Reporting Elevated Biomonitoring Results to Study and Project Participants

Elisabeth Cook[1], **Gurleen Kaur[1,2]**, Eric P. Bind[1], Chang Ho Yu[1], Andrew Steffens[1], Colleen Donohoe[1,2], Zhihua (Tina) Fan[1]

1. New Jersey Department of Health, Public Health and Environmental Laboratories, Ewing, NJ 08628
2. Association of Public Health Laboratories (APHL), Bethesda, MD 20814

Introduction

Common challenges for reporting back biomonitoring results include:
- Lack of consensus on reference ranges and critical values for chemicals without established health limits[2].
- Complexity of conveying pertinent information to individuals with varying scientific literacy[2].

Goal: Maximize the value of results and empower individuals to make changes to reduce exposure.

The NJ Health & Nutrition Examination Survey (NJHANES)
The first statewide probability-based population biomonitoring surveillance study conducted by the NJ Department of Health. NJHANES aims to examine the health, nutrition, and body burden of NJ residents using questionnaires and biospecimen analysis of over 120 environmental chemicals. Participants receive partial reports containing toxic metal levels, intermediate results for elevated levels or upon request, and final reports upon completion of the study.

Prenatal Screening Program (PSP)
Since 2019, the PSP at University Hospital in Newark has tested >17,000 mothers and babies for lead and mercury and is expanding to other hospitals. Of those tested, >13,000 had exposures to lead and/or mercury with >1000 expectant mothers and babies over the health limit. Results are reported to hospital staff to disseminate back to patients.

Methodology

Defining Terms:

ATSDR: Agency for Toxic Substances and Disease Registry

CLIA/CLIS: Clinical Laboratory Improvement Amendments/

Services

Elevated/Critical Value: above the established health limit

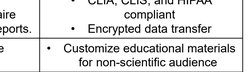
or 3x the 95th percentile,

Reference Range: percentiles for chemicals sourced from NHANES

Subject Matter Expert (SME): Individual with extensive knowledge and experience in a specific field or disclipine[3].

How are SME Calls Conducted?

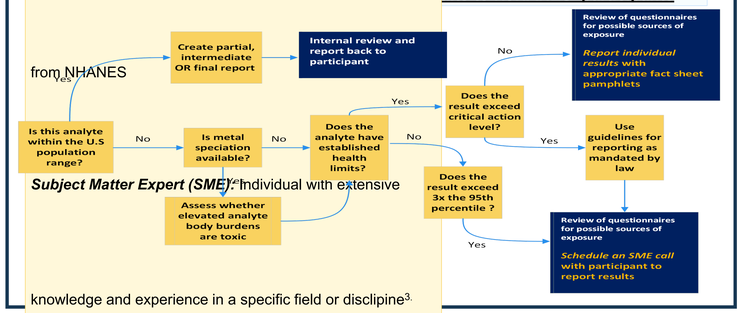
1. Elevated results flagged in LIMS
2. Internal review by NJHANES team and SMEs
3. SME call with participant to discuss results and common sources of exposures



results to the study participants

	Prenatal Screening
and Hg e for other ter IV)	• Test for Pb and Hg ONLY due to established prenatal and child limits
e sources pamphlets	• CLIA compliant report
QA officer t ordering ionnaire nd reports.	• Results reported to patients through providers • CLIA, CLIS, and HIPAA compliant • Encrypted data transfer
lience	• Customize educational materials for non-scientific audience
kages vels the 95th	• Medical provider reporting • Report to CDRSS • Support from NJ Poison Control and other local health departments and state agencies

ults to NJHANES participants



Results

Figure 2: Overall NJHANES Reporting Status

- 195 Partial Reports
- 25 Intermediate Reports
- 25 SME calls
- 9 Contacted State Agency

With Established Health Limits:

Arsenic (As) – 4
Lead (Pb) – 4
Mercury (Hg) – 16

Without Established Health Limits:

Volatile organic compound (VOC) Metabolites – 7
Polycyclic aromatic hydrocarbon (PAH) Metabolites – 2
Metals (Uranium, Thallium) – 2
Nicotine Metabolites – 3
Per- and polyfluoroalkyl substances (PFAS) – 1

Figure 3. Percentage of Select NJHANES Ana

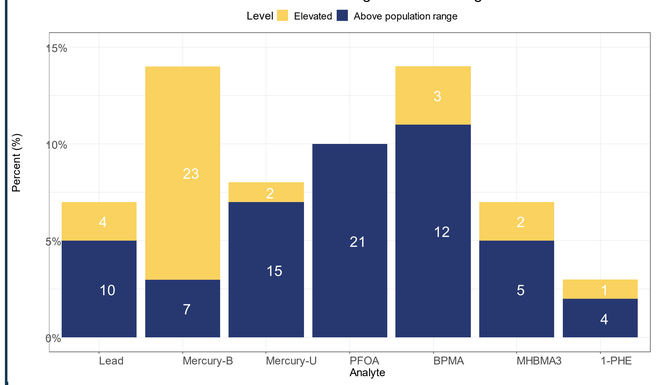


Figure 3:

Frequency of 7 analytes of interest above the average population level vs. 3x the 95th percentile.

Table 2: Case Study #1 (Prenatal Screening)

	Mother					Baby
Test Date	09/17	12/9	01/13	02/10	4/16	4/16
Hg (µg/L)	44.7	13.8	7.80	5.56	3.41	7.37
% MeHg	95%					100%

Table 3: Case Study #2 (NJHANES)

Analyte	Initial Result	Final Result	Population Range Value	Critical Value / Reportable Level*	Change
Hg in Urine (µg/L)	1.660	4.18	0-1.05	3.15/20*	252%
Hg in Blood (µg/L)	26.9	3.38	0-3.87	5/28*	-87%
1-PHE in Urine (ng/L)	2150	1300	0-482	1482	-39.5%
1- PYR in Urine (ng/L)	895	347	0-674	2022	-61.2%

Case Study #1
- First prenatal visit at week 10 of pregnancy
- Source identification: Fish – education and discontinued consumption of large fish
- Hg levels declined steadily during pregnancy
- Baby born with 90-95% less mercury than would be expected due to intervention

Case study #2
- Received partial/intermediate report and had 2 SME calls
- Eight-month gap between initial and follow up result
- Mercury
  - Decrease in consumption of large fish led to significant decrease in blood Hg levels
- PAHs
  - 1-PHE >3x95th; 1-PYR <3x95th
  - Significant decrease in both due to use of ventilation in kitchen and house plants

Conclusions

NJHANES
- **Final report template is in progress with the following considerations:**
  - 500 participant target for NJHANES ending year of 2024.
  - Compare participant results to NHANES and NJHANES 50th and 95th percentiles

Prenatal Screening
- Elevated lead and mercury levels are identified by the standard-of-care model that would otherwise go undiagnosed.
- These exposure can be addressed and treated.

Providing actionable data empowers individuals to make changes to reduce their exposure and improve their health outcomes.

Our approach to reporting elevated results is proving to be effective and meets our overall program goals/objectives.

Future Plans

NJHANES
- Continue to modernize our data infrastructure for more accessible reporting
- Address the lack of harmonized reference values for chemicals

Prenatal Screening
- Expansion to additional communities
- Pre-/perinatal screening for lead and mercury as standard-of-care across the state
- Implement statewide mercury tracking program to support exposed residents

References

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