

Sub-Regional workshop on enhancing national cooperation and coordination for the implementation of the BRS and Bamako conventions and SDGs in the ECOWAS region

Seminar on Sound Management of ULAB in the ECOWAS Region, Dakar Senegal, 24th Dec. 2016

Some previous studies showing environmental and health impact of lead acid batteries in Kenya

By

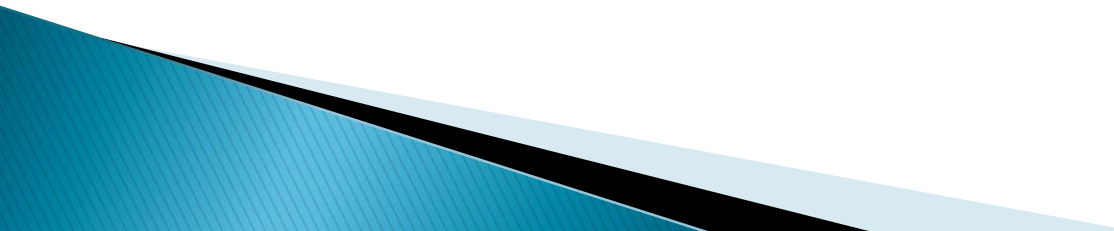
Dr. Faridah Hussein Were

Collaborating institutions

- **College of Biological and Physical Sciences, University of Nairobi, P.O. Box 30197-00100 in Nairobi, Kenya**
- **Kenya Industrial Research and Development Institute (KIRDI), P.O. Box 30650-00100 in Nairobi, Kenya**
- **Occupational Knowledge International, 4444 Geary Boulevard, Suite 300 San Francisco, CA 94118 USA**
- **Financed by the government of Kenya through the National Commission for Science, Technology and Innovation**

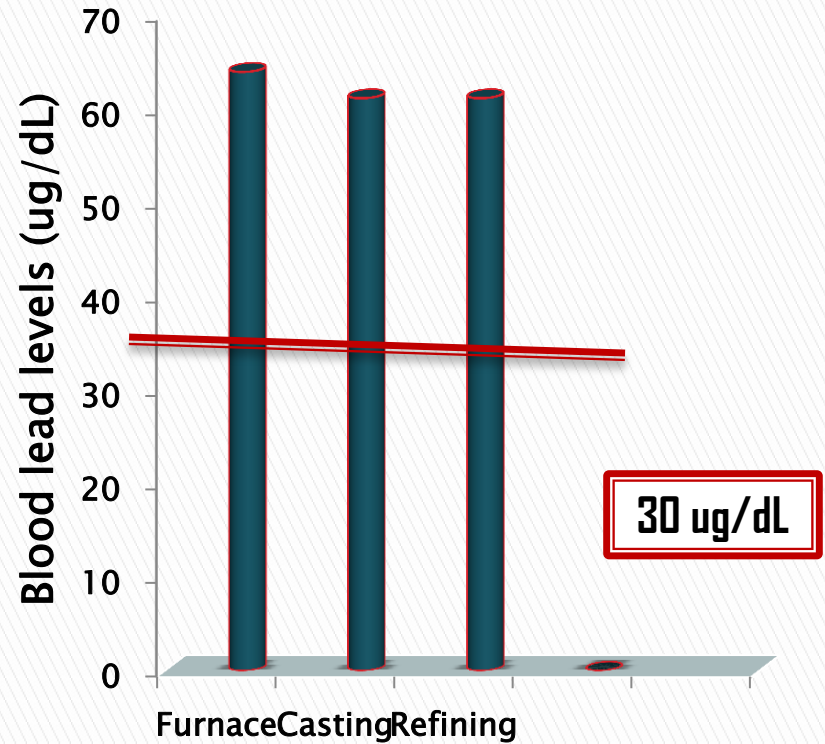
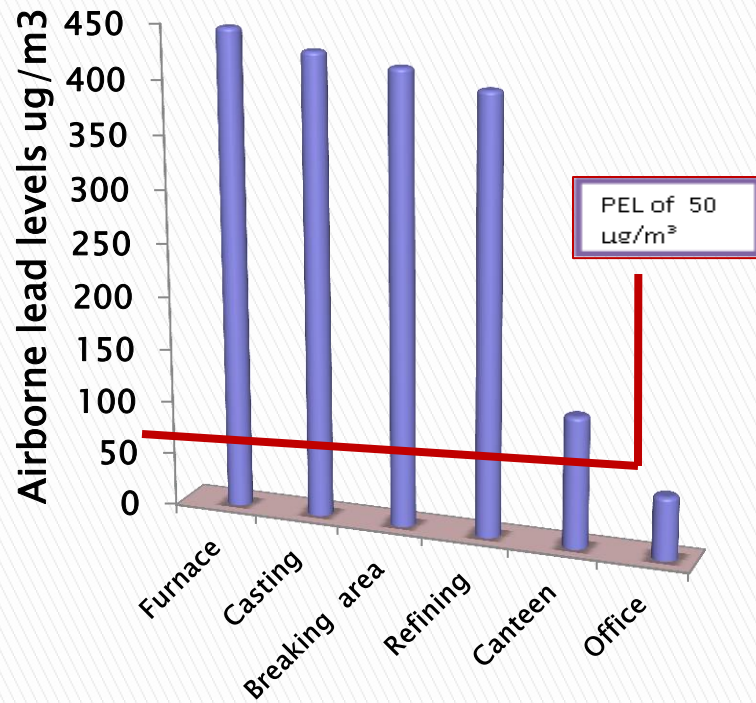


Previous research work

- ▶ **Assessing air and blood lead concentrations among workers and comparing with established exposure limits (2009 – 2010)**
 - ▶ **Evaluating blood lead concentrations blood pressure among diverse workers (2011 – 2012)**
 - ▶ **Assessing lead exposure from the informal battery lead acid recycling to the nearby communities (2013 – 2015)**
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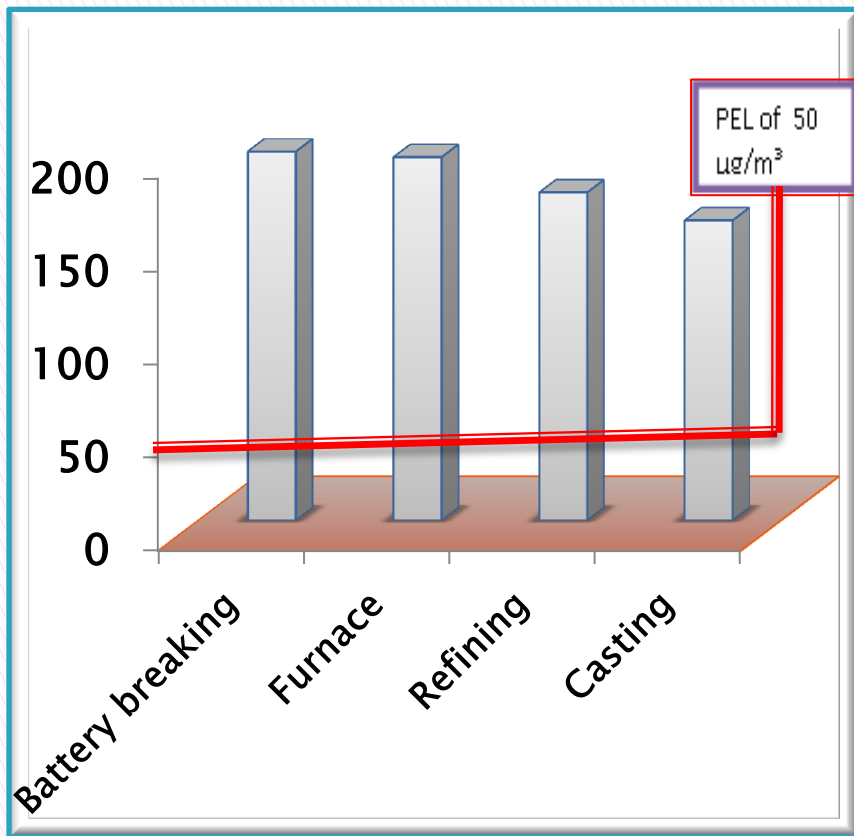
Lead levels in large scale battery recycling plant (2009 - 2010)

Average airborne lead levels

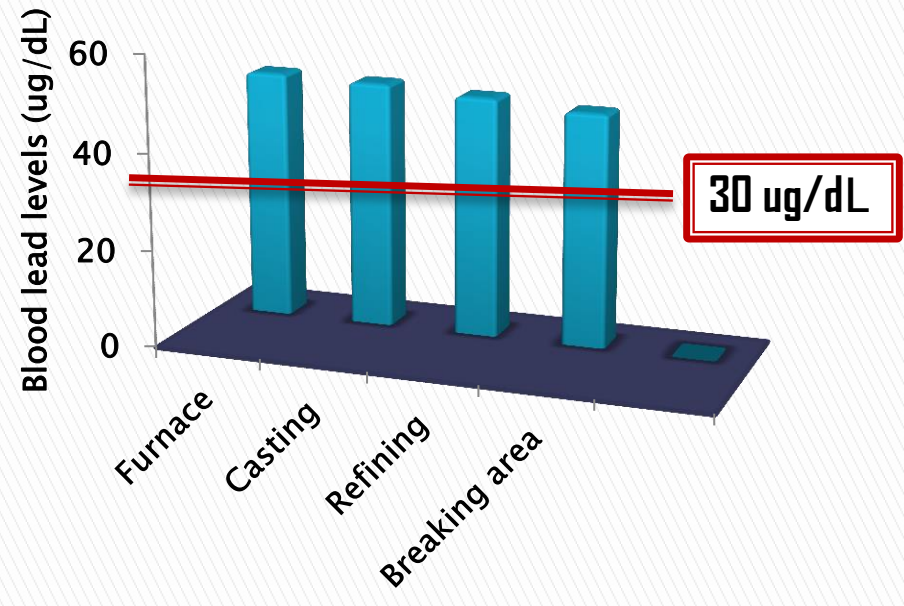


Average blood lead levels

Lead levels linked to blood pressure in large scale battery recycling plant (2011-2012)



Airborne lead levels



Blood lead levels linked to blood pressure

Battery recycling process before and after the research

Stockpile of used lead batteries
(2011-2012)



During the research (2011-2012)

Storage and breaking area of ULABs
(2014)



After the research (2014)

**198 ug/m³
airborne lead
level**

Breaking area of ULABs (2011-2012)

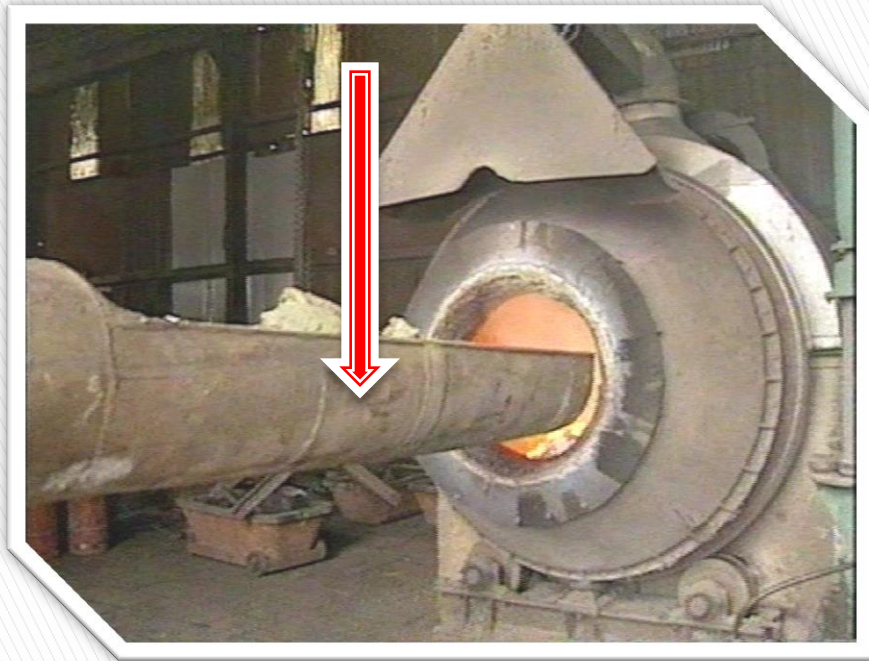


- ▶ **2016: Looking for possibility of introducing mechanical breaking of batteries however they require more volume to run to the capacity**

ULABs are broken using axes and sorted manually to remove plastic The process is inefficient as exposure level is elevated

Reduction process in the furnace

195 ug/m³
airborne lead
level



Rotary furnace 2011-2013



Closed after
charging

105
ug/m³
airborne
lead level

Rotary furnace 2014 (new)

Refining process

Open vessel (2011-2012)

Lead containing fumes



176 ug/m³ airborne lead level



Upgraded (2014)

Disposal of industrial waste along side general wastes

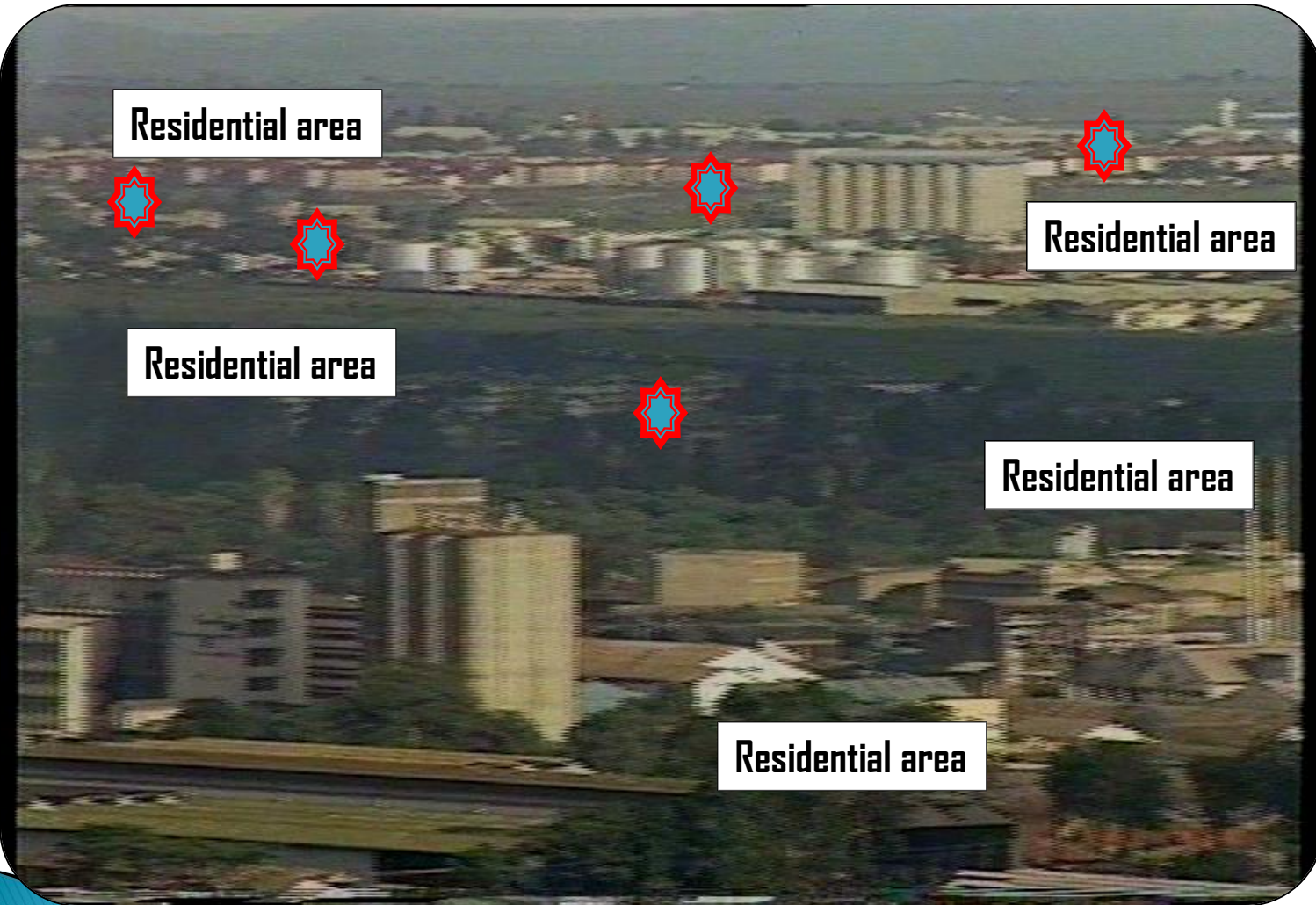


Disposal at Dandora



Open burning to reduce on volume in Mombasa county

Overview of small scale lead recycling in Industrial Area in Nairobi



Informal sector

- ▶ **Dismantling of lead acid battery**



Composite soil 3880mg/kg



Composite soil lead level of 1632
mg/Kg

Soil lead levels of battery recycling activities within the residential areas in Nairobi

Composite soil lead level of 6780 mg/Kg ▶ Composite residential soil lead level 4300 mg/Kg



Reconditioning of lead acid battery



School playground for children

Lead in soils near the informal battery recycling activities (2014)

Dumping grounds of industrial activity residues



Lead levels of soil lead in nearby residential areas



Outcry of lead poisoning in Mombasa

Background information	Year
Year of establishment	2007
Concerns of lead poisoning among the community	2010
Confirmation of poisoning and factory closed, However, the community continued to be exposed	2012
Investigation made with technical assistance from US CDC Indication of serious poisoning of blood lead levels in the range of < 5 ug/dL - 420 dL and the media took up the issue	2014

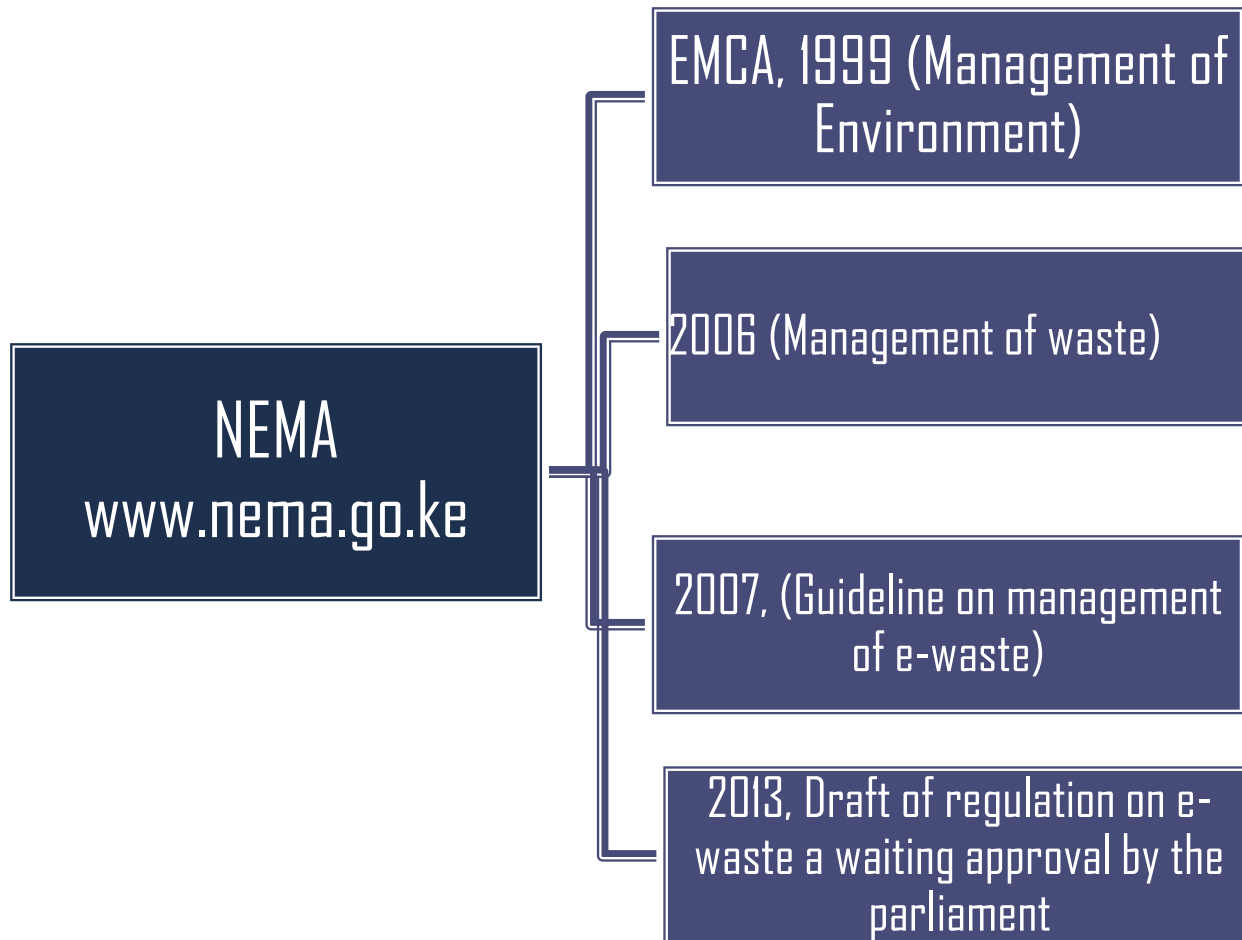
Lead level report by the ministry of health in Kenya

Parameters	N		Range	Blood lead (µg/dL)	N (%)	Implication
Soil	31		0.1 - 2655 Threshold: 400 mg/Kg	< 5.0	20 (21)	Low
House dust	31		0.1 - 47.6 µg/f ² Threshold: 40 µg/f ²	5 - 9.9	25 (39)	Elevated
Drinking water	31	< Action level of 50 µg/dL		10 - 19.9	16 (25)	High
Soil inside the factory	1	26,837 mg/Kg		20 -45.0	4 (5)	Highly elevated
Soil near the factory gate	1	2,380 mg/Kg				

Environmental lead levels

Blood lead level

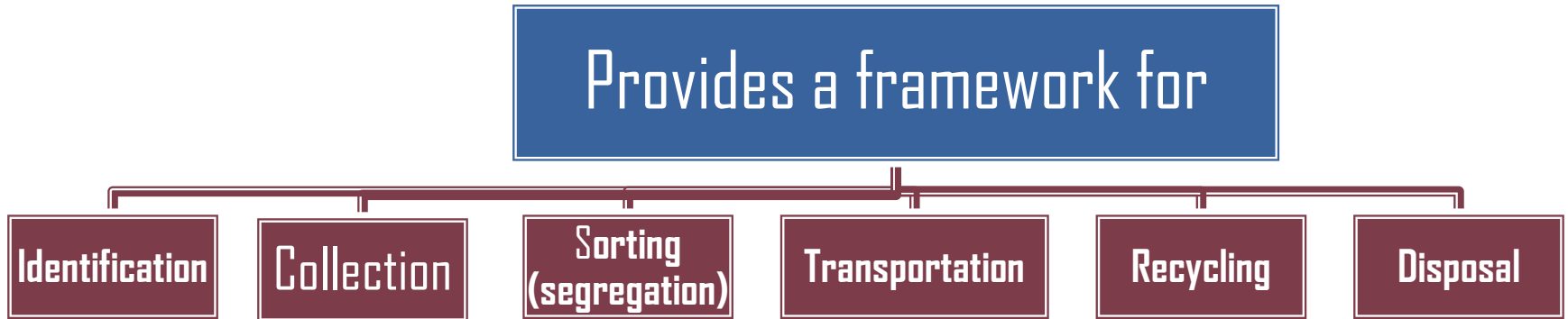
Legal and regulation framework on management of wastes



Solid waste management

- ▶ **Industrial waste**
 - ▶ **General waste**
 - ▶ **Hazardous waste**
 - ▶ **Pesticides**
 - ▶ **Radioactive waste**
 - ▶ **Biochemical waste**
 - ▶ **E-waste (special waste)**
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Draft regulation on management of lifecycle of e-waste (2013)



- **Segregation and storage of waste from the source**
- **Using licensed transport to the approved Recyclers**

The regulation covers specific responsibilities

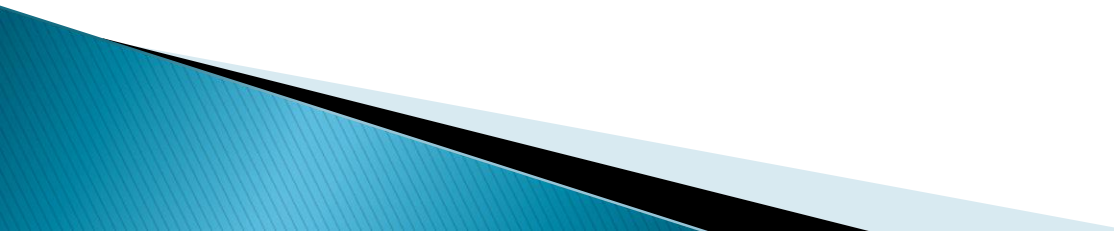
Importers/producers

Generators

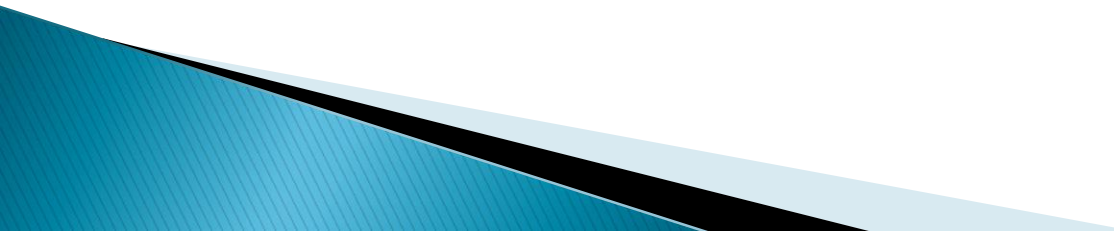
Recyclers

Repairers

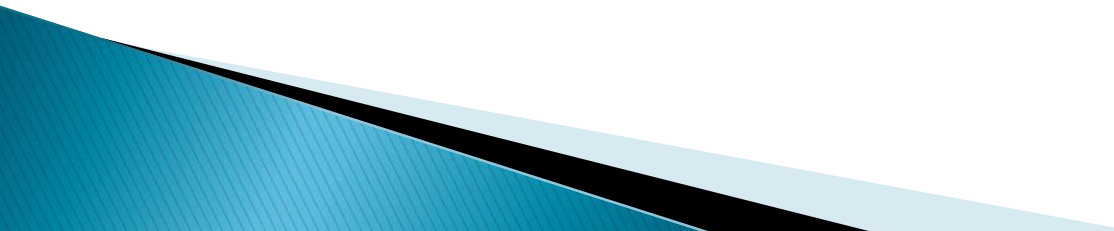
Transporters



Other legislation

- ▶ **The Directorate of Occupational Safety and Health Services (DOSHS) among others**
 - ▶ **Scrap metal bill (2015), the East African Community countries banned the export of scrap metal. A report showed that region's metal-related industries were facing closure due to shortage of raw materials.**
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What is needed

- **Regular monitoring of all sources of lead exposures in human and environment (life cycle)**
 - **Interventions and enforcement of existing legislation, and comprehensive regulatory framework for lead acid battery recycling operations**
 - **Capacity at all levels of government (both National and 47 counties)**
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Thank you

