Global citizen-led insights into the composition and risks of household dust

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DustSafe 2017-2021

- Engage citizens in understanding science related to dust and contaminants.
- Characterise chemicals, metals, allergens, microbial components in house dust.
- Guidance on what to do next where elevated contaminants are identified.
VegeSafe Program 2014-present

Soil lead in domestic gardens

- Analysed garden soils using XRF.
- >1800 individual premises across Australia tested.
- Results report sent back homeowners.
Invited paper

VegeSafe: A community science program measuring soil-metal contamination, evaluating risk and providing advice for safe gardening☆

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Citizen Science approach

- Advertise the program via media and existing email databases / Facebook.
- Citizens register online and complete household questionnaire.
- Vacuum dust mailed to Macquarie University for XRF and XRD analysis.
- Summary report returned by email.
- Maps and graphs of suburb level data generated on program web site.
Summary approach

360 Dust Analysis.
A global research initiative to get baseline data on harmful chemicals in regular households.

http://www.360dustanalysis.com
Sources of dust contaminants

**Traffic pollution**
- Chromium (Cr), Copper (Cu), Lead (Pb), Manganese (Mn), Zinc (Zn)

**Petrol stations**
- Lead (Pb), Manganese (Mn)

**Lead based paints**
- Chromium (Cr), Lead (Pb), Titanium (Ti), Zinc (Zn)

**Industrial areas**
- Arsenic (As), Cadmium (Cd), Copper (Cu), Iron (Fe), Mercury (Hg), Lead (Pb), Zinc (Zn)

**Polluted Landfill/soil**
- Arsenic (As), Bromine (Br), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Lead (Pb), Zinc (Zn)

**Household pollutants**
- EG. Smoke, furnishings, moulds, solvents, pesticides, cleaning products etc
Constituents of household dust

- Flame retardants
- Metals/metalloids
- Allergens
- Microbes
- Pesticides
- Organics
- Dust mites
- PFAS
- Asbestos
Why are contaminants a potential problem?

- Contaminants easily absorbed.
- Exposures typically via:
  - Veggies grown in contaminated soil
  - Ingestion of soil, dust, paint
  - Inhalation of soil and dust.
- Young children most at risk
  - higher absorption
  - more hand - mouth activity.
- Adverse neurocognitive and behavioural outcomes.
The 360° approach

- 600 dust samples stratified according to house age (20 yr bands) for *detailed* analysis of organic and inorganic contaminants.

- Program members undertake parallel analysis (comparable data).

- Data stored in a single portal.

- Any researcher can join the program and expand the network.

- Samples stored and available for new users.
The 360° approach

United Kingdom

USA / N. America

Asia

Australia
Outcomes

• Contribute to international resources and databank.

• Assist in characterising human exposure and risks in the home environment.

• Have potential for a wide range of applications outside households.

• Metadata explored using GIS for investigation of spatial trends.

• Links Australian public health via the Social Health Atlas of Australia.