposure Controls / PPE	Normal use: no special respiratory, eye or hand protection required, **but avoid excessive inhalation**. Wash hands after use. Yes 16 May 2019

Pyrethroid Health Effects Overview

- concentration, duration, frequency dependent, etc

Mild Symptoms:

Headache, dizziness

Nausea and vomiting

Skin itching, burning, or irritation

Increased salivation

Paresthesia (numbness or tingling, especially in the face)

More Severe Symptoms:

Muscle tremors or twitching (fasciculations)

Altered mental status

Seizures

Respiratory distress or acute lung injury

Coma or loss of consciousness

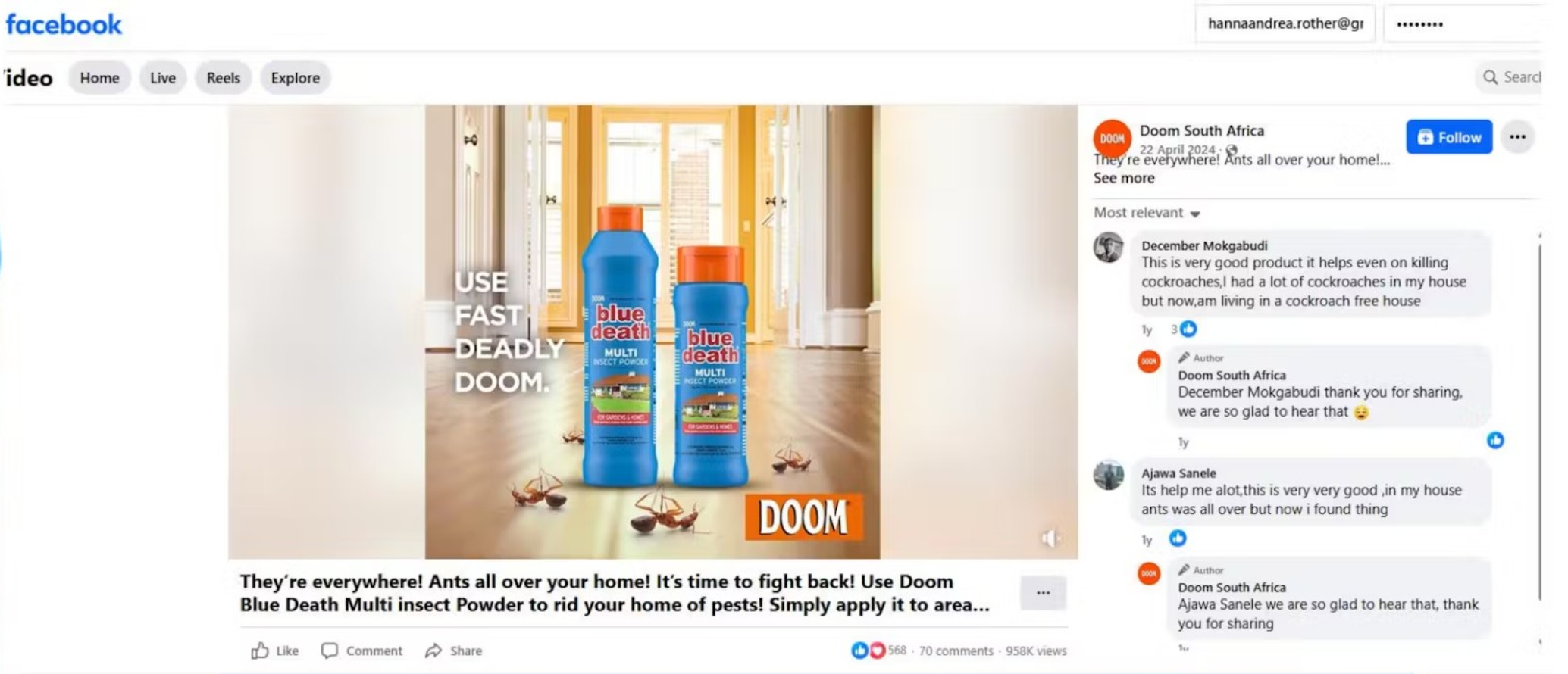
Risks for Children

Young children are particularly vulnerable due to their higher breathing zone (closer to the floor) and potential for ingestion or inhalation of residues. Caregivers may report symptoms like coughing, skin rash, or runny nose.

Long-Term Health:

Endocrine Disruption: Some research suggests pyrethroids may act as endocrine disruptors, potentially affecting hormonal functions and reproductive health.

Mortality Risk: A large study found an association between higher environmental exposure to pyrethroids and increased risks of all-cause and cardiovascular disease mortality, although more research is needed to confirm these findings.



- South Africa: The country was **phasing out certain pesticides**, with a full ban on chemicals like carbaryl planned by June 2024 due to concerns about **reproductive health and genetic mutations**.

- But this has **not actioned yet**.

- **Should the public be informed when a pesticide is scheduled to be banned?** How?

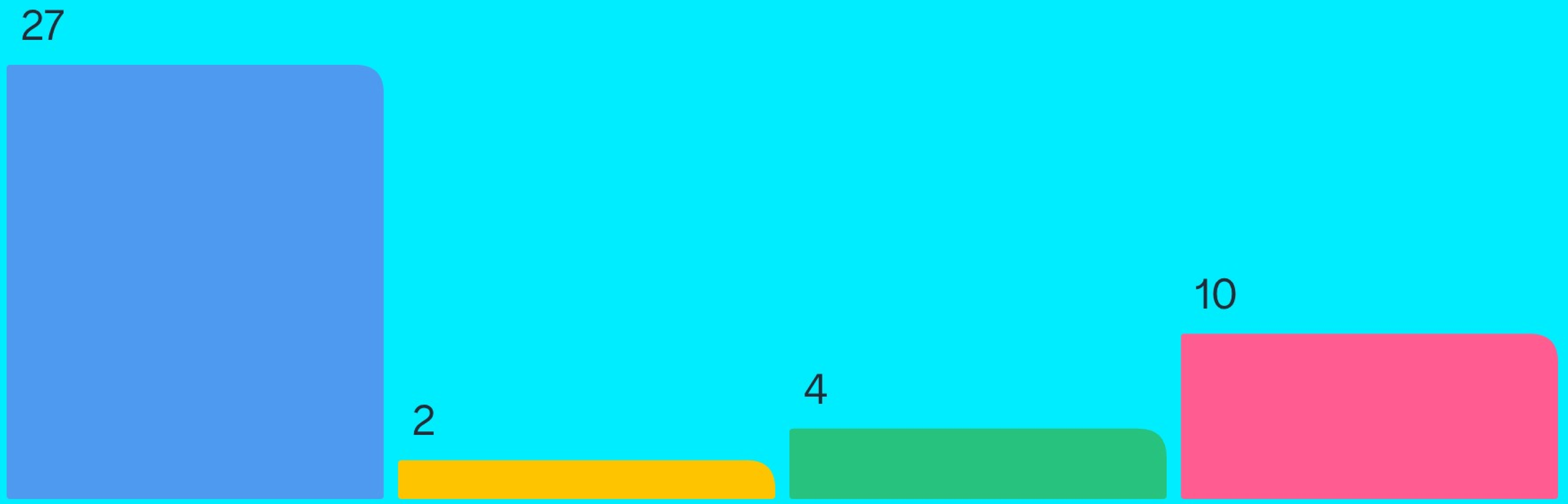
Put in poll

✉ environmentalhealth@uct.ac.za

Use of pictograms to communicate risks to low literate populations – top down approach

What is the scientifically intended meaning of this pictogram?

When this GHS symbol is on a label it may indicate causing:



GHS* Chronic Hazard Pictogram

- *Prolonged or repeated exposure to this chemical may cause long term health effects as cancer or birth defects.*
- Symbol used on chemicals with one or more of the following effects:
  - *Carcinogen*
  - *Respiratory Sensitizer*
  - *Reproductive Toxicity*
  - *Target Organ Toxicity*
  - *Mutagenicity*
  - *Aspiration Toxicity*

- Pictograms are not intuitively obvious
- Developed to address illiteracy
- Developed without field testing

* Globally Harmonized System of the Classification and Labelling of Chemicals

Labelling Goal as RC Tool – Protecting Health or Liability?

Two hazard classification systems since 2022

1. Current system phasing out

4 Colour Codes on SA Pesticide Labels as RC tool/risk decision making for acute toxicity

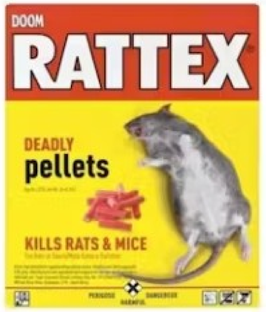
Based on WHO toxicity classification based on pesticide's LD50:

RED: Class Ia&b – extremely hazardous

YELLOW: Class II – highly hazardous

BLUE: Class III – moderately hazardous

GREEN: unclassified - less hazardous



2. Phasing In:

Globally Harmonized System of the Classification and Labelling of Chemicals (GHS)

Health Hazard	Flame	Exclamation Mark
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
• Gases Under Pressure	• Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle	**Environment** (Non-Mandatory)	**Skull and Crossbones**
• Oxidizers	• Aquatic Toxicity	• Toxic or toxic

How does “disease mongering” affect communicating chemical risks?

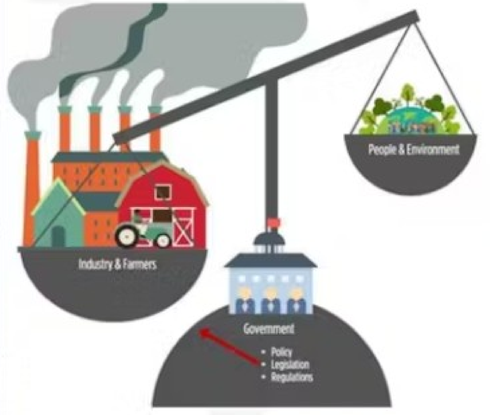
Marketing strategies – ***Kills Malaria Mosquitoes*** – expanding perceived threats of diseases to sell more products.

Intended as a domestic aerosol spray

Lack of evidence proving effectiveness against malaria transmission

Corporate Capture:
'Ghost Management' Strategies By Chemical Companies Shape **Public Perception**

Strategies of Capture	Detail	South African Examples
Regulatory	Influence and manipulate legislation to prioritise corporate interests over health and the environment; "revolving door"	Industry supports1947 Legislation; don't want stronger regulations
Scientific	Corporate funding manipulates knowledge production; conflict of interest; unfavourable results intentionally concealed	Manipulates risk info; downplays health risks
Professional	Influence professionals to promote industry products; gifts/ bribes; spin doctors for companies; ghost write academics work	CropLife training Eniv Health Practitioners
Civil Society	Establishing front groups; funding existing entities	
Media	Shape public perceptions through advertising	Doom Adverts
Technological	Safeguarding confidential business information	No co-formulants listed on labels
Market	Conflicts of investment; investments support market sales of their products	



Source: Dong and Gagon. 2025. Unveiling Chemical Industry Secrets: Insights gleaned from scientific literatures that examine internal chemical corporate documents – A scoping review. Plos One: 20(1): e0310116.

Division of Environm ealth

What does Adaptability, Sustainability & Innovation look like with Corporate Capture and Ghost Management?

- Focus of pesticide label is on protecting industry from liability
- Health risks are minimised
- Adaptability, Sustainability and Innovation focused on maximising profits
- Pesticide labels as a RC tool communicating a narrative which promotes product sales

Right – to – Comprehend (RtC) RC Info

- **Access to information not enough** (right-to-know) to promote protective and informed behaviour changes

- **<u>Mechanisms</u>** are needed to aid and promote understanding of hazard and risk information

  => ***Right to Comprehend***

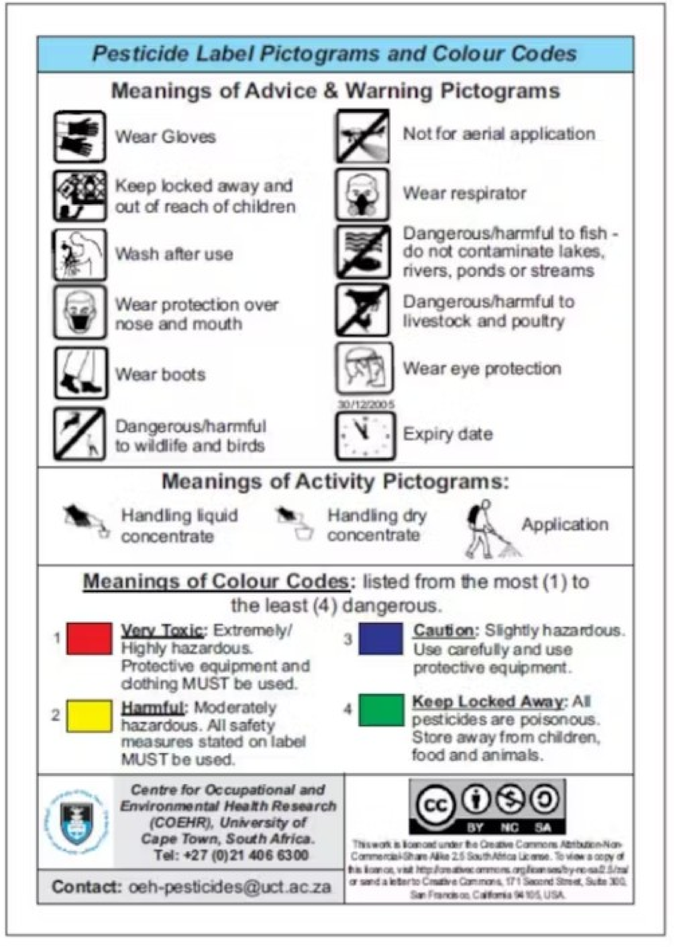
- **Few measures are in place or legislated** to promote this right (e.g., training, label cards) through culturally relevant means

- Concepts of "misuse"& "ignorance" used to explain why pesticide poisoning occurs disregard workers & public RtC

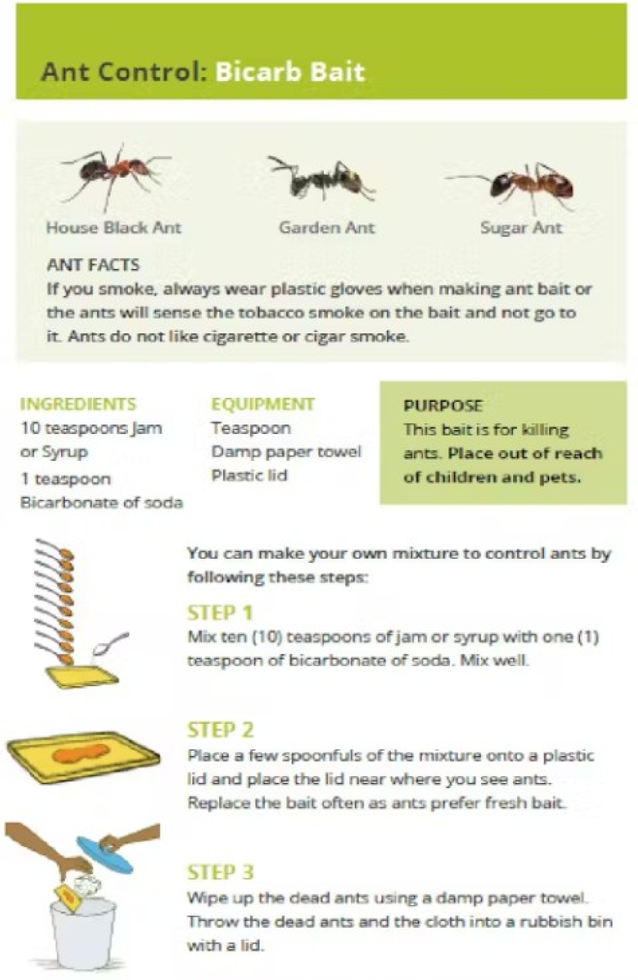
Avoid <u>excessive</u> inhalation

Rother Environmental Research 2008

Adaptability: Promoting the Right-to-Comprehend Pesticide Risk Information



Less toxic pest control alternatives/recipes – community oriented booklet



Download at: http://www.publichealth.uct.ac.za/phfm_environmental-health

Opportunities for RC Sustainability & Innovation to Counter Corporate Capture

Figure 4: Good Risk Communication practices

Source: Adapted from WHO, 2021

- ✓ **Backed by strong, updated legislation** detailing RC good practices
- ✓ **More research** on health and risk communication methods
  - ✓ QR codes
  - ✓ Increased social media campaigns
  - ✓ Increased engagement with training children and youth
- ✓ Use **Communication Specialists in projects** for Research Translation/ RC (e.g. social media)

Shifting the Balance from Corporate Capture to Promoting Health and Well-Being through Pesticide Risk Communication

Adaptative
(flexibility & responsiveness)

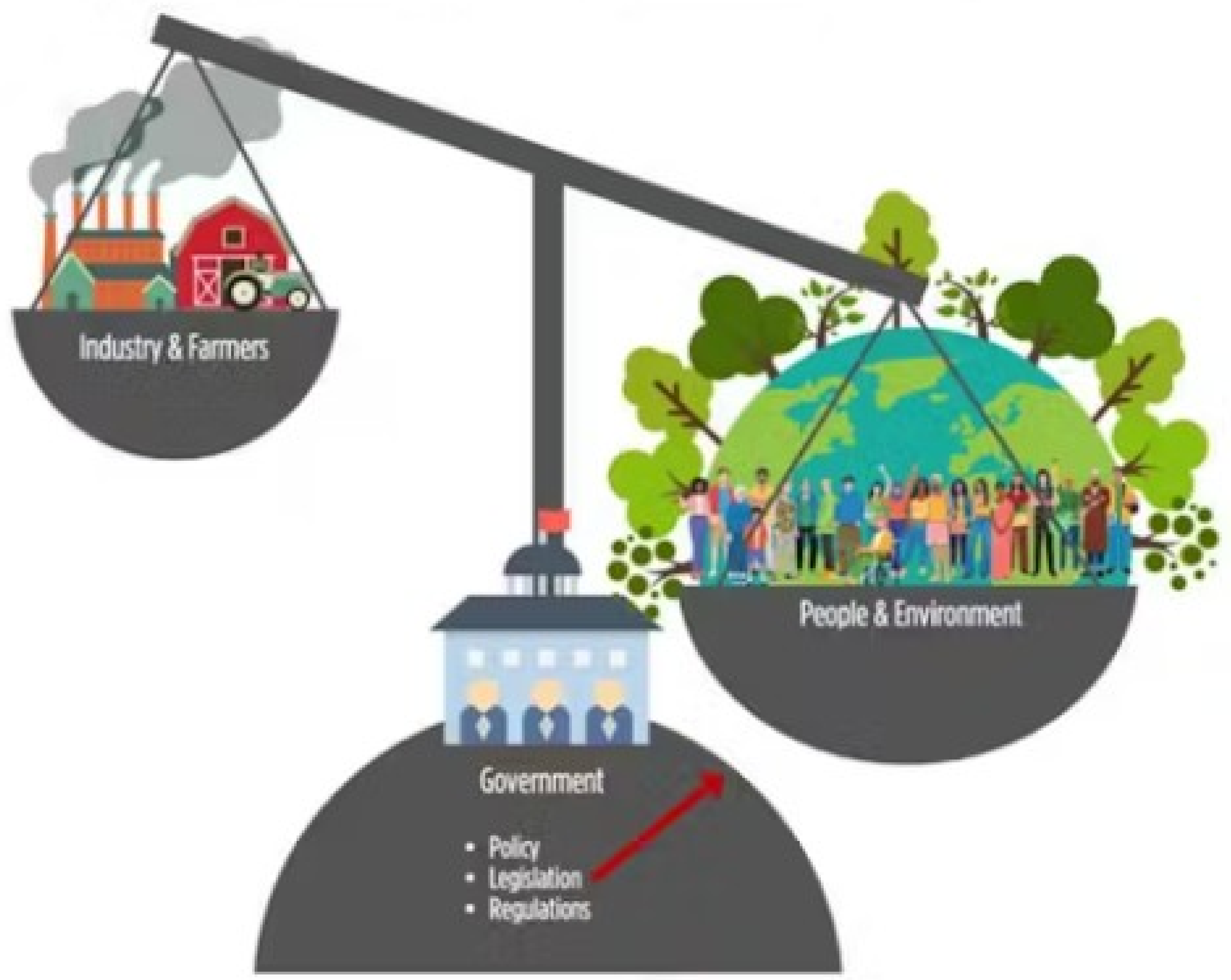
- **Audience tailored** - simple language
- **Cultural fit** – local languages; don't rely on labels
- **Two-way feedback** (participatory approaches)

Sustainable
(long-term & systemic approach)

- **Capacity building** – promote comprehension mechanisms
- **Integration into existing systems –** legislation updated; include industry RC regulations

Innovative
(engagement & technology)

- **Trust building to reduce misinformation** (counter industry narratives; influencers e.g. faith based leaders, doctors
- **Technology-driven comprehension mechanisms** (social media; QR codes; ehealth; dynamic digital labels; voice-based tools)



Thank you!

Visit the Division project website for pesticide/chemical materials and other research outputs.