



Overview of Lead Poisoning Outbreak Response in Zamfara State

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What is Lead?

- Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust
- It can also be produced from human activities such as mining and burning of fossil fuels

What is Lead Poisoning?

- Is a medical condition caused by increased levels of heavy metal lead in the body

Routes of Exposure to Lead

- Inhaling air or dust that contains lead. Mining activities can generate lead into the air
- Eating food or drinking water that contains lead
- Parents who are exposed to lead in the workplace can bring lead dust home on clothes or skin and expose their children

Exposure to Lead Particles in Dust



Sources of Global Lead Poisoning

- Lead mining and smelting
- Battery recycling
- Leaded gasoline
- Paint
- Traditional medicines
- Toys
- Discarded electronic devices

Grinding of Raw Ore for Gold



Effect of Lead on Human Health

- High levels of lead can be toxic to nervous and reproductive systems, kidneys, heart, bones
- It interferes with nervous system development and can cause permanent learning and behavior disorders in children
- May cause miscarriage in pregnant women
- May cause reduced sperm production in men

Why are children susceptible?

- Behavioral factors e.g frequent hand-to-mouth activities
- Biological factors
 - Greater gastrointestinal absorption
 - Developing neurological systems

Epidemiology

- WHO estimates that lead poisoning causes 0.6% of global burden of disease
- It contributes approximately 600,000 cases of intellectual disability in children annually
- In past 20 years, high blood lead levels (BLLs) documented globally in children
 - living in mining and smelting areas
 - or where lead batteries are reclaimed

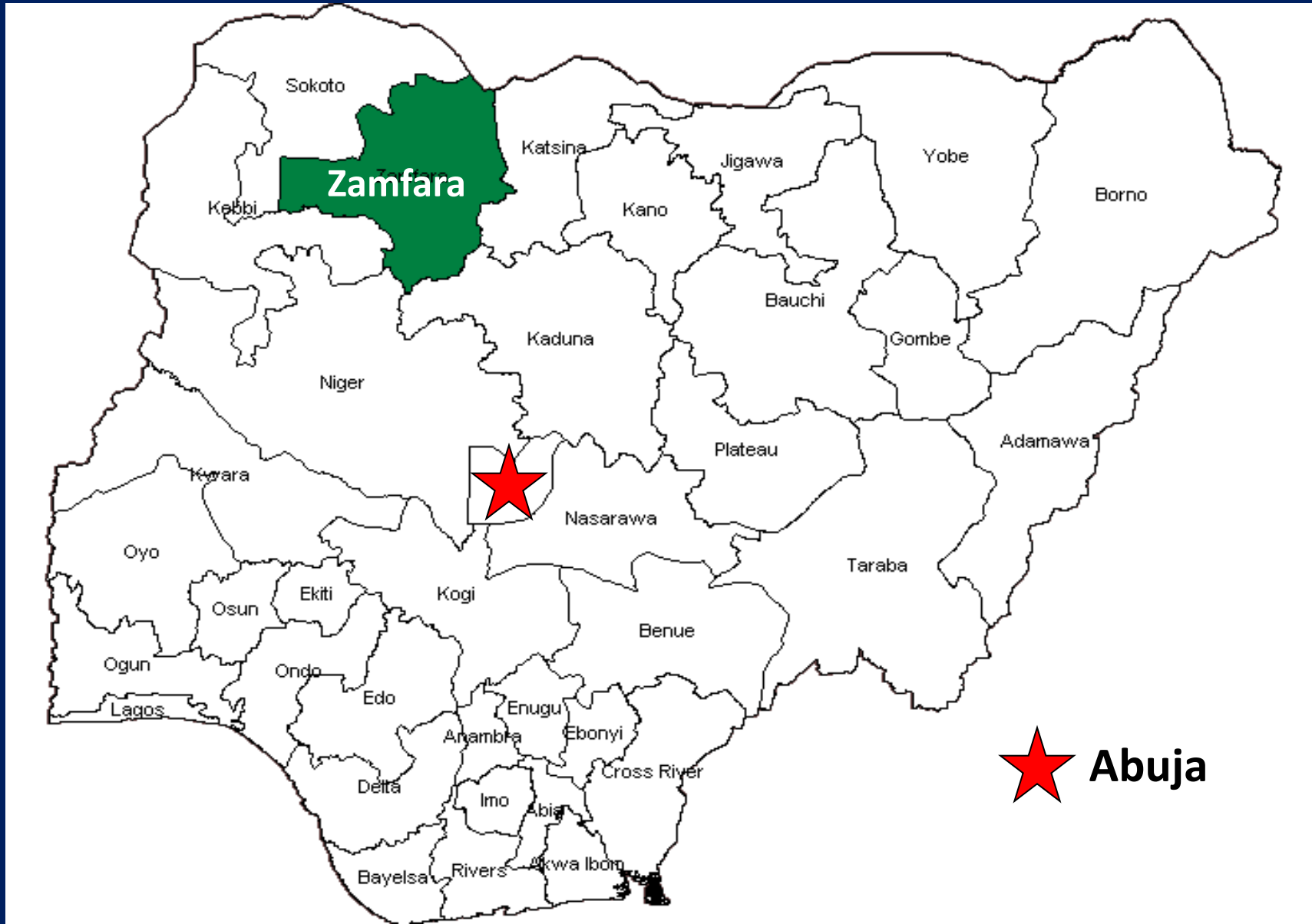
Epidemiology (2)

- Only one recent report documents fatalities from childhood lead poisoning
 - In 2008 in Senegal
 - Source was informal battery recycling
 - 18 children died

Notification of Outbreak

- In March 2010, MSF staff in Zamfara MOH clinics reported ongoing pattern of excess childhood illnesses and deaths
- Mostly affected were children < 5 years in Bukkuyum and Anka LGAs
- Symptoms included vomiting, abdominal pain, headache and convulsions
- It was noted that affected villages participated in artisanal gold ore processing activities

Location of Zamfara State in Nigeria

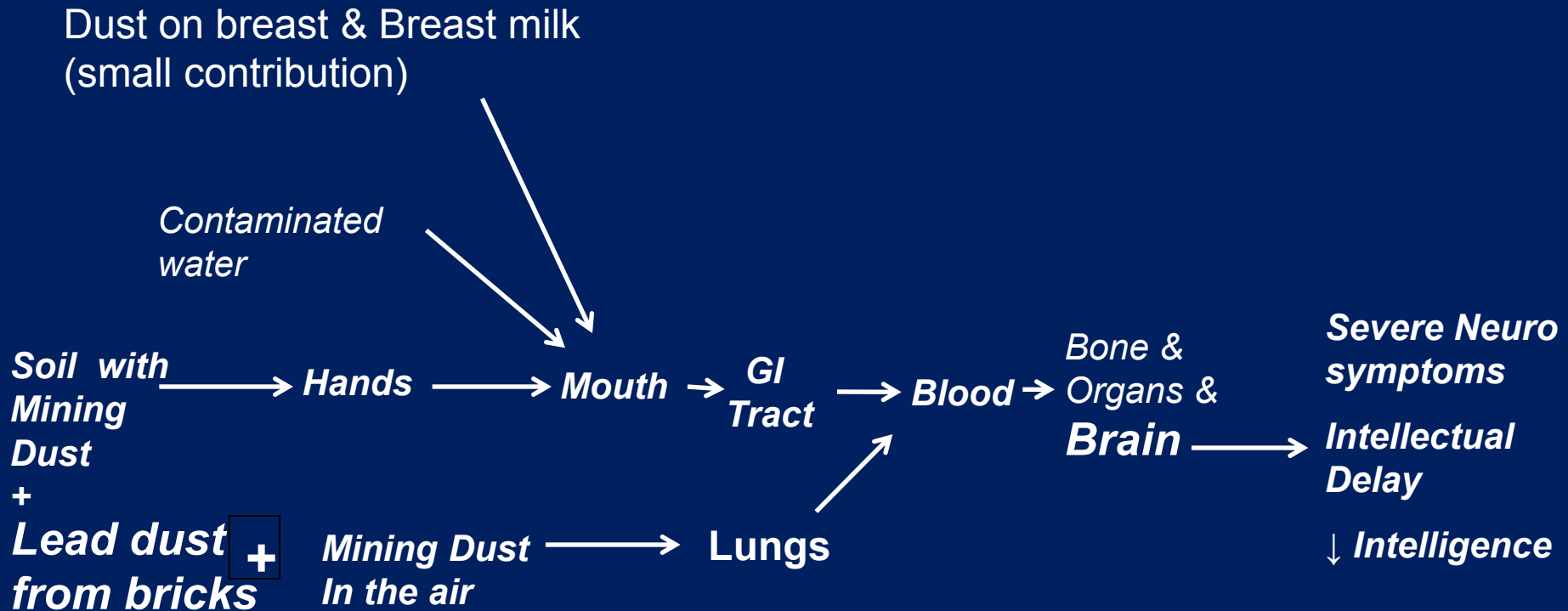


Notification of Outbreak (2)

- Heavy metal poisoning was considered a potential source of illness
- Venous blood samples from eight symptomatic children indicated high Blood Lead Level
- This far exceeds WHO and US CDC levels of concern of 10 $\mu\text{g}/\text{dL}$

Model Of Exposure

Here is the model of the problem
in the affected villages



Reference: Prof. Dr. Randall Bond, WHO Consultant

Control Measure

Here, the sources of infection can be interrupted

~~Dust on breast & Breast milk~~
(small contribution)

~~Contaminated water~~

~~Soil with Mining Dust~~

~~Lead dust from bricks~~ +

~~Mining Dust In the air~~

Hands

Mouth

GI Tract

Blood

Bone & Organs & Brain

~~Severe Neuro symptoms~~

~~Intellectual Delay~~

~~↓ Intelligence~~

Reference: Prof. Dr. Randall Bond, WHO Consultant

Response to Outbreak

- On May 16 2010, combined team from FMOH, CDC, WHO and Nigeria FELTP joined MSF and Zamfara SMOH
- Purpose of investigation
 - Determine cause and contributing factors to the outbreak
 - Triage children aged < 5 years with lead poisoning for emergency chelation therapy

Response to Outbreak (2)

- National task force on lead poisoning established
- Zamfara State task force established
- High-level advocacy visit involving Hon. Minister of State for Health
- Community involvement (Youth empowerment)
- UN assistance of Central Emergency Response Fund grant

Response Activities

- Cross sectional study to identify cause and contributing factors to outbreak
 - Door-to-door survey
 - Interview parents
 - Sample blood from children < 5 years
 - Collect soil from households
- Environmental remediation
 - Blacksmith Terragraphics

Laboratory Diagnosis

- Conventional Medication with Antibiotics/ Antimalarial - Ineffective
- Initial Laboratory Results (BLL: 109.7 - 370 ug/dL) Indicative of lead toxicity - Tested in GERMANY by MSF.
- Initial Soil Sample Results
- (Over 10,000 ppm)
- Indicative of Environmental Lead contamination



■ CDC: ≥ 10 ug/dL-Lead Poisoning



■ US/EPA: ≥ 400 ppm-Contamination

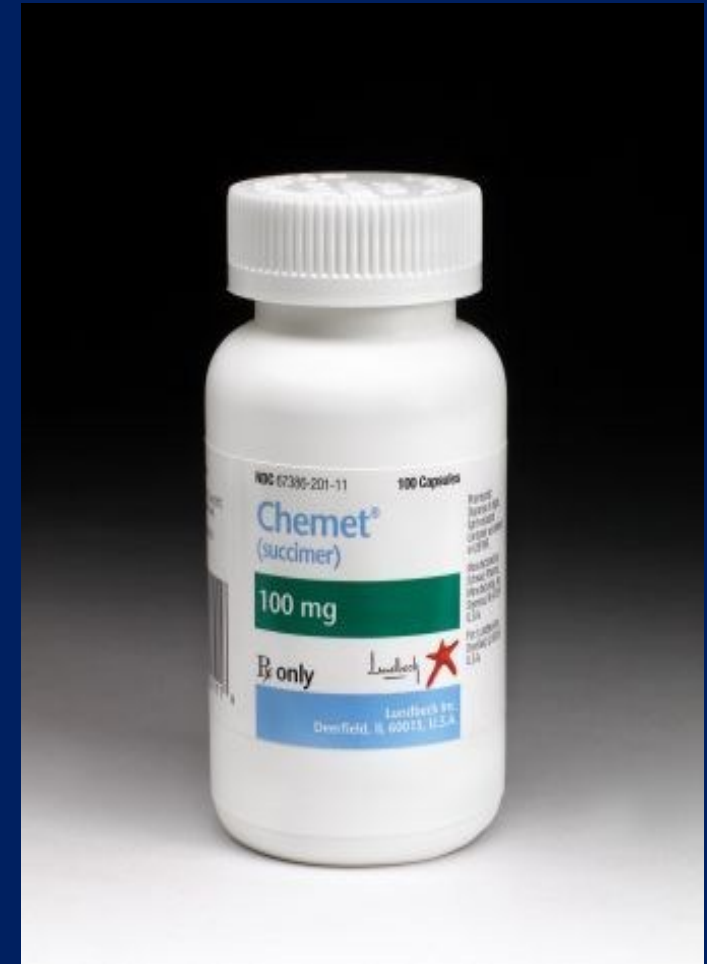
Response Activities (2)

- Chelation therapy
- Community-based health education campaigns
- Training of Zamfara health staff on laboratory diagnosis and surveillance
- Strengthening of surveillance and active case search
- Regulation of mining activities

Case Management

In collaboration with SMOH,
MSF and CDC:

- Reviewed case management including treatment protocol, used by MSF to treat cases
- Donated Chemet (DMSA) to ensure sustained supply of chelation agent at the Health Facilities
- Identified a referral Health Facility for lead poisoning in Gusau
- Over 1000 under-fives received chelation treatment



Community interactions



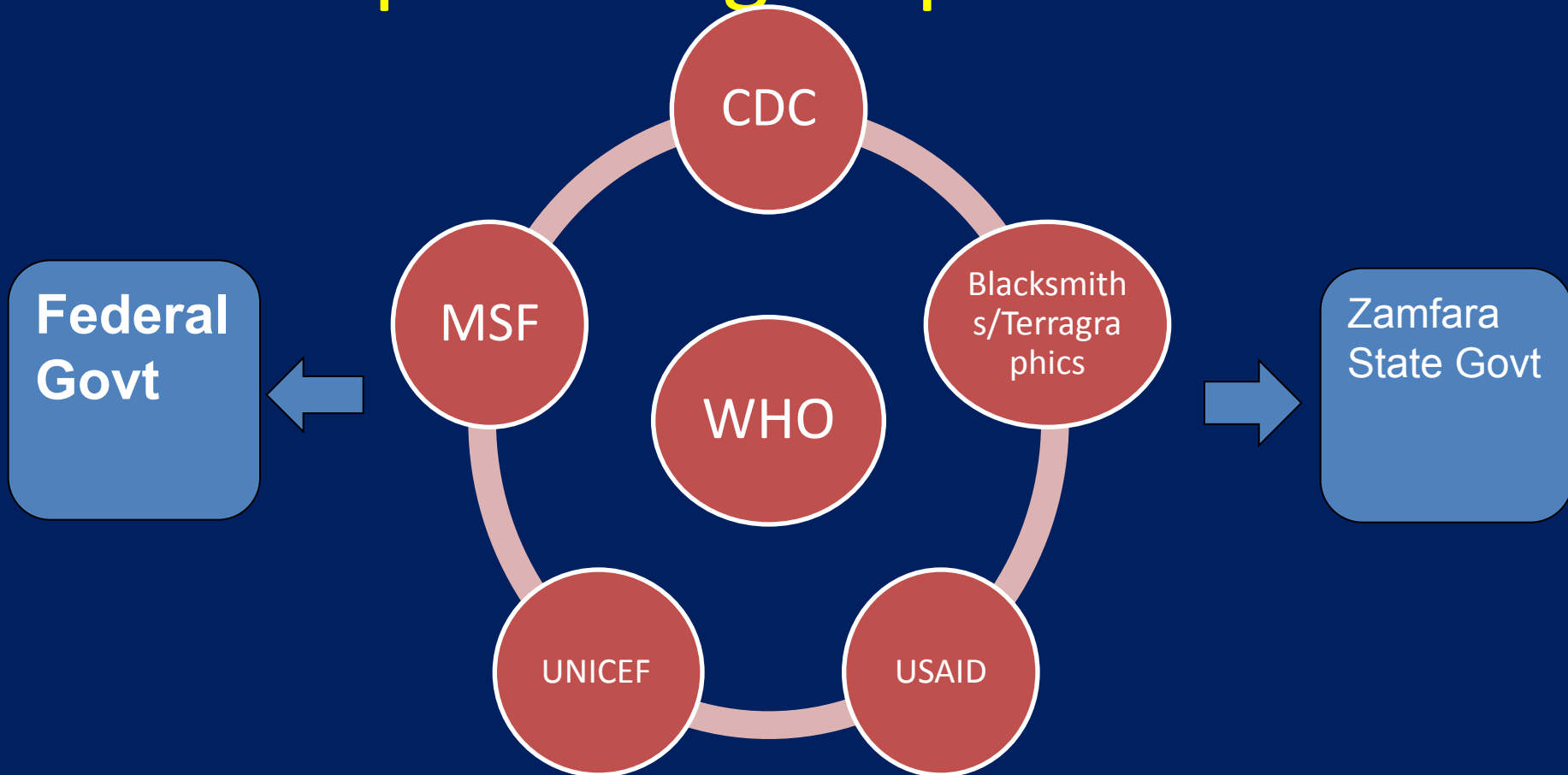
Challenges Related to Case Management

- Refusal of cases to leave homes
- All affect children do not appear ill
- People still return to contaminated environment
- Villages/compounds remain contaminated after child discharge
- Treatment yet to cover the teaming population of older children, pregnant women, miners, etc.

Other Current Challenges

- Remediation Challenges:
 - Only Seven Villages Remediated
 - Eight Villages yet to be remediated
 - Bagega (Anka LGA) yet to be remediated
 - Bagega is bigger than all the 7 remediated villages
- Logistics (Monitoring Survey):
 - Transportation, Security and Funding
- Regular Community Demands:
 - Mining Process Stores and Boreholes (BH) at sites
 - Boreholes (constructed BH still not inaugurated)
 - Noncompliance(mining activities returned <500m

Development Partners in the lead poisoning response



Thank You

