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WASTE TO WEALTH:
SOLUTIONS FOR A SUSTAINABLE FUTURE
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Burning of waste on landfills in the Free State Province, South Africa

Dr H Roberts,
Central University of Technology, FS
CAFSaB/Life Sciences,
South Africa

Introduction: waste burning

Aim of the study:

- **Determine landfill conditions and community exposure** (health, environmental and social impacts) when **living on/close to waste burning and landfills** ;
- Evaluate the status of **ambient air quality at identified "hot-spot" landfills**
- Make **recommendations to reduce waste burning** and **improve current waste strategies**

Methodology:

- The study was conducted in **49 towns** and **50 landfills** in the FS, South Africa and 13 "hot spot" landfills were identified
- **Questionnaires** were conducted with –
  - 361 people living on/in proximity to landfills and in the town/city
  - 73 people living on and picking waste on the landfills
- Observations were noted and photographs were captured
- **Real-time air samples, $PM^{2.5}$ and PM^{10}**, taken **on "hot spot"** landfills using a hand-held **Aeroqual 500 Series monitor**.

IMPACT OF BURNING WASTE

ENVIRONMENTAL IMPACTS

- **AIR POLLUTION** (smoke, particulate matter, chemicals)
- **WATER POLLUTION**
- **SOIL POLLUTION**

HEALTH IMPACTS

- **RESPIRATORY DISEASES: asthma, bronchitis & emphysema**
- **HEART CONDITIONS**
- **CANCER**
- **PREMATURE DEATH**
- **DEATH**

SOCIAL IMPACTS

- **FINANCIAL BURDEN**
- **POOR LIVING CONDITIONS**

SOME "HOT SPOT" LANDFILLS

Potential environmental impacts on FS landfills: water and wind-blown waste

PEOPLE LIVING ON LANDFILL SITES

AIR POLLUTION: POTENTIAL FOR HUMAN HEALTH ISSUES

Municipal workers standing in the smoke (intentional burning)

Air quality standards: particulate matter

SANS 69: 2004 – South African National Standard – Framework for setting & implementing national ambient air quality standards and

SANS 1929:2005 – South African Standard – Ambient Qir Quality – **Limits** for **particulate matter less than 10 µm in aerodynamic diameter PM10**
Schedule 2 of the National Environmental Management: Air Quality Act (AQA) (Act No. 39 of 2004) (DWAF, https://www.dffe.gov>default>files>docs)

Pollutant thresholds of PM10 and PM2.5

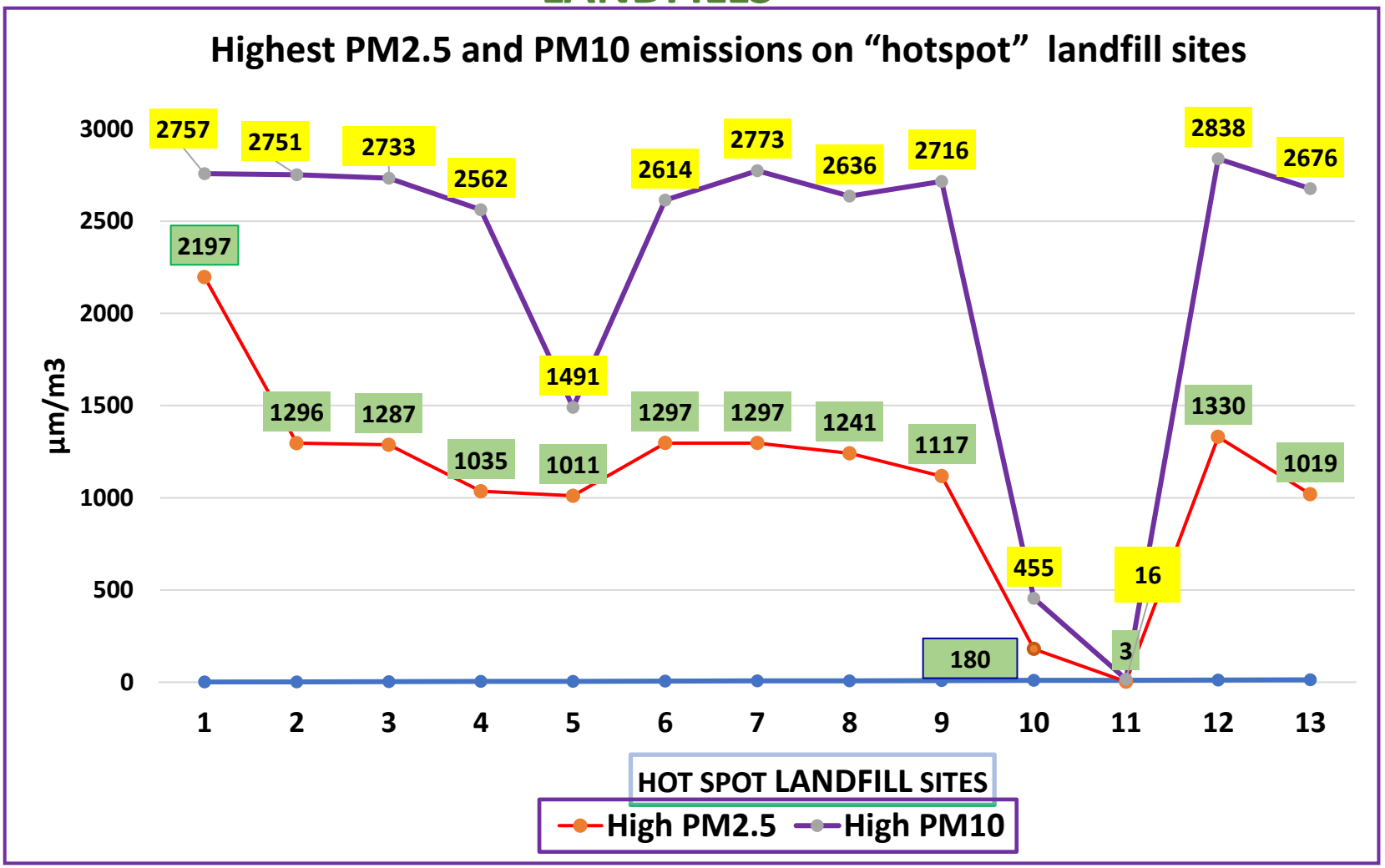
Pollutant	Low exposure µm/m³	Moderate µm/m³	High µm/m³
PM^{10} (SAQA)	<50	50 – 75	>75
Proposed standard	**Highest daily µm/m³**	**Annual averages**	
PM10	**180 µm/m³**	**40 µm/m³**	

- Each limit = an hourly averaging period
- (Govt. Gazette No. 28899, 9 June 2006).

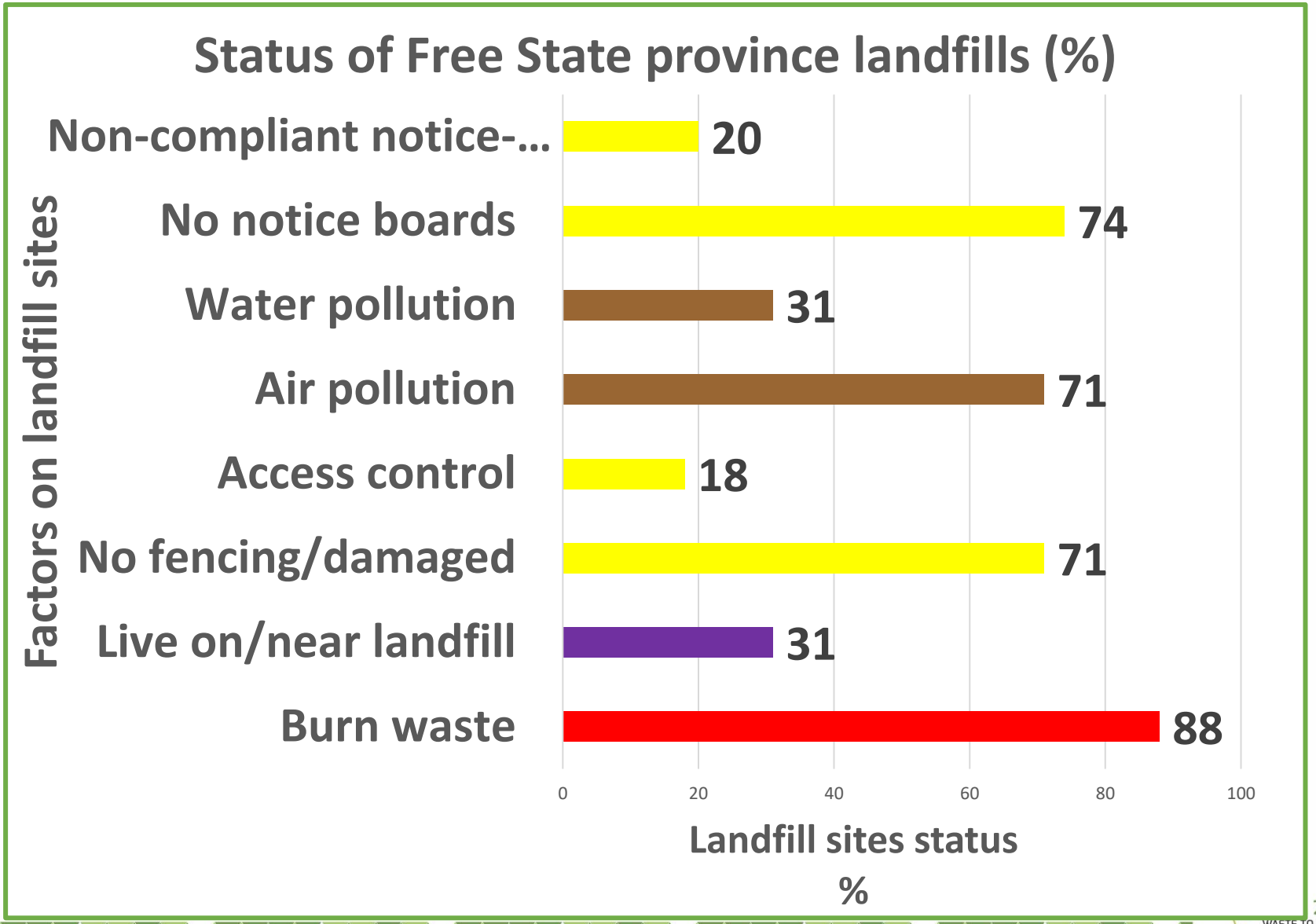
Air pollution levels: "hot spot" landfills (exceeds max. levels)

Landfill	Lowest $PM^{2.5}/\mu mm^3$	Highest $PM^{2.5}/\mu m/m^3$	Lowest $PM^{10}/\mu m/m^3$	Highest $PM^{10}/\mu m/m^3$	
1	4 $\mu m/m^3$	2197 µm/m3	13 µm/m3	2757 µm/m3	
2	5 $\mu m/m^3$	1296 µm/m3	10 µm/m3	2751 µm/m3	
3	4 $\mu m/m^3$	1287 µm/m3	13 µm/m3	2733 µm/m3	
4	3 $\mu m/m^3$	1035 µm/m3	13 µm/m3	2562 µm/m3	
5	5 $\mu m/m^3$	1011 µm/m3	7 µm/m3	1491 µm/m3	
6	1 $\mu m/m^3$	1297 µm/m3	2 µm/m3	2614 µm/m3	
7	1 $\mu m/m^3$	1297 µm/m3	2 µm/m3	2773 µm/m3	
8	0 $\mu m/m^3$	1241 µm/m3	1 µm/m3	2636 µm/m3	
9	1 $\mu m/m^3$	1117 µm/m3	1 µm/m3	2716 µm/m3	
10	4 $\mu m/m^3$	180 µm/m3	5 µm/m3	455 µm/m3	
11	0 $\mu m/m^3$	3 µm/m3	1 µm/m3	16 µm/m3	
12	0 $\mu m/m^3$	1330 µm/m3	1 µm/m3	2838 µm/m3	
13	9 $\mu m/m^3$	1019 µm/m3	16 µm/m3	2676 µm/m3	

HIGHEST AVERAGE $PM^{2.5}$ & PM^{10} EMISSIONS: "HOT SPOT" LANDFILLS



LANDFILL CONDITIONS



Environmental and social effects: waste burning and poor landfill management

- Chemicals: Children and animals (poisoned and death)
- Houses could burn
- Polluted air and littering
- Compromised environmental aesthetics
- Smouldering waste heaps, leachate and smoke and
- Bad odour.

Social impacts:

- Housing prices lower
- Crimes, drugs and gender-based violence on landfill sites and
- Residents feel unsafe.

HEALTH EFFECTS IDENTIFIED BY RESPONDENTS

Diseases/symptoms	Annual & Bi-annual %	Daily, weekly, monthly %
Respiratory disease	**47**	**25**
Reproductive symptoms	**41**	**4**
Gastro-intestinal	**41**	**27**
Dermatological	**38**	**29**
Muscoskeletal symp	**40**	**29**
Eye symptoms	**33**	**29**
Ear/hearing symptoms	29	21
Dental disease/symptoms	**34**	**41**
Mental health disorder: **adults**	36	18
Mental health disorder: **children**	30	15
Psychological disorder	**44**	**29**
Cardiovascular disease	**43**	6

Health effects identified by respondents

Diseases/symptoms	Annual & Bi-annual %	Daily, weekly, monthly %
Sudden falling & seizures	33	7
Blood sugar level disorders	**34**	11
Cancer related diseases	**37**	6
Stroke	33	6
Drastic weight loss	37	19
Fatique (extreme tiredness/ weak)	**33**	**33**
Jaundice	27	18
Fever (heavy sweating)	**37**	**37**
Headaches/migraines	**34**	**25**
Acute sickness/sudden death	34	14
Sudden falling & seizures	33	7

CONCLUSION

- Burning of waste cause disease and death!
- Landfills need to comply with legislation and
- Improving landfill conditions must be priotizized.

Waste strategies to reduce waste burning

- Increase **community awareness of dumping, burning hazards**, and motivate more recycling and alternative options;
- **Training waste workers and communities to improve landfill waste handling;** prevent open burning of waste by authorities and communities;
- **Co-operation from municipal leaders** to improve waste strategies;
- Monitor **personal air pollution PM^{10} and $PM^{2.5}$,** and other criteria air pollutants,on landfills using specific sensors.

Thank You!

Dr Hester Roberts
Central University of Technology, FS.
CAFSaB/Life Sciences, South Africa
robertsh@cut.ac.za;
heterrscott@gmail.com
Cell: +27 67 405 2617

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