

Minnesota Department of Health Environmental Health Tracking and Biomonitoring Advisory Panel Meeting

JUNE 8, 2021

1:00 P.M. – 3:00 P.M.

Via Microsoft Teams

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Agenda Overview

DATE: 6/8/2021

Welcome & Agenda

1:00pm

Chair Lisa Yost will welcome attendees to the meeting. Panel members are invited to introduce themselves. Lisa will give a brief agenda overview.

Clinical Urine Mercury Projects: Progress, opportunities, obstacles

1:10pm

Biomonitoring Program Director Jessica Nelson will give a short introduction. Then, Nimo Ahmed and Lily Tamire, both recently-graduated Doctor of Nursing Practice students at the University of Minnesota, will give summaries of results from their urine mercury screening projects at United Family Medicine in St. Paul and Community Health Services, Inc. in Rochester. They will reflect on lessons learned from these projects, and opportunities/obstacles in expanding these efforts. Panel members are invited to ask questions.

1:30pm Discussion

Questions for the Panel

- How do we address the key obstacles in effectively expanding these efforts?
- Are there additional tools/support/information needed?

Healthy Kids Minnesota: Updates and discussion

1:50pm

Biomonitoring Program Director Jessica Nelson will give an update on the Healthy Kids Minnesota program and an overview of key areas for discussion: sampling strategy and timeline, planned equity analyses, and threshold levels to identify children with elevated results to certain chemicals. Panel members are invited to ask questions.

2:10pm Discussion

Questions for the Panel

- What is your feedback on extending the recruitment timeframe into the winter to increase sample size?
- Are there additional considerations for our decision to include six racial/ethnic groups for a priori equity analysis?

- What is your feedback on our approach to establishing follow-up levels for kids with elevated exposures to certain chemicals?

Update: COVID-19 in Minnesota

2:40pm

Environmental Epidemiology Supervisor Jessie Shmool will give a brief update on the epidemiology of COVID-19 in Minnesota and MDH's response.

Public Comments, Audience Questions, New Business

2:55pm

Motion to Adjourn

3:00pm

Clinical Urine Mercury Projects: Progress, opportunities, obstacles

Nimo Ahmed, DNP, CNM, RN, PHN earned her Doctor of Nursing Practice (Nurse-Midwifery) from the University of Minnesota Twin-Cities. Nimo did a quality improvement project in a federally qualified health center in St. Paul focusing inorganic mercury screening during prenatal visits. She plans to practice as a midwife in the Twin-cities area and hopes to educate other providers about mercury screening. She intends to include mercury screening in her assessments.

Lily Tamire, DNP, RN, CMSRN is a recent graduate of University of Minnesota earning a Doctor of Nursing Practice degree in the Family Nurse Practitioner track. Her DNP scholarly project was implementing inorganic mercury urine screening at a small community clinic in Southeast Minnesota in collaboration with the MDH. This included educating staff and patients about the risk of mercury exposure from skin lightening products. She currently works at a large hospital as an inpatient RN. After board certification, she plans to work in primary care at a community clinic and pursue her interest in environmental health and health equity.

Background

In follow-up to the MDH [MN FEET study](#), a series of quality improvement projects led by University of Minnesota Doctor of Nursing Practice (DNP) students have been conducted in partnership with MN Biomonitoring. These projects assess the effectiveness and process changes needed to routinely screen clinical patients for urine mercury. They have taken place at different community clinics serving populations MN FEET found to be at higher risk for the use of skin lightening products and inorganic mercury exposure. By being based in clinics, these projects have greater potential to educate providers and integrate the issue of skin lightening and mercury exposure into clinical practice, where exposure reduction will be most effective.

1. The first of these projects was presented to the Advisory Panel in February 2020. DNP student Andrea Jordan led this project, which offered screening to a prenatal population at two Minnesota Community Care clinics in St. Paul. It was conducted from May through October 2019.
2. DNP student Nimo Ahmed led the second project with United Family Medicine, a community clinic in St. Paul. Similar to the first, this project screened prenatal patients for urine mercury. The project ran from March through August 2020. Nimo will present a summary of results at this meeting.
3. DNP student Lily Tamire led the most recent project, based at Community Health Service Inc., a community clinic in Rochester. This project offered screening to a wider range of patients, all adults over age 18. It ran from February to May 2021. Lily will present a summary of results at this meeting.

For all these projects, MDH provided funding for clinical staff time and the MDH Public Health Laboratory (PHL) carried out the urine mercury analysis. MDH also handled all follow-up with elevated cases (≥ 5 mcg/L urine mercury) using the protocol developed through MN FEET. This

involved a phone call from an MDH-contracted family physician; a home visit to check for mercury contamination, if the patient agreed; and a recommended urine re-test to be sure exposure was reduced.

The issues of colorism and use of skin lightening products were highlighted in a recent PBS New Hour show filmed in Minnesota and featuring Amira Adawe. The show can be watched here: PBS News Hour, May 19, 2021, [How colorism haunts dark-skinned immigrant communities](#).

Questions for panel

- How do we address the key obstacles in effectively expanding these efforts?
- Are there additional tools/support/information needed?

Healthy Kids Minnesota: Updates and discussion

Update/Timeline

Healthy Kids Minnesota is our new statewide biomonitoring program that will systematically measure exposures to chemicals of concern in children, with funding through a cooperative agreement with the U.S. Centers for Disease Control and Prevention (CDC). Working in one non-Metro and one Metro region of the state every year, we will partner with Early Childhood Screening (ECS) programs at local public health agencies and school districts to recruit preschool-age children for testing. The original plan was to include 250 – 300 children per community in each program cycle, and to recruit for a 6-month period covering late spring, summer, and into fall. The first program cycle, Healthy Kids Minnesota 2021, will begin in Southeast Minnesota and Minneapolis.

After the one-year delay in starting recruitment due to COVID-19, we will launch the program in summer 2021. The timing and details will differ slightly between our two selected regions: Minneapolis and Southeast Minnesota.

- **Minneapolis**: We continue our strong partnership with Minneapolis Public Schools (MPS) ECS program (also a partner in the 2018 Healthy Rural and Urban Kids Project). We have established a financial contract for Healthy Kids Minnesota 2021 for their staff time for coordination, recruitment, data collection and entry, and guidance as the project proceeds. Training of staff is set to begin in early July, and we will hopefully start recruitment in mid-July, extending for approximately 6 months through December. We will also work with MPS on a qualitative inquiry into best practices for results return to families, to be planned in fall 2021, and likely implemented once families receive their results.
- **Southeast Minnesota**: We have made good contacts and are pursuing promising partnerships with Mower County (involved in ECS screening for Austin Public Schools), Fillmore County (involved in ECS screening for several smaller school districts in the county), and Rochester Public Schools ECS program. It has taken longer than anticipated to finalize details and establish financial contracts with these groups due to ongoing impacts from COVID-19, various logistical issues, and timing. Most of them will not be doing in-person screening this summer and will resume in later summer/early fall. We plan to begin recruitment in late August/September and are working to determine the length of recruitment period. We also hope to have one recruitment site in Goodhue County, providing better geographic coverage of the region, and are pursuing contacts there. When the timing is appropriate, we will work through government-to-government channels to connect with Prairie Island Indian Community, the one Tribal nation within the region.

As these updates reveal, the timelines between our two Healthy Kids Minnesota 2021 regions are not entirely consistent. Minneapolis will begin recruitment in July, and should be able to achieve our hoped-for sample size by November or December (see discussion about Equity analysis, below). For Southeast Minnesota, recruitment will not begin until late August/September. And, for the smaller areas with a more limited ECS screening schedule, the number of children will be more limited. For Fillmore County, extending recruitment into February (6 months from September) will make it much more likely we will achieve our hoped-for sample

size of kids from that county. This trade-off, between achieving adequate sample size for the different areas sampled and keeping timelines consistent, is the focus of the first question for Advisory Panel, below.

In fall 2021, we will select regions for Healthy Kids Minnesota 2022 and begin outreach to potential partners.

Analytes

The Advisory Panel has discussed the analyte panel for Healthy Kids Minnesota at past meetings. As submitted in the original CDC grant, the panels include:

- Metals
- Pesticides
- Environmental phenols
- Phthalates
- Flame retardants

As laboratory method development is proceeding (see Laboratory update, below), some decisions about refining the individual analyte lists within these panels have arisen. We will bring this topic to the Advisory Panel for discussion in October 2021.

In addition to these panels, we have decided to include a suite of polycyclic aromatic hydrocarbons (PAHs) as an additional analyte panel in Healthy Kids Minnesota. As discussed with the Advisory Panel in the past, PAHs were included in our Healthy Rural and Urban Kids 2018 project as markers of exposure to air pollution. Preliminary results found differences in exposure between urban and rural kids and found the exposure to be associated with certain predictors (such as incense use). The Public Health Laboratory has recently purchased a new instrument that will enable PAHs to be included.

Equity analysis

An important goal of Healthy Kids Minnesota is to consider disparities in chemical exposures between groups of children, including racial/ethnic and income groups. As we have been planning recruitment protocols for Minneapolis, we are also planning these analyses, as the two are closely connected. Sample size calculations indicated that groups of around 50 children would be sufficient to analyze differences between them. We are assuming that we will achieve good distribution of the different income groups as ECS programs are universal for the pre-kindergarten population.

To achieve sufficient size of racial/ethnic groups, we considered using an over-sampling approach for certain groups and discussed this possibility with our partner, MPS. They provided feedback that they are not comfortable with offering participation only to families from some racial/ethnic groups who come in for screening on a given day as other families may overhear discussion about the program and wonder why they are not being included. Instead, we agreed on the approach of offering participation to all families and having a target size of 50 for certain

racial/ethnic groups over the course of recruitment. This will increase the total sample size; MPS’ staffing capacity and our budget allow for this.

Two important factors we are considering in deciding which racial/ethnic groups to include in this equity analysis are:

1. Comparability to national biomonitoring data from the National Health and Nutrition Examination Survey (NHANES), which provides biomonitoring data by certain race/ethnicity categories: Non-Hispanic blacks, Non-Hispanic whites, Mexican Americans, All Hispanics, and Asians. Ideally, this is a core set of racial/ethnic groups that we would have for all regions sampled (though it obviously may not be possible in some parts of the state).
2. The specifics of the region/location we are sampling. For MPS, we have data on race/ethnicity and language spoken by kids/families from 2019 (see Tables 1 and 2).

Table 1. Race/ethnicity of children screened by MPS ECS in 2019

	Number	%
White	1716	40%
African American	1491	35%
Hispanic	638	15%
Asian	309	7%
Native American	93	2%
2 or more	2	0%
Total	4249	

Table 2. Primary language spoken at home of children screened by MPS ECS in 2019

	Number	%
English	3094	71%
Spanish	469	11%
Somali	431	10%
Hmong	135	3%

Other	120	3%
Unknown	93	2%
Total	4342	

Disaggregated data on race/ethnicity is important and our goal is to disaggregate data from Healthy Kids Minnesota as much as possible. Our survey question about the child’s cultural identification will enable disaggregation by cultural groups present in Minnesota and is based on how race/ethnicity is collected for Minnesota birth certificate data.

To choose the racial/ethnic groups for which we will attempt to achieve a sample size of 50, we explored the 2019 MPS data and discussed the issue with MPS. We propose to plan a priori for an equity analysis of differences in chemical levels by these six racial/ethnic groups: White, African American (non-immigrant), Hispanic, East African, American Indian, Asian. We can disaggregate East African from the larger African American group. However, the MPS ECS numbers do not appear to support further disaggregating the larger Asian group. We know this is a limitation as aggregated groups can mask important differences that may exist. We will prioritize sufficient sample size to disaggregate the larger Asian group in other locations we sample in the future (Healthy Kids Minnesota 2022-2025, which will include St. Paul/Ramsey County). A final note: Although the overall number of American Indian children screened is low, much of this screening happens at community locations in a targeted manner that could facilitate greater participation.

Follow-up levels

Since our last discussion with the Advisory Panel, we have refined our approach to “follow-up levels” – urine concentrations for a small subset of chemicals that trigger a rapid response protocol for participants. Our current approach has follow-up levels for three urine metals: arsenic, mercury, and manganese. These chemicals were selected because they have more established concern regarding specific health effects and have a clear exposure reduction intervention/message. Exceedance of these follow-up levels indicates that an unusual exposure has occurred and should be followed up on to try to reduce exposure. It is not a level that necessarily indicates a health concern. If we can have both unusual exposure and health-based levels for a chemical, that is ideal (see urine mercury example, below).

For the chemicals with follow-up levels, the lab reports the results to epidemiology staff on a shorter timeline (within 30 days of sample collection) and we initiate our rapid response protocol. This involves a phone call from our contracted family physician sharing the results and information about sources of exposure, asking additional questions about how exposure may have occurred, and answering families’ questions. Depending on the chemical that is elevated, it will also trigger appropriate public health follow-up, i.e. offering well water testing for arsenic and manganese or a home visit for mercury contamination.

Families with kids who have especially high levels of the many other chemicals without follow-up levels will also receive phone follow-up, just not as quickly. We will send all results to families via mail in three different mailings, depending on when laboratory analyses are complete. All results will be sent within one year of sample collection. Right after mailing, families whose children's results are notably elevated will receive a phone call from staff to discuss the results and ask questions. They will be offered the opportunity to speak with the program physician or the Principal Investigator.

As part of our CDC Cooperative Agreement, we have connected with the CDC and other state biomonitoring programs about their approaches to follow-up/threshold levels. These conversations revealed no uniform approach; it is still very much a work in progress. In addition to the discussion with the Advisory Panel at this meeting, we will continue to connect with other states and internal groups as we finalize our approach for Healthy Kids Minnesota.

Here are our follow-up levels:

Urine arsenic

- Results with total arsenic ≥ 20 mcg/L will be speciated (organic arsenic is primarily from fish consumption and not a health concern).
- Follow-up level is inorganic arsenic ≥ 20 mcg/L.
- We are continuing to explore whether a health-based exceedance value for inorganic arsenic in children exists.

Urine mercury: We have a 3-tiered approach established through our clinical urine mercury testing projects.

- Follow-up level is ≥ 5 mcg/L. In the general population, normal urine mercury levels should be < 5 mcg/L. Anything higher indicates likely exposure to inorganic mercury.
- At levels ≥ 25 mcg/L, symptoms may be present though are unlikely, and a toxicologist or environmental specialist should be consulted.
- At levels ≥ 100 mcg/L, acute health effects are possible, and a toxicologist should be consulted as soon as possible through Minnesota Poison Control.

Urine manganese

- Follow-up level is ≥ 1.5 mcg/L.
- This value represents the 95th percentile from our 2018 Healthy Rural and Urban Kids project. It is a bit different than the follow-up level for arsenic and mercury. We know that urine manganese is not an ideal biomarker (hair and nails are preferable). However, manganese is an important chemical of concern due to private well contamination in some parts of the state. MDH has worked extensively to encourage private well testing for manganese, with a particular concern about exposures in infants. Results from our 2018 project showed that the Minnesota kids tested had higher urine manganese than we would expect based on children in NHANES.

Questions for panel

- What is your feedback on extending the recruitment timeframe into the winter to increase sample size?
- Are there additional considerations for our decision to include six racial/ethnic groups for a priori equity analysis?
- What is your feedback on our approach to follow-up levels for kids with elevated exposures to certain chemicals?

MDH Public Health Laboratory Updates

Method development

Method development is complete for these methods: environmental phenols in urine, pesticides in urine, speciated arsenic in urine, and trace elements (metals) in urine. Two of these methods, officially called Universal Pesticides and Environmental Phenols, were included in the method development presentation from the February 2021 Advisory Panel meeting.

The 12 analytes included in the Environmental Phenols method are listed in Table 1. These compounds are related to chemical exposures from personal care and consumer products. Table 2 lists the 8 analytes included in the Universal Pesticides method. These analytes represent some of the more commonly used pesticides in homes, gardens, and agricultural areas of the U.S. Table 3 lists the 6 arsenic species included in the Speciated Arsenic method. Arsenic speciation can help differentiate if an arsenic exposure is from less toxic organic arsenic compounds or the more toxic inorganic arsenic compounds. There are 12 metals that will be included from the Trace Elements method: total arsenic, cadmium, chromium, cobalt, manganese, mercury, molybdenum, nickel, antimony, thallium, tungsten, uranium. These metals have a variety of exposure sources, including diet, tobacco smoke, personal care products, drinking water, and industrial emissions.

The method validation experiments were completed and summarized in the respective validation reports. The SOPs for each method have been written or updated and we recently participated in proficiency testing for all three methods.

Table 1: Environmental Phenols included in method for Healthy Kids Minnesota

Analyte	Acronym
Benzophenone-3	BP3
Bisphenol A	BPA
Bisphenol F	BPF
Bisphenol S	BPS
2,4-dichlorophenol	DCP24
2,5-dichlorophenol	DCP25
Triclocarban	TCC
Triclosan	TCS
Methyl Paraben	MEPB

Ethyl Paraben	ETPB
Propyl Paraben	PRPB
Butyl Paraben	BUPB

Table 2: Universal Pesticides included in method for Healthy Kids Minnesota

Chemical name	Acronym	Parent or metabolite
3,5,6-trichloro-2-pyridinol	TCPY	Metabolite of chlorpyrifos & chlorpyrifos methyl
4-nitrophenol	PNP	Metabolite of parathion, methyl parathion*
2-isopropyl-4-methyl-6-hydroxypyrimidine	IMPY	Metabolite of diazinon
3-phenoxybenzoic acid	3-PBA	Metabolite of cyhalothrin, cypermethrin, deltamethrin, fenopropathrin, permethrin, tralomethrin
4-fluoro-3-parabenoic acid	4F-3PBA	Metabolite of cyfluthrin
<i>cis</i> -3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid	<i>c</i> -DCCA	Metabolite of cypermethrin, cyfluthrin, permethrin
<i>trans</i> -3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid	<i>t</i> -DCCA	Metabolite of cypermethrin, cyfluthrin, permethrin

* Methyl parathion not currently in use

Table 3: Arsenic Species included in method for Healthy Kids Minnesota

Arsenic species	Acronym	Organic or inorganic
Arsenobetaine	AB	Organic
Arsenocholine	AC	Organic
Monomethylarsonic acid	MMA	Inorganic
Dimethylarsinic acid	DMA	Inorganic

Arsenite	As3	Inorganic
Arsenate	As5	Inorganic

Method development activities for the analysis of phthalates and other plasticizer metabolites in urine continues. There are currently >30 analytes included in these method development activities. Method development for the analysis of organophosphate flame retardants is recently underway. There are 12 organophosphate flame retardant metabolites in this method.

Other updates

We have hired a new chemist in our unit. Danielle Timp will primarily work on urine mercury, trace elements, and arsenic speciation methods but will be cross-trained in other Laboratory Response Network for Chemical Threats (LRN-C) and biomonitoring methods as time allows.

One unexpected side effect of the COVID-19 pandemic is a shortage of some lab supplies. We have encountered shortages and backorders for some of the materials used in sample collection and have adjusted our protocol to accommodate these shortages. Fortunately, we can be flexible in some aspects of sample collection and storage.

Due to staff reassignments to assist with the COVID-19 response, unspent state biomonitoring funds have been re-allocated to purchase a new Liquid Chromatography with tandem mass spectrometry (LC/MS/MS) instrument for use in biomonitoring. This instrument will increase the lab's capacity and efficiency, allowing for the analysis of PAH metabolites in the Healthy Kids Minnesota program.

MN Tracking Program Updates

MN Tracking was successfully awarded a continuation of our Environmental Public Health Tracking grant with CDC through July 2022, with a 2.6% reduction in available funds. This was the final year in our 5-year Cooperative Agreement. We will start working on new project ideas for our competitive application, tentatively due Spring 2022. This grant funding supports 8 MDH staff at least in-part, as well as MN.IT partners on the MN Data Access Portal.

For more than a year, all MN Tracking team members have been fully or partially reassigned to various important aspects of the COVID-19 response, including working within MDH's Incident Command structure to support safe learning in K-12 schools, public inquiry and guidance, internal communications, multiple data and reporting teams, and planning for long-term follow-up for sequelae and chronic disease surveillance.

Section Overview: Other Information

This section contains documents that may be of interest to panel members.

- Upcoming Advisory Panel meeting dates
- Environmental Health Tracking and Biomonitoring Advisory Panel Statute
- Advisory Panel roster
- Biographical sketches of Advisory Panel members
- Biographical sketches of staff

Upcoming Advisory Panel Meeting Dates

Advisory Panel meetings in 2021/2022:

October 12, 2021

February 8, 2022

June 14, 2022

October 11, 2022

Unless otherwise announced, these meetings will take place from 1-4 pm at

The American Lung Association of Minnesota

490 Concordia Avenue

St Paul, Minnesota

144.998 ENVIRONMENTAL HEALTH TRACKING AND BIOMONITORING ADVISORY PANEL STATUTE

Subdivision 1. **Creation.** The commissioner shall establish the Environmental Health Tracking and Biomonitoring Advisory Panel. The commissioner shall appoint, from the panel's membership, a chair. The panel shall meet as often as it deems necessary but, at a minimum, on a quarterly basis. Members of the panel shall serve without compensation but shall be reimbursed for travel and other necessary expenses incurred through performance of their duties. Members appointed by the commissioner are appointed for a three-year term and may be reappointed. Legislative appointees serve at the pleasure of the appointing authority.

Subd. 2. **Members.** (a) The commissioner shall appoint eight members, none of whom may be lobbyists registered under chapter 10A, who have backgrounds or training in designing, implementing, and interpreting health tracking and biomonitoring studies or in related fields of science, including epidemiology, biostatistics, environmental health, laboratory sciences, occupational health, industrial hygiene, toxicology, and public health, including:

(1) At least two scientists representative of each of the following:

- (i) Nongovernmental organizations with a focus on environmental health, environmental justice, children's health, or on specific chronic diseases; and
- (ii) Statewide business organizations; and

(2) At least one scientist who is a representative of the University of Minnesota.

(b) Two citizen panel members meeting the specific qualifications in paragraph (a) shall be appointed, one by the speaker of the house and one by the senate majority leader.

(c) In addition, one representative each shall be appointed by the commissioners of the Pollution Control Agency and the Department of Agriculture, and by the commissioner of health to represent the department's Health Promotion and Chronic Disease Division.

Subd. 3. **Duties.** The advisory panel shall make recommendations to the commissioner and the legislature on:

- (1) Priorities for health tracking;
- (2) Priorities for biomonitoring that are based on sound science and practice, and that will advance the state of public health in Minnesota;
- (3) Specific chronic diseases to study under the environmental health tracking system;
- (4) Specific environmental hazard exposures to study under the environmental health tracking system, with the agreement of at least nine of the advisory panel members;
- (5) Specific communities and geographic areas on which to focus environmental health tracking and biomonitoring efforts;
- (6) Specific chemicals to study under the biomonitoring program, with the agreement of at least nine of the advisory panel members; in making these recommendations, the panel may consider the following criteria:

- (i) The degree of potential exposure to the public or specific subgroups, including, but not limited to, occupational;
 - (ii) The likelihood of a chemical being a carcinogen or toxicant based on peer-reviewed health data, the chemical structure, or the toxicology of chemically related compounds;
 - (iii) The limits of laboratory detection for the chemical, including the ability to detect the chemical at low enough levels that could be expected in the general population;
 - (iv) Exposure or potential exposure to the public or specific subgroups;
 - (v) The known or suspected health effects resulting from the same level of exposure based on peer-reviewed scientific studies;
 - (vi) The need to assess the efficacy of public health actions to reduce exposure to a chemical;
 - (vii) The availability of a biomonitoring analytical method with adequate accuracy, precision, sensitivity, specificity, and speed;
 - (viii) The availability of adequate biospecimen samples; or
 - (ix) Other criteria that the panel may agree to; and
- (7) Other aspects of the design, implementation, and evaluation of the environmental health tracking and biomonitoring system, including, but not limited to:
- (i) Identifying possible community partners and sources of additional public or private funding;
 - (ii) Developing outreach and educational methods and materials; and
 - (iii) Disseminating environmental health tracking and biomonitoring findings to the public.

Subd. 4. **Liability.** No member of the panel shall be held civilly or criminally liable for an act or omission by that person if the act or omission was in good faith and within the scope of the member's responsibilities under section 144.995 to 144.998.

Environmental Health Tracking & Biomonitoring Advisory Panel Roster as of February 2021

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Biographical Sketches of Advisory Panel Members

Jay Desai is the Manager of the Chronic Disease and Environmental Epidemiology Section within the Division of Health Promotion and Chronic Disease at MDH. The Section includes the Environmental Epidemiology, the Minnesota Cancer Reporting System, and the Sickle Cell Data Collection program. It also includes the Long-Term Surveillance of Chronic Disease and Disabilities Annex, a program designed for response and recovery in emergency situations such as the COVID-19 epidemic. Jay received his Epidemiology doctorate from the University of Minnesota, is a chronic disease epidemiologist, and has worked in academic research and public health practice at the University of Minnesota, HealthPartners Institute, and the Minnesota Department of Health since 1993. He has a strong interest in diabetes, diabetes prevention, obesity, cardiovascular disease, chronic kidney disease, gout, cancer prevention, sickle cell disease, their underlying behavioral risk factors, and social determinants of health. He is also interested in implementation science and health equity. At MDH Jay spent 16 years as the epidemiologist for the Minnesota Diabetes Program. At HPI he worked on primary care clinical decision support; using EMR's for diabetes, cardiovascular disease, and obesity surveillance; diabetes prevention in low income individuals, and HPV vaccination in underserved communities. Jay is also a standing member of the NIH Healthcare and Health Disparities study section.

Kristie Ellickson joined the Minnesota Pollution Control Agency in 2007 after completing her PhD at Rutgers University and postdoctoral work at both Rutgers and the University of Wisconsin-Madison. Prior to her academic pursuits, she was a U.S. Peace Corps volunteer in the country of Panama. As a graduate student and postdoc she conducted research on trace metal speciation and bioavailability in a variety of environmental matrices. Her work at the MPCA includes the incorporation of cumulative risk and impact assessment principles into regulatory risk, the review of human health risk assessments for large permitted facilities, and she has been the lead investigator on an EPA community-scale air toxics grant targeting passive and active air sampling for Polycyclic Aromatic Hydrocarbons in an urban and rural environment.

Farhiya Farah has lived in Minneapolis for 18 years. She received her Bachelor of Science degree from Marymount University, and Masters of Public Health from University of Minnesota where she is also currently completing her PhD. Prior to launching her company, she was employed as a Senior Public Health Practitioner with Minneapolis Health Department where she spearheaded Healthy Homes Strategic Planning for the City of Minneapolis. She is the founder and Principle Consultant of GlobeGlow Consulting and Research that focuses on applied environmental health research (food safety and home environmental assessments), and community based participatory research specializing with Limited English Population. She has provided technical support to a diverse group of partners including state health department, academic institutions, local health departments and community-based organizations. She is an active member of her community, and has volunteered with the City of Minneapolis Department of Health, ECHO Minnesota, and the DHS Barriers to Utilizing Public Health Insurance Study Project Management Team. She is currently a board member of AverageMohamed (counter extremism messaging), and is a core member of the University of Minnesota School of Public Health Somali Initiative.

Tom Hawkinson is the Senior Industrial Hygienist for Stantec Consulting Services Inc. (formerly Wenck Associates) in Golden Valley, Minnesota. He completed his MS in Public Health at the

University of Minnesota, with a specialization in industrial hygiene. He is certified in the comprehensive practice of industrial hygiene and a certified safety professional. He has worked in EHS management at a number of Twin Cities based companies, conducting industrial hygiene investigations of workplace contaminants and done environmental investigations of subsurface contamination, both in the United States and Europe. He has taught statistics and mathematics at both graduate and undergraduate levels as an adjunct and is on faculty at the Midwest Center for Occupational Health and Safety, which is a NIOSH-sponsored education and resource center at the University of Minnesota's School of Public Health.

Sarah Kleinschmidt is an epidemiologist with more than 20 years of experience in population-based epidemiologic research and infectious disease clinical trials. She joined the 3M Company in 2016 and serves as an epidemiologist within the Corporate Occupational Medicine Department where she evaluates the health experience of employee groups. Prior to joining 3M, Dr. Kleinschmidt was an occupational epidemiologist for DuPont in Wilmington, DE and taught epidemiology at the University of Delaware as an Adjunct Instructor. She has also held research positions at the University of Iowa, Illinois Department of Public Health, and Southern Illinois University School of Medicine. She earned a B.S. and M.S. in biology from the University of Illinois at Springfield, and a M.S. and Ph.D. in epidemiology from the University of Iowa with specialized training in both infectious disease and occupational epidemiology.

Zeke McKinney is a board-certified Occupational and Environmental Medicine (OEM) physician who works at the HealthPartners Clinic in St. Louis Park, MN. He is additionally board-certified in Public Health & General Preventive Medicine, Clinical Informatics, and Lifestyle Medicine. He completed all of his medical training here in Minnesota. His professional interests are in preventing work-related illness/injury, improving data-driven decision-making in clinical contexts, environmental toxicology, health equity, environmental justice, public safety medicine, managing complex impairment/disability, and increasing the health literacy of patients and communities. He practices clinical occupational and environmental medicine in the Twin Cities, and he is one of few clinicians in Minnesota who evaluates work and community-related environmental toxicologic exposures. He is the Minnesota physician contact for the Pediatric Environmental Health Specialty Units (PEHSU), a national resource for environmental medical information in partnership with ATSDR and CDC.

Jill Heins Nesvold serves as the National Director of Lung Health for the American Lung Association. Her responsibilities include program oversight and evaluation related to asthma, chronic obstructive lung disease (COPD), influenza, and quality improvement. She holds a master's degree in health management and a short-course master's degree in business administration. She has published extensively in a variety of public health areas.

Ruby Nguyen is an assistant professor at the University of Minnesota School of Public Health Division of Epidemiology & Community Health. She received her PhD in Epidemiology from Johns Hopkins University. Ruby's research focuses on maternal, child and family health; the etiology of reduced fertility; pregnancy-related morbidity, and infertility and later disease. Currently, Ruby is conducting a longitudinal study examining the role of endocrine disrupting chemicals in child development. From 2016-2017, Ruby was Co-Principal Investigator of a statewide prevalence study investigating violence against Asian women and children.

Tracy Sides is a policy analyst with the Public Health Law Center at the Mitchell Hamline School of Law in Saint Paul, Minnesota. She completed her MPH in epidemiology and PhD in environmental health sciences at the University of Minnesota School of Public Health. She has worked for more than 20 years at the interface of public health research and policy at the Minnesota Department of Health, University of Minnesota, and as an executive director of a community-based nonprofit organization in Saint Paul. She has led multidisciplinary policy development and program evaluation initiatives for the World Health Organization and U.S. Department of Homeland Security. Her professional work is focused on the intersection of public policy with environmental and social determinants of health.

Cathy Villas Horns is the Hydrologist Supervisor of the Incident Response Unit (IRU) within the Pesticide and Fertilizer Management Unit of the Minnesota Department of Agriculture. She holds a Master of Science in Geology from the University of Delaware and a Bachelor of Science in Geology from Carleton College and is a licensed Professional Geologist in MN. The IRU oversees or conducts the investigation and cleanup of point source releases of agricultural chemicals (fertilizers and pesticides including herbicides, insecticides, fungicides, etc. as well as wood treatment chemicals) through several different programs. She has worked on complex sites with Minnesota Department of Health and MPCA staff, and continues to work with interagency committees on contaminant issues. She previously worked as a senior hydrogeologist within the IRU, and as a hydrogeologist at the Minnesota Pollution Control Agency and an environmental consulting firm.

Eileen Weber is a nurse attorney and clinical assistant professor at the University of Minnesota School of Nursing. She founded and leads the Upper Midwest Healthcare Legal Partnership Learning Collaborative. She earned her Doctor of Nursing Practice degree in Health Innovation and Leadership in 2014 from the University of Minnesota. She earned her RN diploma from Thomas Jefferson University Hospital in Philadelphia, PA, her BSN summa cum laude from the University of Minnesota, and her JD in the founding class of the University of St. Thomas School of Law in Minneapolis. Her clinical experience and past certifications have largely been in urban critical care and emergency nursing. She has served as vice-president of the Minnesota Nurses Association, earning awards for political action and outstanding service. She represented nursing on the Minnesota Health Care Commission, was a regular editorial writer for the St. Paul Pioneer Press and an occasional op-ed contributor for the Star Tribune. She founded Friends of Grey Cloud and worked with environmental leaders at the local, regional, state and national levels to protect Lower Grey Cloud Island from harmful development and to conserve the Grey Cloud Sand Dune Prairie. She has extensive experience in legislative lobbying, community activism, and political campaign management. Her scholarly work is focused on the intersection of law, public policy, and interprofessional healthcare practice and education.

Lisa Yost is a Principal Consultant at RAMBOLL ENVIRON, an international consulting firm. She is in their Health Sciences Group, and is based in St. Paul, Minnesota. She completed her training at the University of Michigan's School of Public Health and is a board-certified toxicologist with expertise in evaluating human health risks associated with substances in soil, water, and the food chain. She has conducted or supervised risk assessments under CERCLA, RCRA, or state-led regulatory contexts involving a wide range of chemicals and exposure situations. Her areas of specialization include exposure and risk assessment, risk communication, and the toxicology of

such chemicals as PCDDs and PCDFs, PCBs, pentachlorophenol (PCP), trichloroethylene (TCE), mercury, and arsenic. Lisa is a recognized expert in risk assessment and has collaborated in original research on exposure issues, including background dietary intake of inorganic arsenic. She is currently assisting in a number of projects including a complex multi-pathway risk assessment for PDDD/Fs that will integrate extensive biomonitoring data collected by the University of Michigan. She is also an Adjunct Instructor at the University of Minnesota's School of Public Health.

Biographical Sketches of Staff

Sheila Amenumey is currently the Biomonitoring Epidemiologist at MDH. Sheila collaborates with the Biomonitoring Program Director and key stakeholders leading the various biomonitoring projects including Healthy Kids Minnesota, the statewide project focused on children's environmental health. She completed her MPH in Maternal and Child Health and PhD in Water Resources Science (Water Quality Hydrology Emphasis) at the University of Minnesota. Prior to her work with the biomonitoring program, Sheila worked with the Maternal and Child Health Section at MDH. Her role as the Maternal and Child Health Epidemiologist involved leading and collaborating with external partners in conducting program evaluation across multiple federal adolescent health grants, and assisting them in monitoring program outcomes and achievement of their health and education goals for the youth they serve. Before coming to MDH, Sheila conducted water quality research at the University of Minnesota to determine the impact of agriculture on water quality.

Carin Huset has been a research scientist in the Environmental Laboratory section of the MDH Public Health Laboratory since 2007. Carin received her PhD in Chemistry from Oregon State University in 2006 where she studied the fate and transport of perfluorochemicals in aqueous waste systems. In the MDH PHL, Carin provides and coordinates laboratory expertise and information to program partners within MDH and other government entities where studies require measuring biomonitoring specimens or environmental contaminants of emerging concern. In conjunction with these studies, Carin provides biomonitoring and environmental analytical method development in support of multiple analyses.

Madison Kircher is a CSTE Applied Epidemiology fellow with the Minnesota Department of Health where she works closely with the MN Tracking and Climate & Health Programs. She received her Master of Public Health degree from the University of Wisconsin Madison in May 2020. During her graduate studies, her research focused on the relationship between trauma and substance harm with the Wisconsin Department of Health Services. Through the fellowship, she is currently working on projects related to environmental health and climate change in Minnesota.

Tess Konen graduated from the University of Michigan's School of Public Health with a master's degree in Occupational Environmental Epidemiology. She completed her thesis on the effects of heat on hospitalizations in Michigan. She worked with MN Tracking for 2 years as a CSTE Epidemiology Fellow where she was project coordinator for a follow-up study of the Northeast Minneapolis Community Vermiculite Investigation cohort. She currently is an epidemiologist working on birth defects, pesticides, and climate change, and is developing new Disaster Epidemiology tools for MDH-HPCD.

Kate Murray is the communications planner for the MN Biomonitoring and Tracking programs. She has a passion for health literacy, particularly through an equity lens. Kate brings experience in creative and technical writing, multimedia production and community engagement. While earning her Master of Public Health degree in Administration and Policy at the University of Minnesota, she also pursued coursework in mass communications and journalism. Prior to joining MDH in April 2019, she worked as a consultant for the American Cancer Society and

Collective Action Lab. She also serves as Communications Chair for the Minnesota Public Health Association.

Jessica Nelson is Program Director and an epidemiologist with MN Biomonitoring. She works on design, coordination and analysis of biomonitoring projects, and has been the Principal Investigator for the Healthy Rural and Urban Kids, MN FEET and PFAS studies. Jessica received her PhD and MPH in Environmental Health from Boston University School of Public Health where her research involved the epidemiologic analysis of biomonitoring data on perfluorochemicals. Jessica was the coordinator of the Boston Consensus Conference on Biomonitoring, a project that gathered input and recommendations on the practice and uses of biomonitoring from a group of Boston-area lay people.

Jennifer Plum is the Program Manager for MN biomonitoring. She studied Community Health Promotion while earning her MPH from the University of Minnesota. Prior to joining MDH in December 2019, Jennifer worked with WellShare International, Little Earth of United Tribes, and the U of M Department of Epidemiology and Community Health. She has also been a part of the Health Equity Leadership Network. Jennifer is passionate about health equity, health literacy and community engagement. She is working to connect environmental epidemiology and biomonitoring efforts to community members while coordinating biomonitoring activities.

Kathy Raleigh is an epidemiologist for MN Tracking. She completed her PhD in Environmental Health at the University of Minnesota's School of Public Health and her MPH in Environmental and Occupational Health at the University of Arizona. She has worked on a variety of environmental health projects including: pesticide exposure in children, occupational asthma, mercury exposure in women and children, and occupational exposure to PFOA. Prior to coming to MN Tracking, Kathy was working on maternal and child health projects both internationally with USAID and, more recently, at MDH. She will also be working on the coordination and collection of hospital discharge data, including heart disease and asthma surveillance projects for MN Tracking with a focus on health disparities.

Blair Sevcik is an epidemiologist with MN Tracking at the Minnesota Department of Health, where she works on the collection and statistical analysis of public health surveillance data for MN Tracking. Prior to joining MN Tracking in January 2009, she was a student worker with the MDH Asthma Program. She received her Master of Public Health degree in epidemiology from the University of Minnesota School of Public Health in December 2010.

Jessie Shmool supervises the Environmental Epidemiology Unit at MDH and is the Principal Investigator for the Environmental Public Health Tracking program. Jessie received her MPH from the Mailman School of Public Health at Columbia University and DrPH from the University of Pittsburgh, where her training and research focused on exposure assessment, GIS and spatial statistics, community-engaged research methods, and environmental health disparities. Prior epidemiology studies have examined social susceptibility to air pollution exposure in chronic disease etiology and adverse birth outcomes.

Lynn Treadwell, Minnesota Public Health Data Portal Coordinator, is an experienced digital communications leader with a solid understanding of websites and application development, social media and digital marketing communications in the health and government sectors. Lynn

brings over 10 years of experience in developing optimized online user experiences and digital communications to the position. She will provide stewardship to Minnesota's public health data portal focusing on audience understanding and interactive development best practices. Lynn has an AAS in graphic design, attended the School of Journalism at University of Minnesota and has a mini-Master's in Marketing from St. Thomas University.