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

JUNE 11, 2019

1:00 P.M. – 4:00 P.M.

American Lung Association in Minnesota

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St. Paul, Minnesota

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Agenda: Environmental Health Tracking and Biomonitoring Advisory Panel

DATE: 06/11/2019

Welcome & Introductions

1:00pm

Lisa Yost will welcome attendees to the panel meeting. Panel members and audience are invited to introduce themselves.

Agenda Overview

1:05pm

Jessie Shmool will give a brief overview of topics and discussion items.

Legislative Updates

1:10pm

Mary Manning will provide an update on the legislative session.

Minnesota and Wisconsin Heat Vulnerability Project

1:20pm

Tess Konen will present the Minnesota and Wisconsin Heat Vulnerability Project. Panel members are invited to ask questions and comment.

Healthy Rural and Urban Kids: Participation

1:40pm

Jessica Nelson will present Healthy Kids participation rates and information on refusals and ineligibles. Panel members are invited to ask questions and comment.

Healthy Rural and Urban Kids: Demographics and Spatial Analyses

1:50pm

Yuko Ekyalongo will present preliminary demographic and spatial data for Healthy Kids participants.

Discussion 2:00pm

Questions for the Panel

- Does the Panel have feedback about the spatial variables and analyses presented?
- Does the Panel have advice on integrating spatial variables as we develop the plan for data analysis of Healthy Kids biomonitoring results?

Healthy Rural and Urban Kids: Metals Analysis and Follow Up

2:15pm

Jessica Nelson will provide an update on results for arsenic and manganese, and follow up conducted for participants with higher than expected levels.

Discussion 2:25pm

Questions for the Panel:

- What are the Panel's thoughts about the need for additional follow-up on the manganese results presented?
- Does the Panel see the need for additional follow-up on the arsenic results presented?

Refreshments

2:45pm

MN FEET Updates

2:55pm

Written updates on MN FEET results release and follow-up projects are provided in the panel book. Panel members are invited to ask questions and comment.

National Biomonitoring Meeting, CDC State-based Public Health Laboratory Grant

3:00pm

Carin Huset, Public Health Lab, will discuss the upcoming National Biomonitoring Meeting, held in Minnesota this fall, and the recent MDH application for a CDC grant for state-based biomonitoring.

Discussion 3:10pm

Questions for the Panel

- What ideas does the Panel have for using the National Biomonitoring Meeting as an opportunity to promote biomonitoring and connect with other states?
- Does the Panel have thoughts on other ways to share the vision for an ongoing program as described in the CDC grant application?

CDC Funding Opportunity on PFAS health effects

3:30pm

Jim Kelly and Deanna Scher will provide information on the MDH grant application to CDC. Panel members are invited to ask questions and comment.

MN Tracking Updates

3:40pm

These updates are provided in written form in the panel book. Panel members are invited to ask questions and comment.

Public Comments & Audience Questions

3:45pm

New Business

3:55pm

Motion to Adjourn

4:00pm

Section Overview: MN Tracking Updates

Minnesota and Wisconsin Heat Vulnerability Project

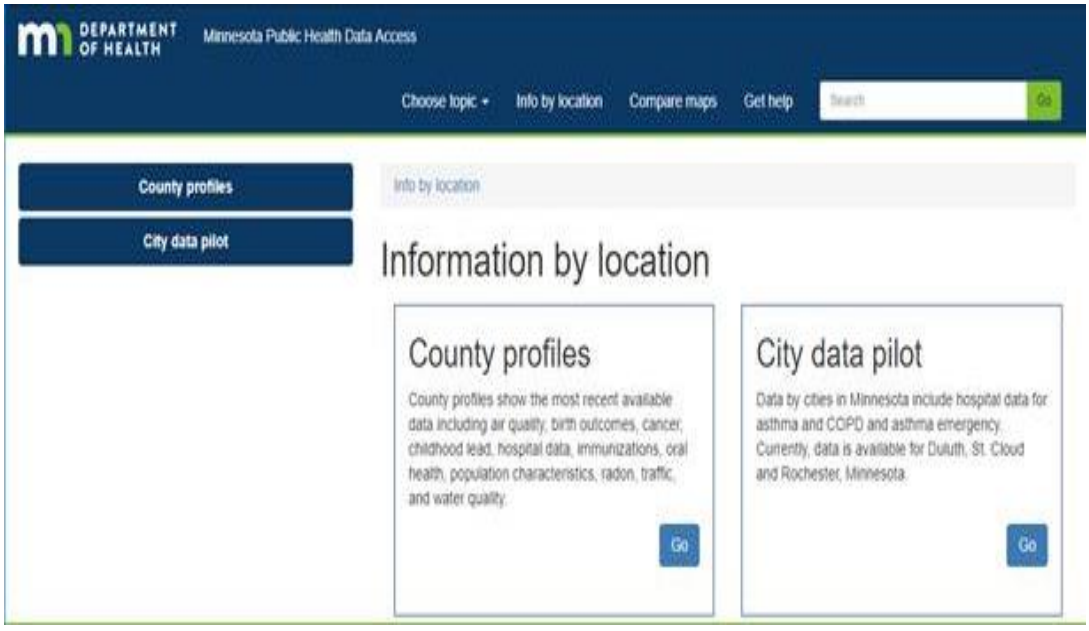
Wisconsin and Minnesota have similar climate, populations, and patterns of heat-related illness. The purpose of this project was to combine emergency department data to better understand ecologic spatial and population vulnerability patterns of heat-related illness. This collaborative project provided more information on the risk factors and spatial occurrence of heat-illness. The next steps are to develop targeted materials for communities, public health professionals, and decision makers to emphasize key vulnerability factors and prevention strategies.

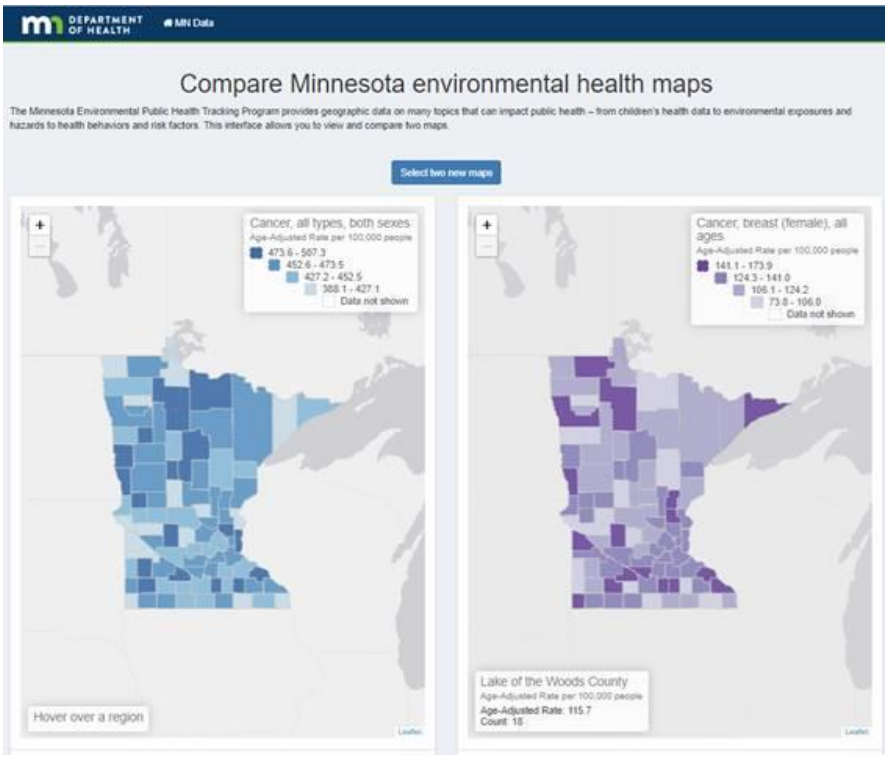
See also two page PDF document: “EXTREME HEAT: WHO’S AT HIGHEST RISK? Findings from a Collaborative Project between Minnesota and Wisconsin” on the next page.

MN Public Health Data Access Portal update

In the last quarter, we have added content and features. New content includes:

- A map showing the radon average annual testing rate by census tract.
- Two analytes added to community water systems: TCE and PCE
- City data for mid-sized cities of Duluth St. Cloud and Rochester
  City asthma hospital rates compared to the state
  City asthma ED rates compared to the state
  City COPD hospital rates compared to the state
- Adolescent immunizations data: HPV, meningococcal, tetanus, diphtheria and pertussis (Tdap).
- Functionality includes “information by location” and side-by-side maps to view and compare





Life & Breath project: communication plan

MDH Tracking Program and MPCA, along with Olmsted County (coordinating with other partners including the Rochester Mayor, community members and respiratory physicians) will host a live media event to present the findings of the joint MPCA and MDH report *Life and Breath: How air pollution affects health in Minnesota*. The event will take place at Chesterwoods Park in Rochester on June 11, beginning at 10 a.m. The speakers will provide an overview of: the concerns about air quality in Minnesota (specifically southeast Minnesota), which populations are vulnerable, what individuals can do to protect themselves, and what MDH and MPCA are doing about air pollution. In conjunction with the media event, the report will be released along with data hosted on the MN Tracking data portal.

Outdoor air quality and health

(continued from page 37)

circumstances, N95 (filters at least 95 percent of airborne particles) and N99 (filters at least 99 percent of airborne particles) National Institute for Occupational Safety and Health-approved particulate-filtering face-piece respirators can filter out PM pollution of 0.1–0.3 µm and larger (but are not effective against ozone and other gases such SO2). These devices may be options for vulnerable patients during known exposures, such as smoke from wildfires, but need to be fitted correctly to be health-protective. Discussing these strategies can help patients find ways to stay healthy on poor air quality days.

Summary

Physicians and state agencies can work together to improve Minnesota's air quality and protect the health of Minnesota's citizens. While air quality throughout Minnesota generally meets EPA's NAAQS and there are fewer unhealthy air days compared to other states, those who are sensitive to air pollution know it only takes one day with unhealthy air to feel an impact. Air pollution is associated with acute as well as chronic health effects, including stroke, heart attack, other cardiovascular events and cardio-metabolic conditions and cancer. The new MPCA AQI forecasting program puts Minnesota ahead of the curve by providing easy to understand air quality and health information at our fingertips. Patients and their physicians can use this program to educate themselves and their communities to reduce exposure to unhealthy air and protect their health. Exposure to outdoor air pollution is a modifiable risk factor for cardiovascular and other diseases. MM

Kristen Kellock, PhD, is a research scientist in the Environmental Impacts Analysis Unit of the Minnesota Department of Health. Emily Onello, MD, is assistant professor in the Department of Family Medicine and Biobehavioral Health at the University of Minnesota Medical School-

Extreme heat

Who's at highest risk?

This project is a collaboration of the Minnesota Department of Health and Wisconsin Department of Health Services. Lead investigators were Tess Konen, MPH, Minnesota Department of Health, and Paul D. Cresswell, PhD, Wisconsin Department of Health Services.

Extreme heat events in Minnesota and Wisconsin are already occurring and are expected to become more common, more severe, and longer lasting as our climate changes. Extreme heat causes entirely preventable illness and death.

For years, staff in the Minnesota and Wisconsin Environmental Public Health Tracking programs used similar messaging about how older adults, infants and people with chronic health conditions—particularly in urban areas—were more likely to suffer from heat-related illness. Anecdotally, our programs started noticing more cases of heat-related illness outside of these populations.

Our states teamed up to build a more robust dataset to better understand who is most impacted by extreme heat. Because Minnesota and Wisconsin have similar climates, populations and patterns of heat-related illness, we decided to combine our data and work together to assess current trends and patterns.

What we did

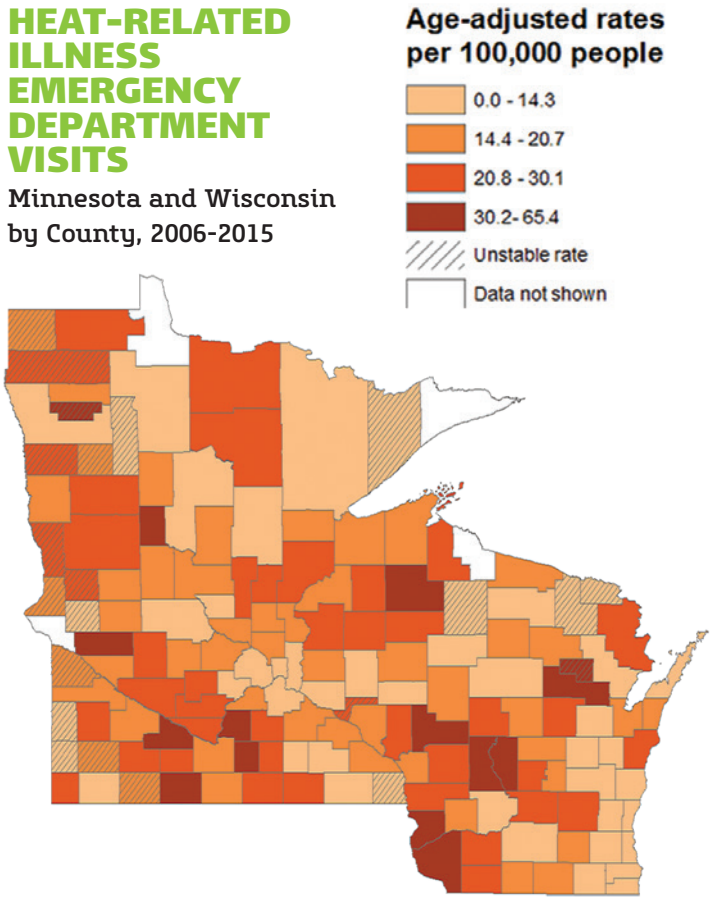
In 2017, our state Environmental Public Health Tracking programs began discussing heat-related illness and how to frame an analysis. We decided to base the analysis on the following data:

Emergency department data. Any Minnesota or Wisconsin resident who went to the emergency department for heat-related illness during warm weather months (May-September) 2006–2015 was included in the analysis. Veteran's Administration and Indian Health Services hospitals were not included in the analysis.

Risk factor data. Staff pulled data on known risk factors for heat-related illness, such as being an older adult or living in poverty. In total, we assessed 17 county-level variables linked to heat-related illness.

HEAT-RELATED ILLNESS EMERGENCY DEPARTMENT VISITS

Minnesota and Wisconsin by County, 2006-2015



Duluth. Kristin Raad, MLA, MPH, is Minnesota Climate and Health Program director for the Minnesota Department of Health.

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Shi L et al. Low-concentration PM2.5 and mortality: estimating acute and chronic effects in a population-based study. Environmental Health Perspectives. 2016; 124(1): 46-52. LOI: 10.1289/ehp.1409111. Epub 2015 Jun 3.

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With the emergency department data, we ran several statistical tests to measure differences among age, sex, insurance status, county and month and year of admission. We assessed patterns of correlation to see which risk factors were associated with heat-related illnesses.

These county-level risk factors included urban and rural designations, climate regions, percent of elderly population living alone, people below the 185-percent poverty threshold, percent of population with limited English proficiency and occupation.

What we learned

People ages 15–34 are most likely to visit the emergency department for heat-related illness. While messaging often focuses on the very young and the very old, in our states, a younger age group was more likely to report to the emergency department for being sick from the heat.

Men are more likely to visit the emergency department for heat-related illness than women. Men were about twice as likely as women to report to the emergency department with heat-related illness. We don't know precisely why this is, but it could be related to specific occupations. In Wisconsin, heat illness was related to workers' compensation payments, but this wasn't true for Minnesota. This is likely related to differences in reporting by health care providers in each state, but more research is needed.

For more information

- **Extreme heat toolkit** https://www.health.state.mn.us/communities/environment/climate/docs/mnextremeheattoolkit.pdf
- **Heat-related illness data** https://data.web.health.state.mn.us/heat
- **Health and Climate Change training module series** https://www.youtube.com/watch?v=I3LmhJdF2cM&feature=youtu.be&list=PLnv1INVkmxmvgeSWcbXwlWJarnAqx5GAw
- **Extreme heat tips** https://www.health.state.mn.us/communities/environment/climate/docs/heattips_eng.pdfHeat

Counties with a higher heat index generally had more cases of heat-related illness. When we looked at the average maximum heat index in a county, we found more cases of heat-related illness. It makes sense that the hotter it is, the more people get sick from the heat.

For counties as a whole, heat-related illness rates are significantly higher in rural areas than in metropolitan areas. In the past, we have specifically mentioned urban areas as areas at increased risk due in part to the urban heat island effect, when concrete and asphalt in cities absorb and hold heat and can increase temperatures. While age-adjusted rates were lower for urban counties in both states, sub-county data (e.g., zip code data) were not included in our analysis; pockets within a county could have more cases of heat-related illness.

What's next?

Together, the Minnesota and Wisconsin Tracking programs will work with our Climate and Health Programs to build on our understanding of extreme heat. We will use these findings to tailor messages for specific audiences on websites, in videos, at festivals and in print materials. We still have to be concerned about the elderly and the very young during intense periods of heat, but our data show that there are other populations that may need to be informed of their risk. Our programs will continue to find new ways to proactively protect the health of these at-risk groups. MM

Section Overview: Healthy Rural and Urban Kids Update

Healthy Rural and Urban Kids: Update

Recruitment and sample collection for Healthy Kids were completed in summer/fall 2018. Staff from Early Childhood Screening programs at Minneapolis Public Schools and Becker, Todd and Wadena counties conducted these activities.

The MDH Public Health Lab (PHL) is completing analysis of the 232 urine samples collected. Laboratory analysis has taken longer than anticipated due to a few different factors. All PHL instrumentation is shared and used for multiple projects, and staff regularly have to participate in proficiency testing for other LRN-C methods. Every time that happens, it takes time (up to two weeks) to change methods. Staff have also encountered a few analytical issues with the universal pesticides method, including low precision for one analyte (paranitrophenol, the metabolite of parathion) at the low end of the calibration curve. Staff are evaluating different approaches to solve this problem. Some of the troubleshooting has taken extra time as the method involves an overnight incubation. Once these issues are resolved, staff should be able to validate the method relatively quickly. The method for hydroxyl-PAHs is validated and awaiting final authorization to begin running samples. Similar problems arose during validation (contamination issues) as well as an instrument failure that took over two weeks to resolve.

Once lab analysis is complete, we hope to report results back to individual families this summer, and share summary results with communities and stakeholders this fall.

We are still working with White Earth Nation staff to determine whether it will be possible to recruit White Earth Nation children in August 2019 through the White Earth Head Start program. This effort would be an add-on to Healthy Rural and Urban Kids.

This section contains background information on three specific areas that will be discussed at the Advisory Panel meeting: participation rates, preliminary survey results and spatial analyses, and arsenic and manganese results and follow-up to families whose children had higher-than-expected results for these two metals.

Healthy Rural and Urban Kids: Participation

As discussed in the Healthy Kids recruitment panel at the October 2018 Advisory Panel meeting, recruitment of children for Healthy Kids was very successful. This write-up summarizes participation rates and additional information gathered.

Participation rates

Participation rates were calculated by dividing the total number of consented families/children by the total number of families who were offered participation (i.e. those who consented + those who refused).

For urban children, recruited through Minneapolis Public Schools ECS program, the overall participation rate was 75% (see Table 1).

Table 1. Urban Healthy Kids recruitment

Final Status	Number of children
Consented	112
Refused	38
Ineligible	9
Participation rate	**75%**

For rural children, recruited through local public health agencies in Becker, Todd and Wadena Counties, the overall participation rate was 78% (see Table 2). This ranged from 66% in Becker County to 87% in Todd County.

Table 2. Rural Healthy Kids recruitment

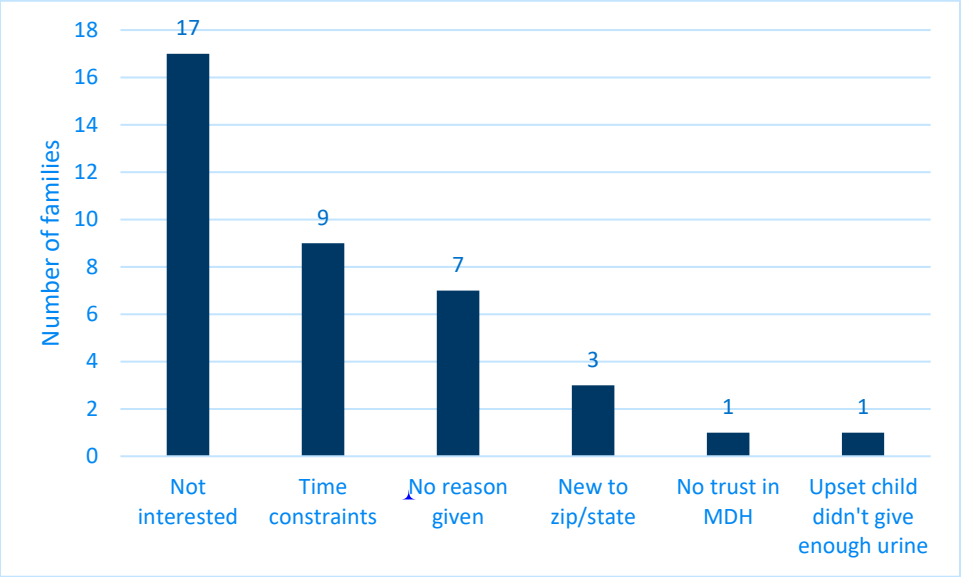
Final Status	Number of children
Consented	132
Refused	38
Ineligible	12
Participation rate	**78%**

Refusal reasons

Families chose not to participate in Healthy Kids for a variety of reasons.

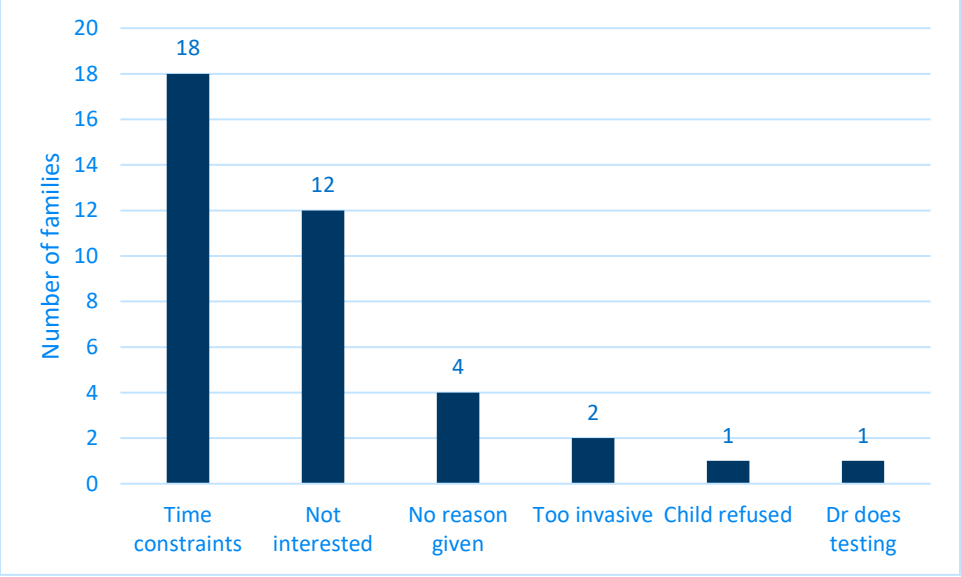
For urban families (see Figure 1), lack of interest was the leading reason (45% of refusals), followed by time constraints (24% of refusals). A few families did not want to participate because they were new to the zip code/state. One family stated that they did not want to participate because they did not believe that MDH would do anything for the community.

Figure 1. Urban families' refusal reasons (n=38)



For rural families, time constraints were the most common reason (47% of refusals), followed by lack of interest (32% of refusals). Two families felt the study was too invasive. In one case, a parent felt that her child's doctor would do all needed testing, and that this program was unnecessary.

Figure 2. Rural families' refusal reasons (n=38)

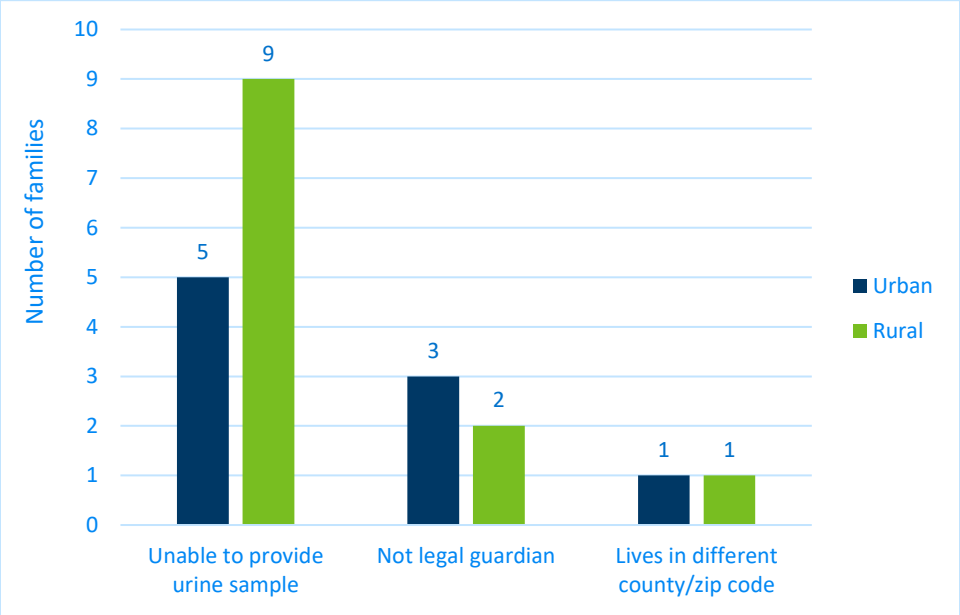


Ineligible reasons

The number of ineligible families recorded was fairly low (Figure 3). The primary reason for ineligibility was that the parent stated the child was unable to provide a urine sample because they were not potty-trained or could not sit on the urine collection hat (56% of urban ineligible families, 75% of rural ineligible families). This was followed by the adult present not being the legal guardian (33% of urban ineligible families, 17% of rural ineligible families), and then by

residence in a different county/zip code (11% of urban ineligible families, 8% of rural ineligible families).

Figure 3. Ineligible reasons by urban/rural status (n=21)



Lost to follow-up

As discussed at the October 2018 Advisory Panel meeting, a small number of families were lost to follow-up because the child was not able to provide a urine sample at the time of the appointment and the take-home sample kit could not be collected. This was the case for eight urban children and four rural children. This explains the difference between the total number of children consented (112 urban, 132 rural), and the number of samples collected (104 urban, 128 rural).

Healthy Rural and Urban Kids: Survey Data and Spatial Analyses

Yuko Ekyalongo, a student worker with MN Biomonitoring, has worked on cleaning Healthy Kids survey data and summarizing select demographic and exposure prediction variables. Yuko will present preliminary survey data for select variables.

As part of her master's thesis at the University of Minnesota School of Public Health, Yuko has also created new spatial variables using a Geographic Information System (GIS) to measure participants' proximity to environmental pollution sources relevant to the chemicals measured in Healthy Kids. After consulting with partners at the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture, Yuko used geocoding and other spatial techniques to derive the following variables for each participant (grouped by pollution source):

- Pollution source – traffic
  - Traffic Density in participant's block group (km/m^2)
  - Traffic Density in participant's census tract (km/m^2)

    - % near busy road in participant's census tract
- Pollution source – rail
    - Distance to nearest railyard from participant's home (m)
    - Total rail line within 200, 350, 500 meters radius from participant's home (m)
- Pollution source – gas station
    - Distance to nearest gas station from participant's home (m)
    - Number of gas stations within 100, 200, 300 meters radius from participant's home
- Pollution source – point source facility
    - Distance to nearest point source facility from participant's home (m)
- Pollution source – farm
    - Distance to nearest farm from participant's home (m)
    - Total farm area within 500, 750, 1000 meters radius from participant's home (m^2)
    - Total farm area planted in different crop types (corn, potato, soybean, spring wheat, beets, winter wheat) within 500, 750, 1000 meters radius from participant's home (acres, m^2)

Yuko will give more background on these variables and their creation, and describe differences between rural and urban children.

Questions for the Panel:

Does the Panel have feedback about the spatial variables and analyses presented?

Does the Panel have advice on integrating spatial variables as we develop the plan for data analysis of Healthy Kids biomonitoring results?

Healthy Rural and Urban Kids: Metals Analysis and Follow Up

Arsenic and manganese follow-up levels and response protocol

For two metals tested in Healthy Kids – arsenic and manganese – we set "follow-up levels." These levels indicate the child's exposure may be elevated and staff will follow up with the family to see if a source of exposure can be identified and reduced. These levels do not mean that any health effect is expected to occur. Follow-up levels were determined based on 95th percentile exposure levels from previous biomonitoring population surveys in children and conversations with other state biomonitoring programs and colleagues.

- For arsenic, the follow-up level was 20 ug/L. For children with urine above this level, samples were sent to the New Hampshire Department of Health and Human Services Public Health Laboratory for speciation. Speciation provided critical information in interpreting results: organic arsenic comes primarily from seafood and is not of health concern, whereas inorganic arsenic comes from other sources including drinking water (particularly of concern for private well users, as there are no requirements for testing), diet (rice, apple juice) and air pollution from industrial emissions. Exposure to inorganic arsenic is of health concern.
- For manganese, the follow-up level was 0.5 ug/L. This value represents the 95th percentile urine level for children in both the U.S. biomonitoring surveillance program (NHANES) and

the Canadian biomonitoring surveillance program (CHMS). For Healthy Kids, the primary exposure sources we were concerned about were drinking water (again, especially for private well users), air pollution from industrial emissions and exposure to fungicides such as mancozeb that contain manganese.

The MDH PHL provided early lab results for children with arsenic or manganese above the follow-up levels. Per our study protocol, these families were contacted by Dr. Mary Winnett, our study physician. Dr. Winnett called the families, shared their child's results, answered questions, asked the parent follow-up questions about possible sources of exposure and discussed ways to prevent exposure. If the family/parent was interested, Dr. Winnett offered to contact the child's health care provider and discuss the results. Dr. Winnett's phone call was followed by a mailing to the family with any relevant exposure reduction resources (such as information on private well testing and arsenic in rice).

Arsenic follow-up cases

For arsenic, 15 children had *total arsenic* above the follow-up level. Speciation results revealed that only four of these children (2% of all kids) had *inorganic arsenic* above the follow-up level. These were both urban and rural children; one rural child was on community water and one used a private well (see Table 3).

Table 3. Children with inorganic arsenic ≥ follow-up level (n=4)

Location/water source	Number of children
Urban/community water	2
Rural/community water	1
Rural/private well	1

Dr. Winnett called all four families and reached three; we mailed information to the fourth.

- A rural child with a high urine level (254 ug/L inorganic arsenic) did not have an obvious source of exposure. The family drank community water, and existing water testing records for the water system did not reveal arsenic elevations (via communication with the MDH Drinking Water Protection program); Dr. Winnett communicated this to the family. One possible exposure source was apple juice (reported drinking 4 times per week). The parent said they would follow up with the child's doctor to get a re-test and suggested testing their other children as well. We sent the family information on reducing arsenic exposures, including a packet of information to share with the child's doctor. Dr. Winnett followed up repeatedly to encourage contacting the child's physician and getting a re-test.
- An urban child (urine = 74 ug/L inorganic arsenic) had high rice consumption (3-4 times per day). The family was mailed extensive information on arsenic in rice (and other sources) and ways to reduce exposure. The parent also requested a packet of information to share with the child's doctor.
- A rural child (urine = 20 ug/L inorganic arsenic) drank private well water that was treated by a whole house or under-the-sink GAC filter, and the family occasionally had bonfires and

burned any wood they could find. We sent the family information on private well testing and ways to reduce arsenic exposure, and shared information with the child's doctor.

For the remaining children with organic arsenic > 20 ug/L, we assumed that the exposure was from fish and not of health concern; we did not report these results to families.

Manganese follow-up cases

For manganese, 29 children (13% of all kids) had levels above the follow-up level. These children were a mix of rural and urban kids, some on private wells and some on community water (see Table 4).

Table 4. Children with manganese ≥ 0.5 (n=29)

Location/water source	Number of children
Urban/community water	11
Rural/community water	6
Rural/private well	10
Rural/water unknown	2

This number was unexpected – based on past biomonitoring surveys, we anticipated ~5% of children would have levels above 0.5 ug/L. In addition, we hypothesized that higher urine levels would be associated with use of private wells with higher manganese. After further investigating the literature on sources of manganese in the environment and the use of urine as a biomarker for manganese exposure (see Discussion, below), we modified our follow-up protocol in order to be sure we could provide constructive information about reducing exposures to families. We decided on a revised 2-tiered follow-up protocol:

- Call families of children with manganese ≥ 1.5 ug/L. This value represents the 95th percentile of urine manganese in our study population, the high end of exposure among children in Healthy Kids. It was important to contact these families, ask follow-up questions about possible sources of exposure and share information on ways to reduce exposure. For families on private wells, an important emphasis was providing information on private well testing.
- Call families of children with manganese ≥ 0.5 ug/l *and* whose parents reported using a private well for drinking water. This offered the opportunity to share information on private well testing.

Ten children had urine manganese levels above 1.5 ug/L (see Table 5). Seven of the children were rural, with four reporting private wells, and three of the children were urban.

Table 5. Children with manganese ≥ 1.5 (n=10)

Location/water source	Number of children
Urban/community water	3
Rural/community water	3
Rural/private well	4

Dr. Winnett reached six of these families (all rural families except for one); we mailed or emailed information to the rest with results and ways to reduce exposure. Before calling families on community water, we received information from the MDH Drinking Water Protection program about existing water testing results from participants' community water systems; Dr. Winnett was able to share this information with families, which revealed that none of the systems had high manganese detections. For the private well users, drinking water was a possible source of exposure and Dr. Winnett discussed well testing with the family. Two families reported possible welding exposures, and two reported that a parent worked on a farm (though one was an organic farm). Most of the rural families lived in close proximity to crop fields, though only one family reported living near a potato farm.

Of the remaining children, seven had urine manganese above 0.5 *and* reported a private well (or were unsure or did not respond to this question). These were all rural children on private wells. Dr. Winnett reached five of them; we mailed or emailed information to the rest. Information sent to these families included brochures on private well testing and contact information for labs that perform testing.

Discussion

The arsenic results discussed above are reassuring. For the children in Healthy Kids, it does not appear that drinking water exposure to arsenic is a significant problem. The one case about the follow-up level clearly linked to rice consumption shows that rice may be an important source of exposure to inorganic arsenic for some children. The results also show the importance of arsenic speciation for public health interpretation of and response to results.

The manganese results are more confusing. We found a higher proportion of children with urine levels above our original follow-up level than we expected and children were from both rural and urban locations and reported private well and community water drinking water sources.

Further exploration revealed the complexities in interpreting urine measurements as a biomarker for manganese exposure. Manganese is an essential nutrient at low levels, and for most people, diet is the predominant exposure pathway from food nuts, greens, seafood, legumes and tea (Coetzee 2016). Homeostatic mechanisms in adults and children older than 6 months keep manganese levels in the body in balance (Cigan 2018). Due to these mechanisms, over-exposure to manganese through diet is not considered of health concern.

Other exposures pathways, however, including inhalation, are thought to be of greater health concern (Haynes 2015). Possible exposure pathways for Healthy Kids children include drinking water, air pollution from industries, contact with manganese-containing pesticides (like mancozeb, used on potatoes) and parent's take-home occupational exposures (welding, fungicide application).

Urine is a minor excretory pathway for manganese, so it is not entirely clear what a single urine result represents. A higher urine level may represent an ongoing elevated exposure through a pathway of health concern, or it may be the body's mechanism of excreting excess manganese ingested from the diet. Past studies have found that biomonitoring for manganese in different matrices, including hair and nails, is a preferable approach to manganese biomonitoring (Coetzee 2016). A recent study by Dr. Patricia McGovern and her team at the University of Minnesota reported that toenails may be the preferable biospecimen for manganese biomonitoring (Cigan 2018).

References

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Haynes EN, Sucharew H, Kuhnell P, Alden J, Barnas M, Wright RO, Parsons PJ, Aldous KM, Praamsma MI, Beidler C, Dietrich KN. Manganese Exposure and Neurocognitive Outcomes in Rural School-Age Children: The Communities Actively Researching Exposure Study (Ohio, USA). Environ Health Prespect. 2015 Oct;123(10):1066-71.

Questions for the Panel:

What are the Panel's thoughts about the need for additional follow-up on the manganese results presented?

Does the Panel see the need for additional follow-up on the arsenic results presented?

Section Overview: MN Feet Updates

MN FEET Results Release: Communications and Outreach Efforts

Findings from the MN FEET study were released in April 2019. A Community Report (health.mn.gov/MNFEET) summarized the findings. Following our Communications Plan, we released the results using different strategies and tactics.

We first mailed the Community Report, along with information sheets on reducing exposure to mercury from skin lightening products and fish, to all 779 women who consented to the study and answered survey questions. We translated the report and materials into Spanish, Somali and (more recently) Hmong, and participants received the mailing in the appropriate language.

In advance of the public release and MDH news release, we shared a summary of findings, the Community Report and an update on communications plans with key contacts from different stakeholder groups: community organizations, health care providers, local public health, legislators, and MDH and other agency contacts who work on related issues. Once findings were officially released, we asked our contacts to share information widely with their networks.

On April 23rd, the MDH Communications office disseminated a news release (health.state.mn.us/news/pressrel/2019/mercury042319.html) summarizing the Community Report. The goals were to inform the general public about the study through media outlets and encourage traffic to the MN FEET webpage and Community Report.

As a result, the study was covered in sixteen print and online news sources throughout Minnesota, including metro, outstate and Tribal news outlets. Articles appeared in the Star Tribune and Pioneer Press, among other newspapers. Total estimated reach was over 4.8 million people. Five television news clips about the study aired on two local channels to an estimated viewership of nearly 180,000 people. Additionally, six radio news segments were broadcast on KNOW/MPR (some of which included audio from an interview with Jessica Nelson).

A small social media campaign across Facebook, Twitter and LinkedIn coincided with the news release and continued during the following week. Posts announced the release of the Community Report, highlighted potential dangers of skin-lightening creams and emphasized resources like guidelines for safe fish consumption. There was an average of around 2,500 impressions per post across the three channels with moderate engagement. The campaigns were not sponsored or targeted.

Staff continue efforts to share information with communities and other stakeholder groups directly. Jessica Nelson and Michelle Gin, Environmental Health, have presented on the findings to five Spanish-speaking Early Childhood Family Education (ECFE) classes in St. Paul, and hope to engage with more ECFE classes this fall. We have shared findings at meetings with midwives from Minnesota Community Care, staff from the Center for Earth, Energy and Democracy, and staff from the Minnesota Pollution Control Agency. Looking forward, we have presentations planned to providers at the HealthEast Roselawn clinic and the Hmong Health Care

Professionals Coalition and intend to engage additional local public health, health care provider and community organizations. We also hope to share findings with different audience through diverse media channels and to include information about results in medical association newsletters.

In March, staff also testified about the MN FEET findings before committees in the Minnesota House and Senate where funding was being considered for a grant program to increase public awareness about mercury in skin lightening products (SF 1920 and HF 1898).

MN FEET Clinic Screening Underway

In a follow-up to MN FEET, a quality improvement project led by a Univeristy of Minnesota Doctor of Nursing Practice (DNP) student to assess the effectiveness of routinely screening clinical patients for urine mercury has begun. This is the first of multiple projects that we hope will take place at different clinics serving women 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.

For the first project, DNP student Andrea Jordan has coordinated routine urine mercury screening of all prenatal patients at two Minnesota Community Care (MCC) clinics, La Clinica and East Side Family Clinic. MCC, formerly known as West Side Community Health Services, is the largest federally qualified health center (FQHC) in Minnesota and these two clinics serve many Asian and Latina women. MN Biomonitoring is providing funding for staff support to MCC to implment the screening. The MDH IRB determined that this project is “public health nonresearch” and does not require IRB review.

Screening began on May 15 and will run for 5-6 months. Clinical nurses routinely collect urine samples from all prenatal patients; for this project, a separate vial is collected for urine mercury testing and sent to the MDH Public Health Laboratory (PHL) for analysis. Patients are informed about the screening and given information on ways to reduce mercury exposure.

The PHL will return individual results to MCC. MN Biomonitoring staff will be notified for any patient with a urine mercury ≥5 ug/L and will receive patients’ contact information from the clinic, following clinic protocols regarding patient data. MN Biomonitoring physician, Dr. Mary Winnett, will provide public health follow up to the patient, including answering questions, asking follow-up questions about possible sources of exposures, and providing information on how to eliminate/reduce the exposure. She will also offer a home visit, to be conducted by local public health and agency partners.

MDH will also receive deidentified summary information from the clinic, including urine mercury result, race/ethnicity and language of patient. This will be key information in the quality improvement assessment aspect of the project.

A second project that will take a similar approach with a clinic serving a large East African population is in the planning stages. DNP student Nimo Ahmed is leading this project. Both projects are being done with guidance from Eileen Weber, Advisory Panel member.

Section Overview: National Biomonitoring Meeting, CDC State-based Public Health Laboratory Grant

National Biomonitoring Meeting

The MDH Public Health Laboratory, along with the Association of Public Health Laboratories (APHL), will be hosting the 2019 National Biomonitoring Meeting on October 22-24 in St. Paul. This meeting brings together leaders and staff from state biomonitoring programs across the country, along with CDC and other national biomonitoring experts. The agenda is still being finalized, and the call for abstracts closed May 15. This will be an exciting opportunity to share our success with biomonitoring in Minnesota, and to learn from other states about their experiences.

The web site for the meeting is: 2019 National Biomonitoring Meeting (https://www.aphl.org/programs/environmental_health/nbn/Pages/National-Biomonitoring-Meeting.aspx)

CDC Grant: State-Based Public Health Laboratory Biomonitoring Programs

In April, MDH applied for a CDC Notice of Funding Opportunity entitled, “State-Based Public Health Laboratory Biomonitoring Programs” (CDC-RFA-EH19-1901). Funding for this proposal would go through the MDH PHL, but also provide support for epidemiology, recruitment and results communication activities through MN Biomonitoring. This proposal allowed us to articulate our vision for an ongoing state biomonitoring program modeled on our recent Healthy Rural and Urban Kids Study. Awards will be announced in July 2019.

Abstract: Minnesota Statewide Biomonitoring Surveillance in Preschool-Aged Children

Minnesota has grown a strong state biomonitoring program as a result of participation in the CDC’s LRN-C laboratory network and state legislation passed in 2007 that established a state-based biomonitoring program. However, the public health impact of the program has been limited by geographic scope and laboratory capacity. Laboratory methods are not fully aligned with CDC methods used in NHANES, and projects have generally focused on specific communities and not extended to the broader state population or tracked time trends.

Environmental chemical exposures in children are a key concern due to this population’s vulnerability and developing body systems. Children in some communities across Minnesota, including rural communities, lower-income and communities of color, and immigrant communities, may be more highly exposed to certain chemicals, putting them at increased risk

for long-lasting impacts on health. A number of forward-looking state policies have been passed to reduce childhood exposures. However, without systematic assessment of exposures, we are unable to evaluate the effectiveness of existing policies.

This proposal would take the highly successful population-based recruitment model developed in our current Healthy Rural and Urban Kids (Healthy Kids) project and expand it statewide with the collaboration of key recruitment partners and stakeholders. Healthy Kids partnered with Early Childhood Screening (ECS) programs in local public health agencies and school districts to use systematic sampling techniques to recruit and collect urine samples from 3-6 year-old children. ECS programs offer a universal sampling frame: state law requires that these programs screen all children before entering kindergarten. From our experience in Healthy Kids, this model could easily and cost-effectively scale up to other parts of the state.

We propose to sample children from one of seven Metro-area counties and one of seven non-Metro regions per year, aiming to recruit 250 children per community per year, for a total of 2,000 children during the funding period. Through a combination of developing new laboratory methods and re-validating and optimizing in-house methods, we propose to analyze urine samples for a suite of analytes of concern based on the state's geology, industries and population, and that are tied to state policy initiatives. Analytes include flame retardants, phthalates, environmental phenols, metals (including speciated arsenic) and pesticides. We will provide appropriate public health follow up to families of children whose results exceed thresholds, and communicate results to all families in an informative and constructive manner. We will also share results widely with communities and other important stakeholder groups.

Using high quality biomonitoring science and population-based recruitment methods to systematically assess Minnesota children's exposures to chemicals of concern in the state will allow MDH and our partners to evaluate the many policies and programs aimed at reducing exposures to chemicals. It will increase the capacity of MDH's PHL to conduct biomonitoring analyses and produce interpretable results that can be used to identify at-risk populations. The proposed program also offers exciting opportunities for statewide environmental health outreach and education. This award would allow our state's strong biomonitoring foundation to expand from a series of isolated projects to full programmatic status, more fully meeting the needs of all Minnesotans. MDH is well positioned to leverage our extensive biomonitoring experience, coupled with the boost in capacity and capabilities the proposed program would provide, into ongoing, sustainable funding for a state biomonitoring program.

Questions for the Panel:

What ideas does the Panel have for using the National Biomonitoring Meeting as an opportunity to promote biomonitoring and connect with other states?

Does the Panel have thoughts on other ways to share the vision for an ongoing program as described in the CDC grant application?

Section Overview: CDC Funding Opportunity on PFAS Health Effects

Health Implications of Exposure to PFAS-Contaminated Drinking Water

PROPOSAL FOR A MULTI-SITE STUDY

The Centers for Disease Control and Prevention (CDC) is funding research to study whether exposure to per- and polyfluoroalkyl substances (PFAS) from drinking water might be a public health concern. The multi-site study will collect data on both exposure to PFAS and health outcomes from people who live in communities across the country that have used PFAS-contaminated private wells or public water systems. CDC anticipates enrolling 6,000 adults and 2,000 children combined from all participating sites. Up to six sites will be selected the study will take place from fall 2019 through fall 2024.

MDH Application for Funds to Establish a Study Site in Minnesota

MDH is applying for funds to establish a study site in the East Metro area of the Twin Cities. While MDH has been working with other state agencies, local agencies, and water operators to reduce PFAS drinking water exposures in East Metro communities since the contamination was first discovered, MDH recognizes that there is still more to learn about the potential health effects of exposures to these chemicals.

By participating in this research, MDH hopes to provide some answers to East Metro communities about potential health impacts. This research is also an important opportunity to contribute to scientific knowledge on these chemicals that may lead to additional public health actions to reduce exposures and any identified health risks in other communities impacted by PFAS-contaminated drinking water.

Local and Community Partners are Important

- MDH will work in partnership with the Washington County Department of Public Health and Environment to complete study activities.
- MDH will also work closely with local water system operators, other local government agencies, and community groups to conduct outreach about the study and determine the best ways to share study findings with the communities.
- A Community Advisory group representing a variety of stakeholders will be formed at the start of study planning and will continue to meet throughout the study period.

Study Application Information

The application to participate as a study site must be submitted to CDC by the end of May 2019.

How the study will be done

Participants will attend one study appointment. Later in the study, they will receive their individual test results along with information about how to interpret the results. MDH will follow up with participants as needed. Both MDH and CDC study staff will have access to participant's individualized information and will take steps to protect their privacy to the fullest extent and as required by state and federal law.

- PFAS levels will be measured in blood and urine.
- These biomonitoring results will also be combined with other information, such as historical levels of PFAS in drinking water, to estimate participants' exposure to PFAS in the past.
- Health outcomes data collected will include health indicators measured in blood and urine such as cholesterol levels and tests of liver, immune and thyroid functions.
- Health information will also be gathered from participant questionnaires, which will ask about a number of health conditions.

Who is eligible for the study

Persons aged four years old or older are eligible to participate if they lived in a home that was served by the Oakdale or Cottage Grove public water system or a private well in the East Metro with detectable levels of PFOS and/or PFOA. Parents can enroll their children. Persons with occupational exposure to PFAS or that have not been exposed to PFAS in drinking water in the past 15 years are not eligible. MDH will identify households in the study area and send letters inviting residents to participate.

Contact for more information

For more information about MDH's proposal to participate in the CDC multi-site study, please contact the following staff in the MDH Environmental Health Division:

Jim Kelly, Manager: 651-201-4910 or james.kelly@state.mn.us

Deanna Scher, Epidemiologist: 651-201-4922 or deanna.scher@state.mn.us

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05/06/2019

Section Overview: Other Information

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

- 2019 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

2019 Upcoming Advisory Panel Meeting Dates

The remaining meeting in 2019:

October 8, 2019

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 May 2019

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VACANT SEAT
Minnesota Senate appointee

Biographical Sketches of Advisory Panel Members

Bruce Alexander is a Professor in the Division of Environmental Health Sciences at the University of Minnesota's School of Public Health. He is an environmental and occupational epidemiologist with expertise in cancer, reproductive health, respiratory disease, injury, exposure assessment, and use of biological markers in public health applications.

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 Senor Industrial Hygienist for 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.

Jill Heins Nesvold serves as the Director of Respiratory Health Division for the American Lung Association in Iowa, Minnesota, North Dakota and South Dakota. Her responsibilities include program oversight and evaluation related to asthma, chronic obstructive lung disease (COPD),

lung cancer, and influenza. 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.

Geary Olsen is a corporate scientist in the Medical Department of the 3M Company. He obtained a Doctor of Veterinary Medicine degree from the University of Illinois and a Master of Public Health in veterinary public health and PhD in epidemiology from the University of Minnesota. For 27 years, he has been engaged in a variety of occupational and environmental epidemiology research studies while employed at Dow Chemical and, since 1995, at 3M. His primary research activities at 3M have involved the epidemiology, biomonitoring (occupational and general population), and pharmacokinetics of perfluorochemicals.

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, pentachlorphenol (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

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 perfluerochemicals 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.

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 MPH 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.

Charlotte Napurski is the project coordinator for MN Biomonitoring. She received her Master of Public Health degree from Capella University in 2012. She has over 10 years of experience coordinating research projects in pediatric nephrology and cardiology, cancer survivorship and biomonitoring. She also coordinates the Environmental Health Tracking and Biomonitoring Advisory Panel activities.

Jessica Nelson is an epidemiologist with MN Tracking, working primarily on design, coordination, and analysis of biomonitoring projects. 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.

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.