Michigan Chemical Exposure Monitoring (MiChEM): Developing and Implementing a Statewide Biomonitoring Program

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MDHHS
Michigan Department of Health & Human Services

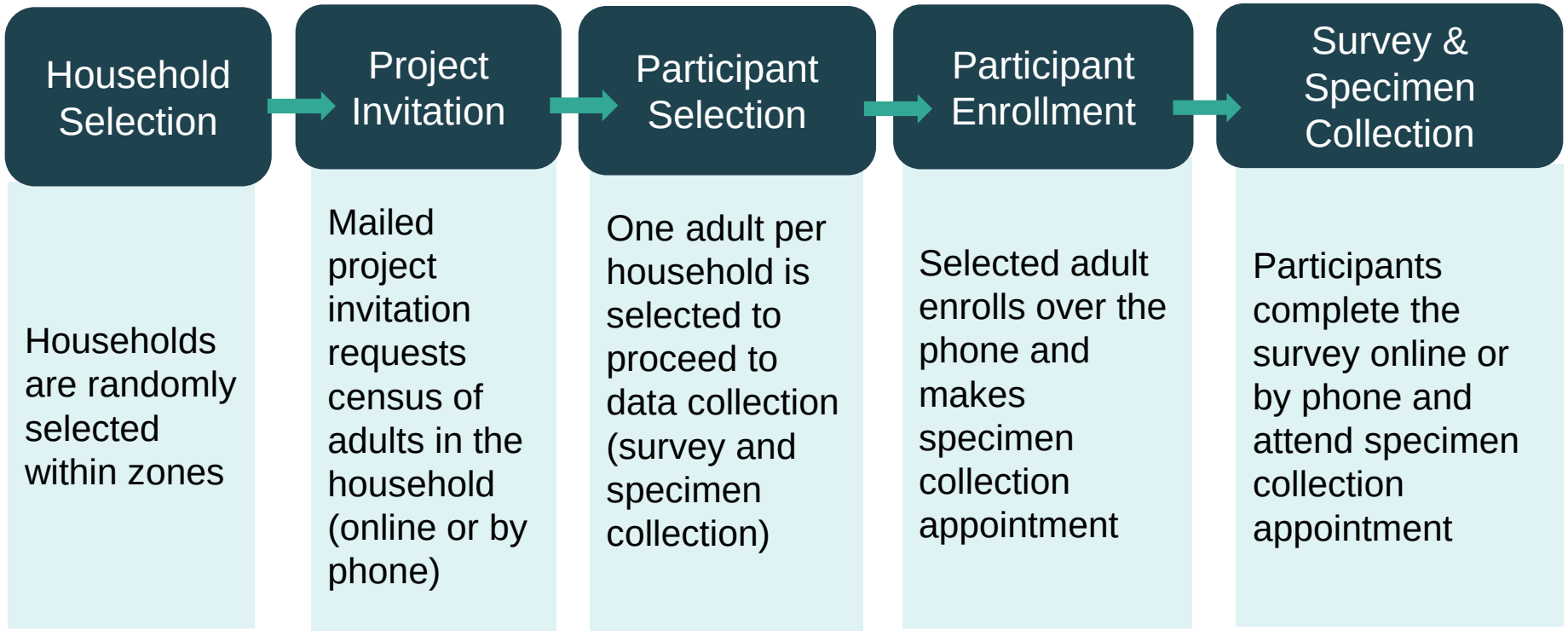
Mission

Michigan Department of Health and Human Services (MDHHS) provides opportunities, services, and programs that promote a healthy, safe and stable environment for residents to be self-sufficient.

MiChEM Overview

- **Objective**
  - Establish reference concentrations in blood and/or urine for chemicals of concern based on a **statewide, representative sample** of Michigan residents
- **Target population**
  - Adult, non-institutionalized Michigan residents
  - Low-income adult, non-institutionalized Michigan residents
- **Methods**
  - Three-stage cluster sampling, resulting in the random sampling of one adult per selected household
  - At least **21** participants were recruited from each of **66** Primary Sampling Units (PSUs), also referred to here as zones (N=1,786)
  - Data collection of exposure survey and samples collected using our mobile laboratory

Recruitment and Second and Third Stages of Sampling



Analytes

45 per- and polyfluoroalkyl substances (PFAS)*

100 polychlorinated biphenyls (PCBs)

17 organochlorine pesticides (OCPs)

24 metals (As, Al, Mn, Cr, Se, Tl, Pb, Cd, Co, Hg, and As and Hg species)

10 polybrominated diphenyl ethers (PBDEs)

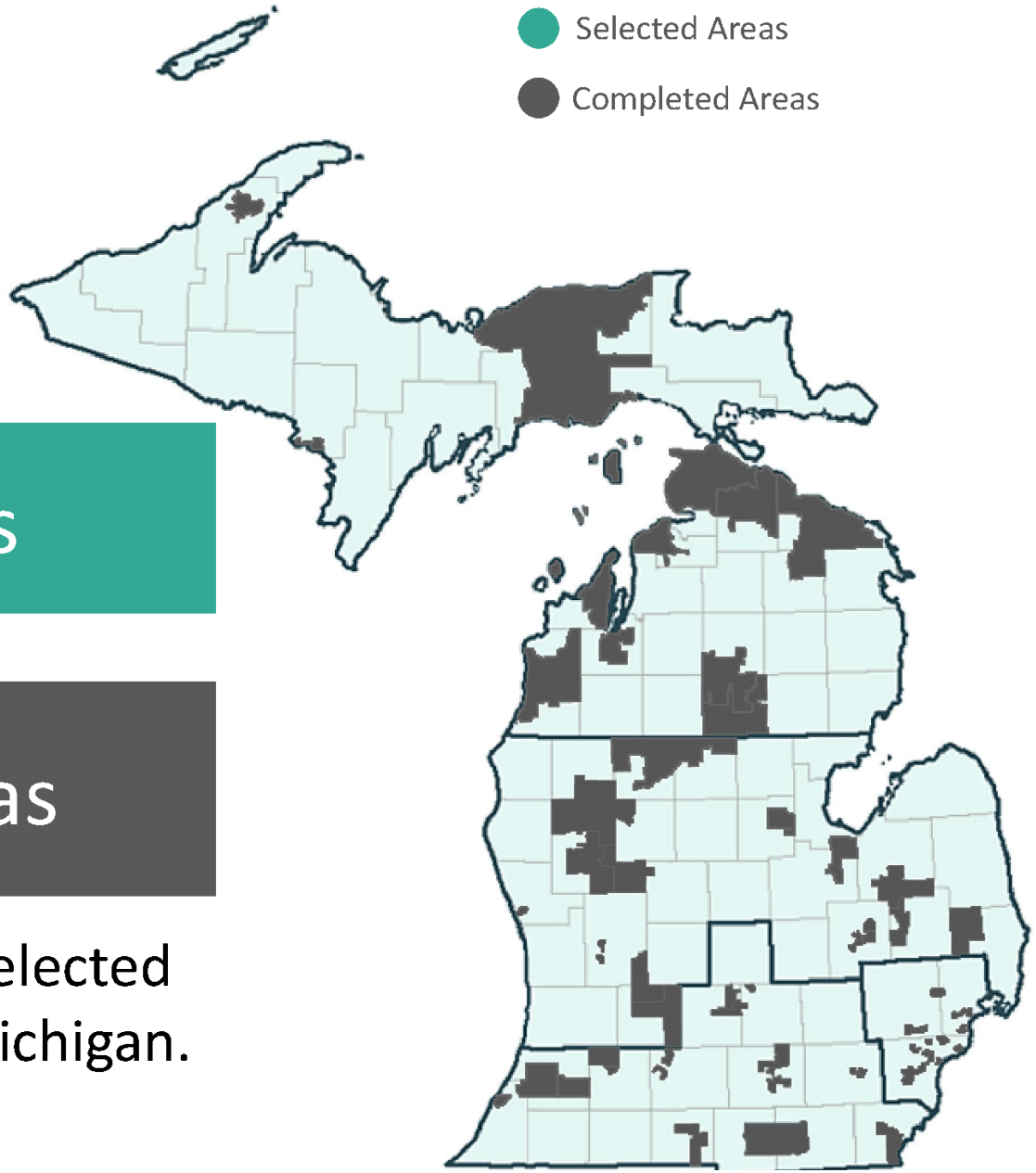
2,2',4,4',5,5'-hexachlorobiphenyl (PBB-153)

* Includes branched and linear isomers and sums of isomers

MiChEM
Michigan Chemical Exposure Monitoring

1,786 Participants

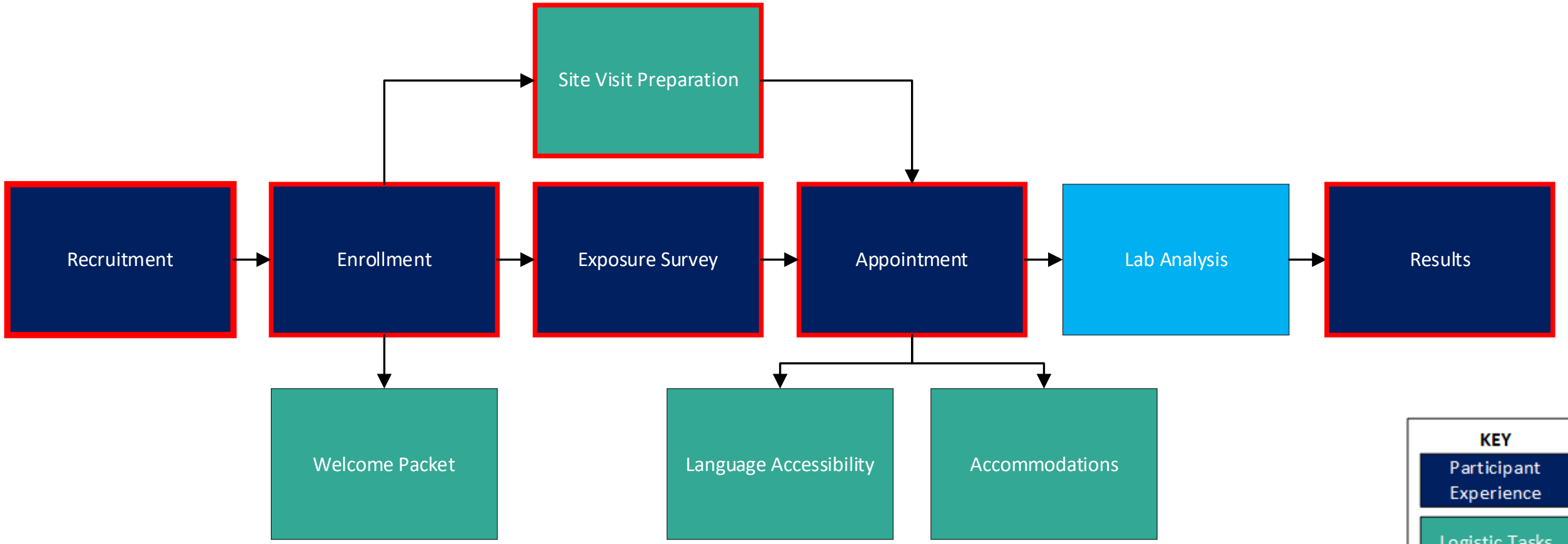
66 Completed Areas



This map shows the 66 areas that were selected using a statistical method to represent Michigan.

Updated 7/19/24

MiChEM Process Map



Recruitment and Enrollment

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Community Engagement

- Employed focus groups to review recruitment materials before start of project
- Reach out to LHDs, NGOs, and points of contact (PoCs) before each visit to a zone
- Utilize professional translation services for translation of all materials, including our website and recruitment materials in Spanish and Arabic
- Update monthly MiChEM infographic on the MDHHS website

Hello Michigan resident,

To register the adults in your household, visit https://is.gd/GVBh6T before [insert date], enter the code XXXXXXX, or call 844-464-7327 between 9 a.m. and 7 p.m., Monday through Friday. In the coming weeks, project staff may visit your home to answer questions about MiChEM.

If you have already called or entered the code on the website, there is no need to do so again. Thank you for your interest!

Sincerely,
The MiChEM Project Team

El Departamento de Salud y Servicios Humanos de Michigan (MDHHS, por sus siglas en inglés) invita a su hogar a registrarse en el proyecto Monitoreo de Exposición Química de Michigan (MiChEM, por sus siglas en inglés). Si está interesado en saber más sobre el proyecto, puede encontrar información en español en nuestro sitio web Michigan.gov/DEHbio y haga clic en 'MiChEM'.

PRESORTED
FIRST CLASS MAIL
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PAID
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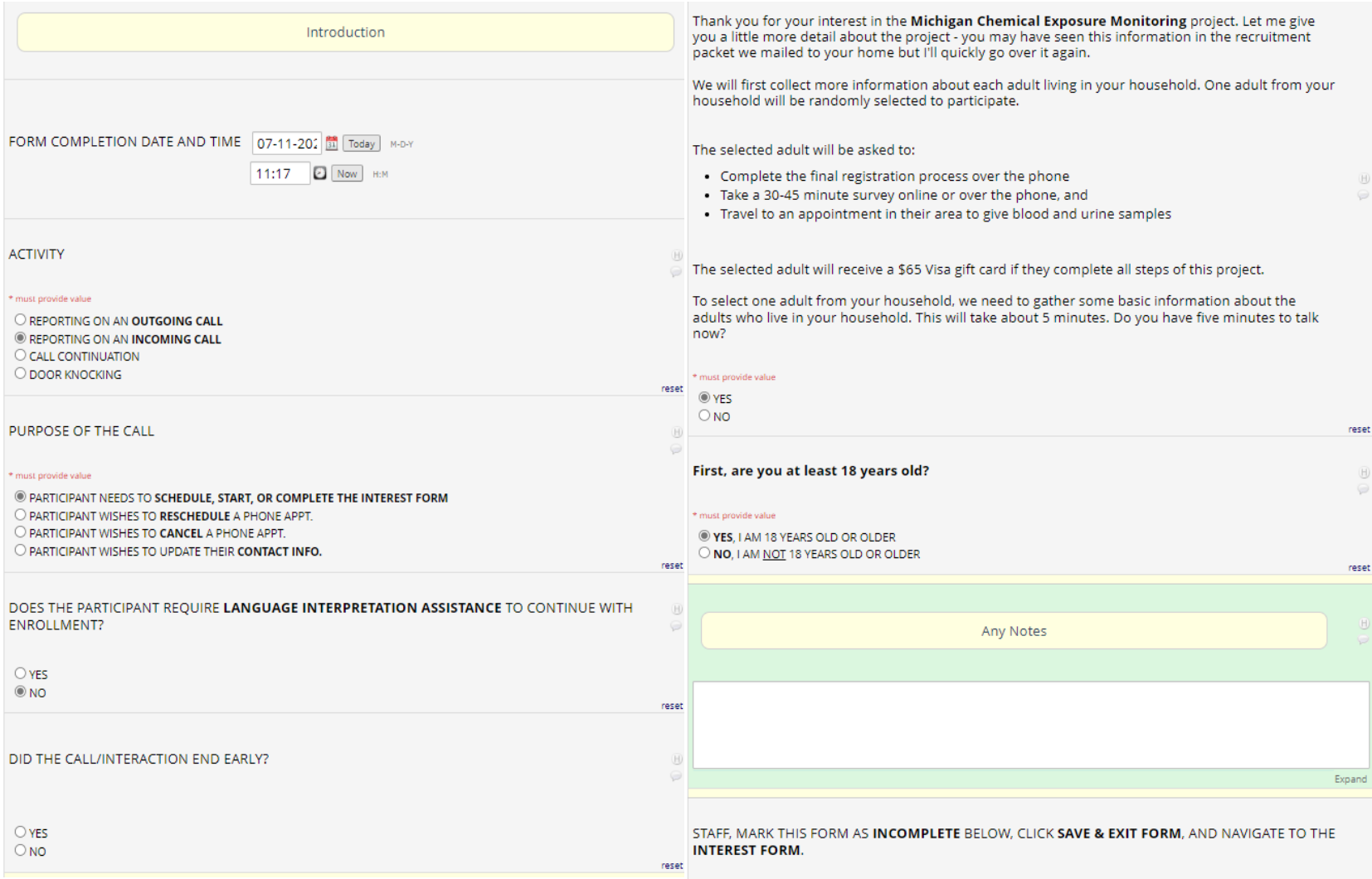
DEH Call Center

- Utilize MDHHS Division of Environmental Health (DEH) toll-free call center number
- Include call center number and hours on all MiChEM materials
- Receive inbound calls for eligibility, scheduling, and survey completion
- Track calls in MiChEM's REDCap project



Introduction

FORM COMPLETION DATE AND TIME 07-11-202 Today M-D-Y
11:17 Now H:M

ACTIVITY

* must provide value

- REPORTING ON AN **OUTGOING CALL**
- REPORTING ON AN **INCOMING CALL**
- CALL CONTINUATION
- DOOR KNOCKING

reset

PURPOSE OF THE CALL

* must provide value

- PARTICIPANT NEEDS TO **SCHEDULE, START, OR COMPLETE THE INTEREST FORM**
- PARTICIPANT WISHES TO **RESCHEDULE** A PHONE APPT.
- PARTICIPANT WISHES TO **CANCEL** A PHONE APPT.
- PARTICIPANT WISHES TO UPDATE THEIR **CONTACT INFO.**

reset

DOES THE PARTICIPANT REQUIRE **LANGUAGE INTERPRETATION ASSISTANCE** TO CONTINUE WITH ENROLLMENT?

- YES
- NO

reset

DID THE CALL/INTERACTION END EARLY?

- YES
- NO

reset

Thank you for your interest in the **Michigan Chemical Exposure Monitoring** project. Let me give you a little more detail about the project - you may have seen this information in the recruitment packet we mailed to your home but I'll quickly go over it again.

We will first collect more information about each adult living in your household. One adult from your household will be randomly selected to participate.

The selected adult will be asked to:

- Complete the final registration process over the phone
- Take a 30-45 minute survey online or over the phone, and
- Travel to an appointment in their area to give blood and urine samples

The selected adult will receive a $65 Visa gift card if they complete all steps of this project.

To select one adult from your household, we need to gather some basic information about the adults who live in your household. This will take about 5 minutes. Do you have five minutes to talk now?

* must provide value

- YES
- NO

reset

First, are you at least 18 years old?

* must provide value

- **YES**, I AM 18 YEARS OLD OR OLDER
- **NO**, I AM NOT 18 YEARS OLD OR OLDER

reset

Any Notes

Expand

STAFF, MARK THIS FORM AS **INCOMPLETE** BELOW, CLICK **SAVE & EXIT FORM**, AND NAVIGATE TO THE **INTERESTFORM**.

Door Knocking Efforts

Implemented door knocking efforts for 12 zones:

- Door knockers would knock on households three separate times in total or until an interaction
- Participants could enroll at the door, schedule a call back at a better time, or refuse to participate

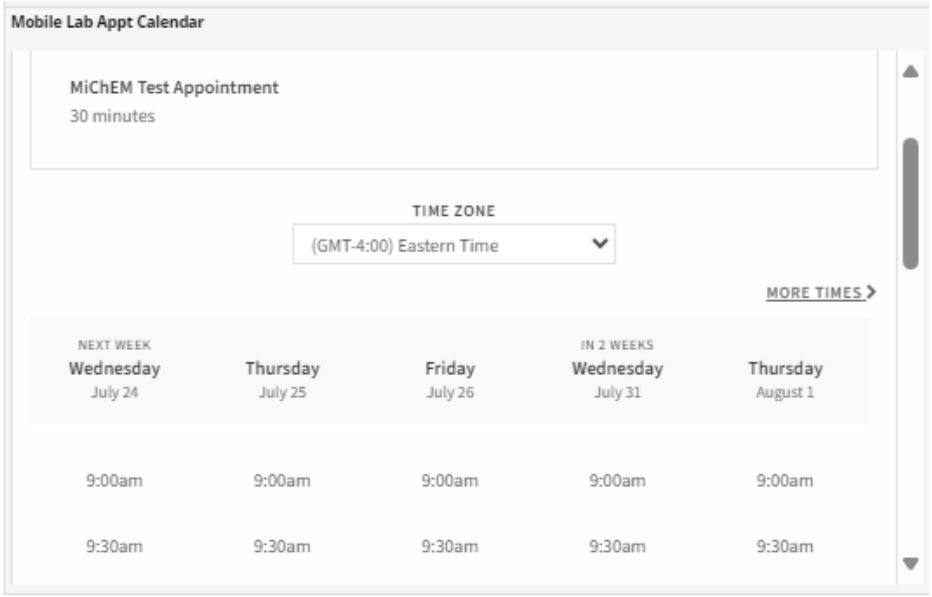
Metric	Total (%)
Households listed for door knocking	8,625
Households that received door knocking	6,037 (70%)*
Total # enrolled at the door	299 (5%)**
Total # lab appointments completed	83 (28%)***
Total # that refused enrollment	1,059 (18%)**
Total # call backs with an interpreter requested	63 (1%)**

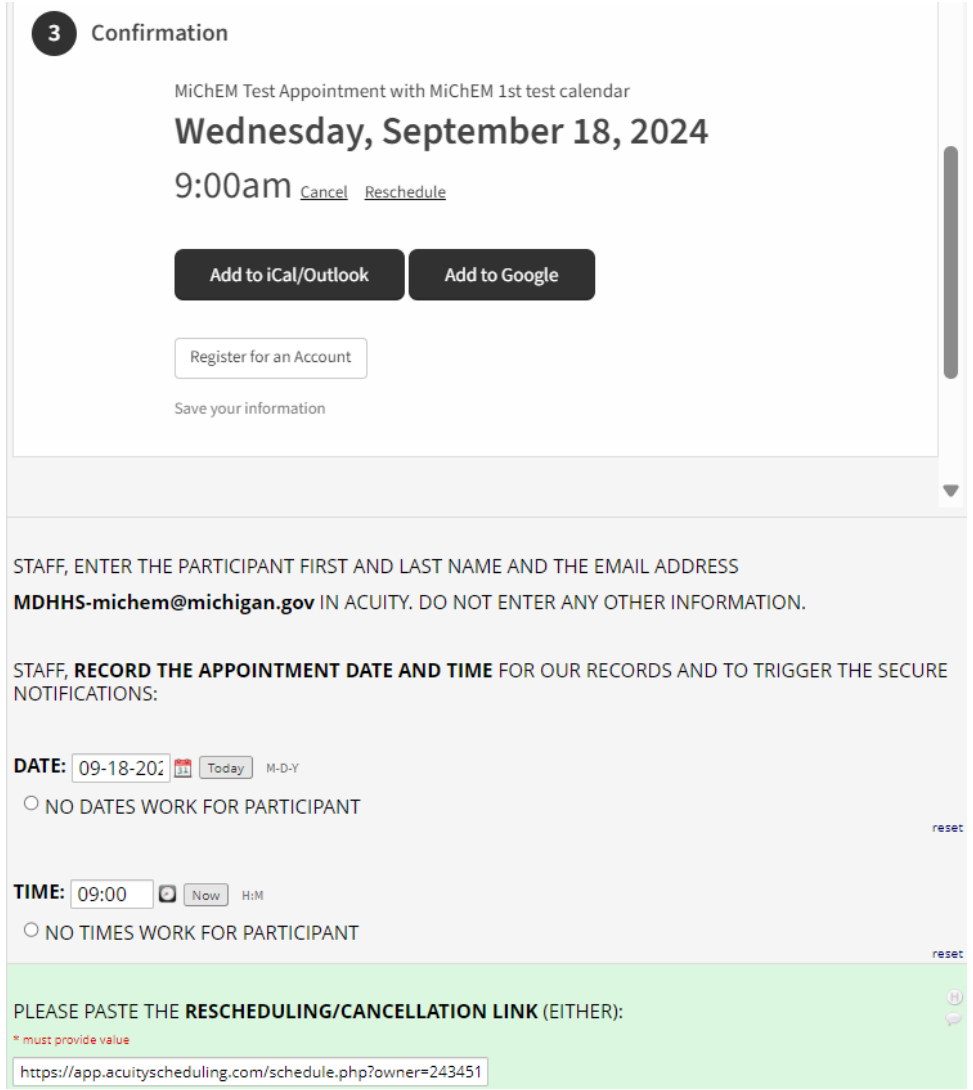
*Represents % of households listed for door knocking
**Represents % of households that received door knocking
***Represents % of total number of interest forms completed at the door

Metrics updated as of 7/24/2024

Scheduling Lab Appointments

- Call center staff use REDCap and Acuity to schedule participant lab appointments
- Participants schedule their lab appointments through a phone call
- Schedules exist in both systems to track appointments and avoid overbooking
- Total of 29 appointment slots per zone





MiChEM Welcome Packets and Appointment Reminders

- Each participant receives a Welcome Packet followed by appointment reminders closer to their appointment
  - Welcome Packets sent via email or mail
  - Welcome Packets translated in Spanish and Arabic
  - Appointment reminders sent via email using REDCap and sent via phone call and text using Twilio within REDCap
  - Appointment reminders translated in Spanish
- Participants confirm or cancel their lab appointment using a link in emailed appointment reminders

Dear John Doe,

Your MiChEM appointment is tomorrow at 15:30 at .

- Please complete the survey via the link sent in the Welcome Packet Email or by calling 844-464-7327.
- Please remember to bring a form of ID with both your name and picture.
- Please drink plenty of water before your appointment.
- You do not need to fast for this appointment.

Click here to confirm your appointment.

For questions or to reschedule, please call 844-464-7327.

Thank you,

The MiChEM Project Team

Michigan Department of Health and Human Services

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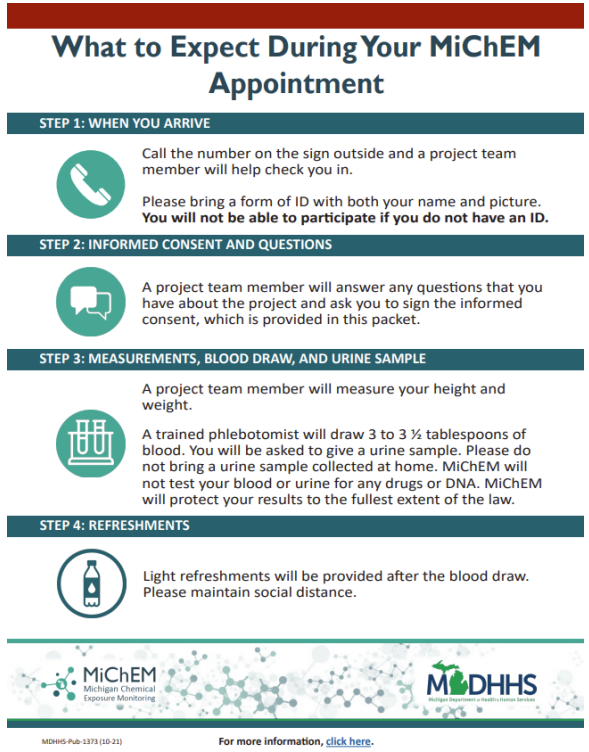
Michigan Chemical Exposure Monitoring



What to Expect During Your MiChEM Appointment

STEP 1: WHEN YOU ARRIVE

Call the number on the sign outside and a project team member will help check you in.

Please bring a form of ID with both your name and picture. **You will not be able to participate if you do not have an ID.**

STEP 2: INFORMED CONSENT AND QUESTIONS

A project team member will answer any questions that you have about the project and ask you to sign the informed consent, which is provided in this packet.

STEP 3: MEASUREMENTS, BLOOD DRAW, AND URINE SAMPLE

A project team member will measure your height and weight.

A trained phlebotomist will draw 3 to 3 ½ tablespoons of blood. You will be asked to give a urine sample. Please do not bring a urine sample collected at home. MiChEM will not test your blood or urine for any drugs or DNA. MiChEM will protect your results to the fullest extent of the law.

STEP 4: REFRESHMENTS

Light refreshments will be provided after the blood draw. Please maintain social distance.

MiChEM Michigan Chemical Exposure Monitoring

MDHHS

MDHHS-Pub-1373 (10-21)

For more information, click here.

Exposure Survey

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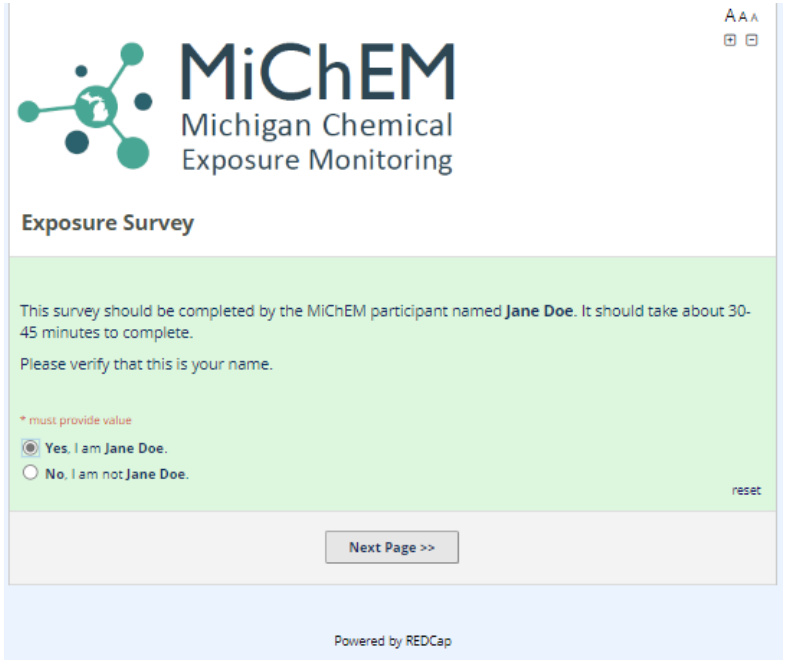
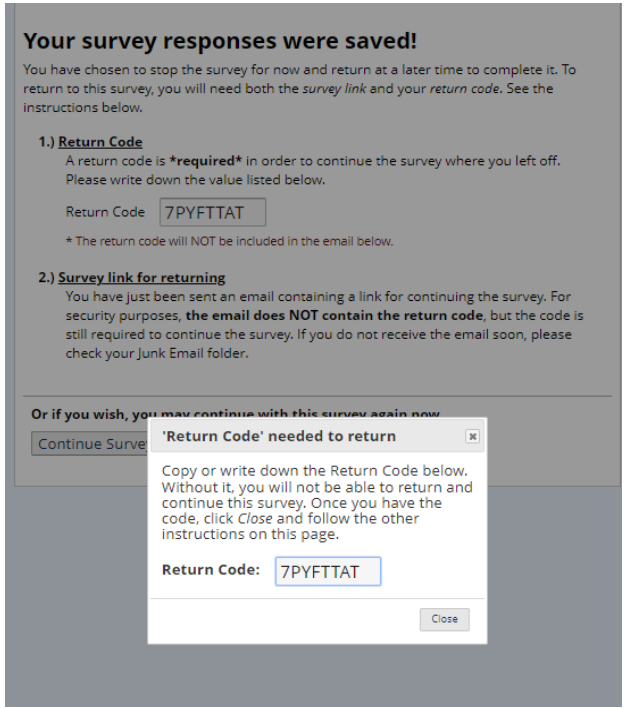
MiChEM Exposure Survey

- Survey takes approximately 30–45-minutes to complete
  - Asks about possible ways the participant could have come into contact with chemicals of interest
  - Can be completed via phone or online through a secure, unique survey link
- MiChEM-trained interpreters available for participants with Limited English Proficiency (LEP) to complete the survey with confidence and understanding





Preparing for Site Visit

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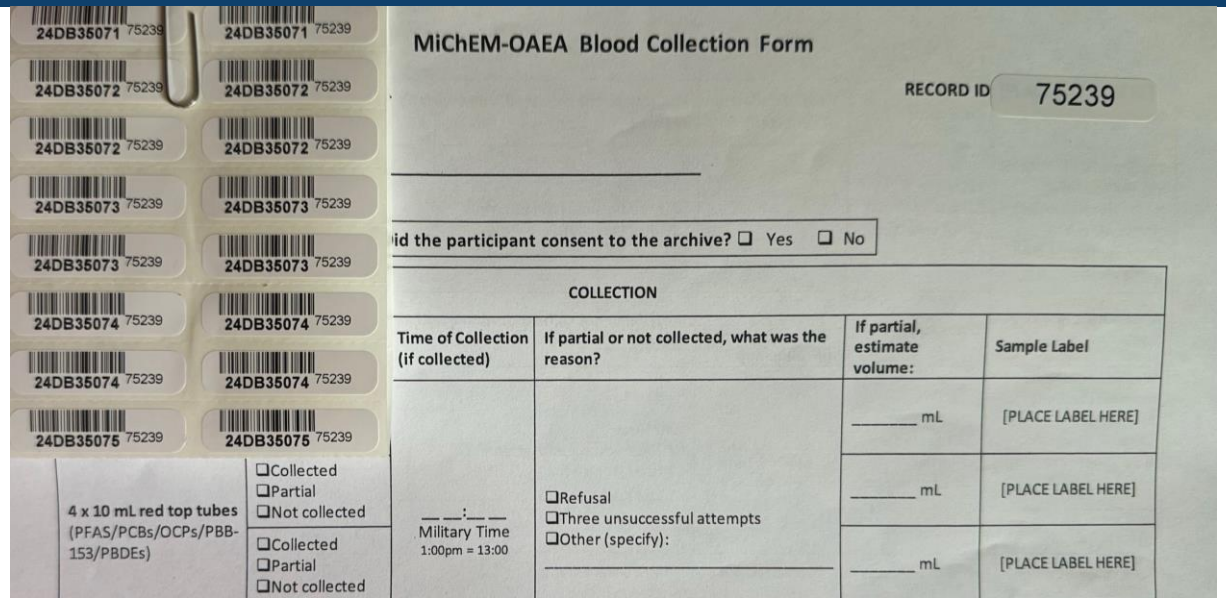
Pre Site Visit Internal Activities

Before the site visit, the Site Lead:

- Prints the weekly lab appointment schedule
- Creates participant labels
- Assembles specimen collection and processing hard copy forms and labels
- Hosts a pre-site visit logistics meeting
- Checks in with the site PoC
- Sends "Arrival Details" email



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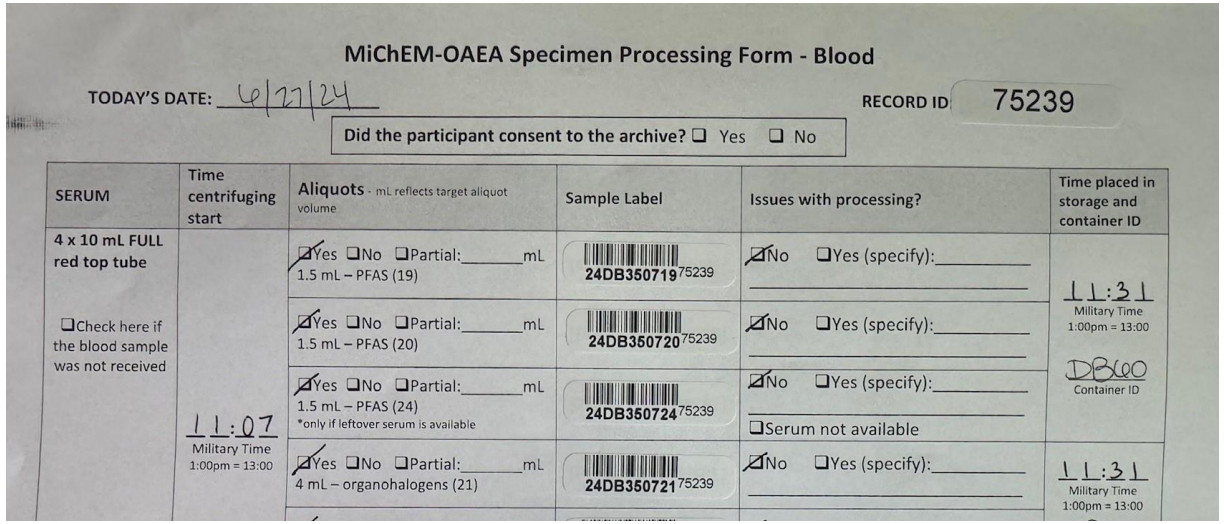
MiChEM-OAEA Blood Collection Form

RECORD ID 75239

id the participant consent to the archive? ❑ Yes ❑ No

		COLLECTION			
		Time of Collection (if collected)	If partial or not collected, what was the reason?	If partial, estimate volume:	Sample Label
4 x 10 mL red top tubes (PFAS/PCBs/OCPs/PBB-153/PBDEs)	❑Collected ❑Partial ❑Not collected	__:__ Military Time 1:00pm = 13:00	❑Refusal ❑Three unsuccessful attempts ❑Other (specify):	_____ mL	[PLACE LABEL HERE]
	❑Collected ❑Partial ❑Not collected			_____ mL	[PLACE LABEL HERE]
				_____ mL	[PLACE LABEL HERE]



MiChEM-OAEA Specimen Processing Form - Blood

TODAY'S DATE: 6/27/24

RECORD ID 75239

Did the participant consent to the archive? ❑ Yes ❑ No

SERUM	Time centrifuging start	Aliquots - mL reflects target aliquot volume	Sample Label	Issues with processing?	Time placed in storage and container ID
4 x 10 mL FULL red top tube ❑Check here if the blood sample was not received	11:07 Military Time 1:00pm = 13:00	☑Yes ❑No ❑Partial:_____mL 1.5 mL – PFAS (19)	24DB350719 75239	☑No ❑Yes (specify):_____	11:31 Military Time 1:00pm = 13:00
		☑Yes ❑No ❑Partial:_____mL 1.5 mL – PFAS (20)	24DB350720 75239	☑No ❑Yes (specify):_____	DBL00 Container ID
		☑Yes ❑No ❑Partial:_____mL 1.5 mL – PFAS (24) *only if leftover serum is available	24DB350724 75239	☑No ❑Yes (specify):_____ ❑Serum not available	
		☑Yes ❑No ❑Partial:_____mL 4 mL – organohalogens (21)	24DB350721 75239	☑No ❑Yes (specify):_____	11:31 Military Time 1:00pm = 13:00

Supply Management

- MDHHS DEH central supply room maintains 6+ months of lab, phlebotomy, and administrative supplies
- Lab supplies that come in contact with biospecimens are lot tested for contaminants that can impact analysis
- Site supplies:
  - Mobile lab stocked with 4 weeks worth of supplies
  - Stationary sites pack 2 weeks worth of supplies
- Remaining supplies are inventoried after every site visit

Travel to Site

- Lab appointments centrally located within invited zones to limit travel burden on participants
- Use combination of mobile lab and stationary pop-up sites
  - Coordinated with 124 local community partners to find parking locations for mobile lab or indoor spaces for stationary pop-up sites

Transportation Assistance

- Transportation assistance to and from appointment location offered to each participant during enrollment
  - 13% requested transportation assistance
- Transportation coordinator sets up transportation with available services in the area:
  - Uber Health
  - Lyft Business
  - Local transportation companies
- Medical transport used for participants with accessibility needs

Language Services for Participants with Limited English Proficiency (LEP)

- Interpretation services available through Bromberg & Associates
- Immediate and pre-scheduled interpreters available in multiple languages for enrollment, surveys, and lab appointments
- Interpreters scheduled 48 business hours out from a survey or lab appointment

MiChEM Interpretation Services Metrics	
Service	**Prevalence (%)**
Total # Calls with Interpreter	108
Hotline	66 (61%)*
MiChEM-trained	35 (32%)*
Pre-scheduled, but not MiChEM-trained	6 (6%)*
VRI	1 (<1%)*
Total # LEP Enrolled	22
Total # Surveys Completed with Interpreter	5 (22%)**
Total # LEP MiChEM Appointments	10 (45%)**

*Represents % of calls with an interpreter
**Represents % of participants who enrolled

Accessibility

- Bring lab to participants' communities
- Transportation accommodations
- ADA Compliant Mobile Lab
  - Wheelchair Lift
  - ADA Restroom
  - Grab bars throughout Mobile Lab
  - Larger staircase for participants with limited mobility
- Interpretation services over the phone
- Exposure Survey by phone, self-guided, or with in-person assistance

Appointment

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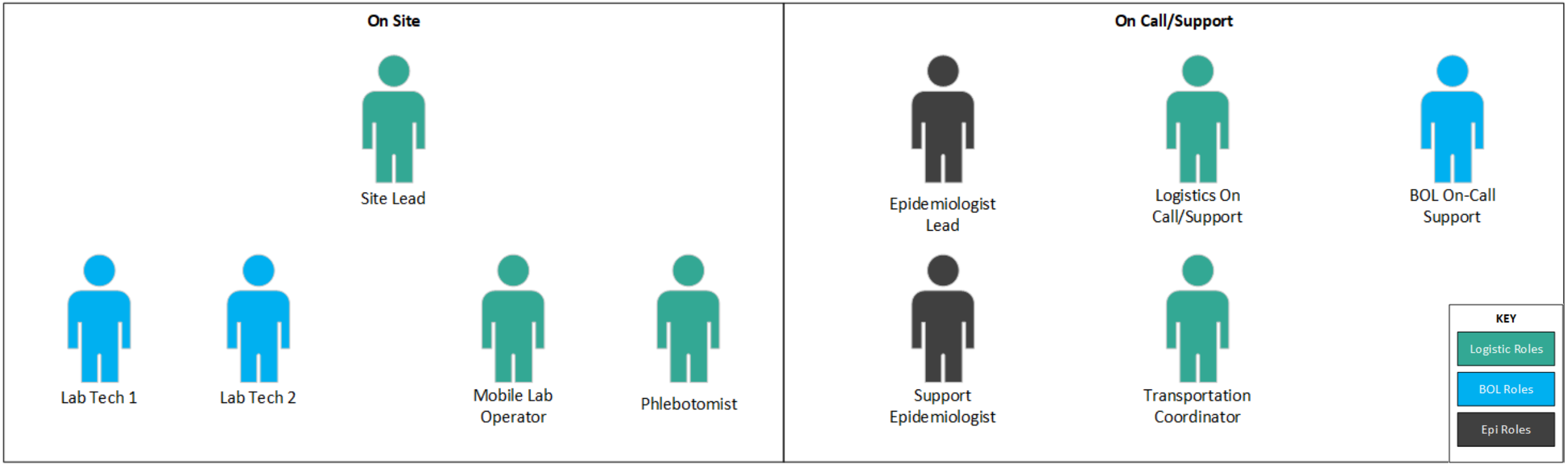
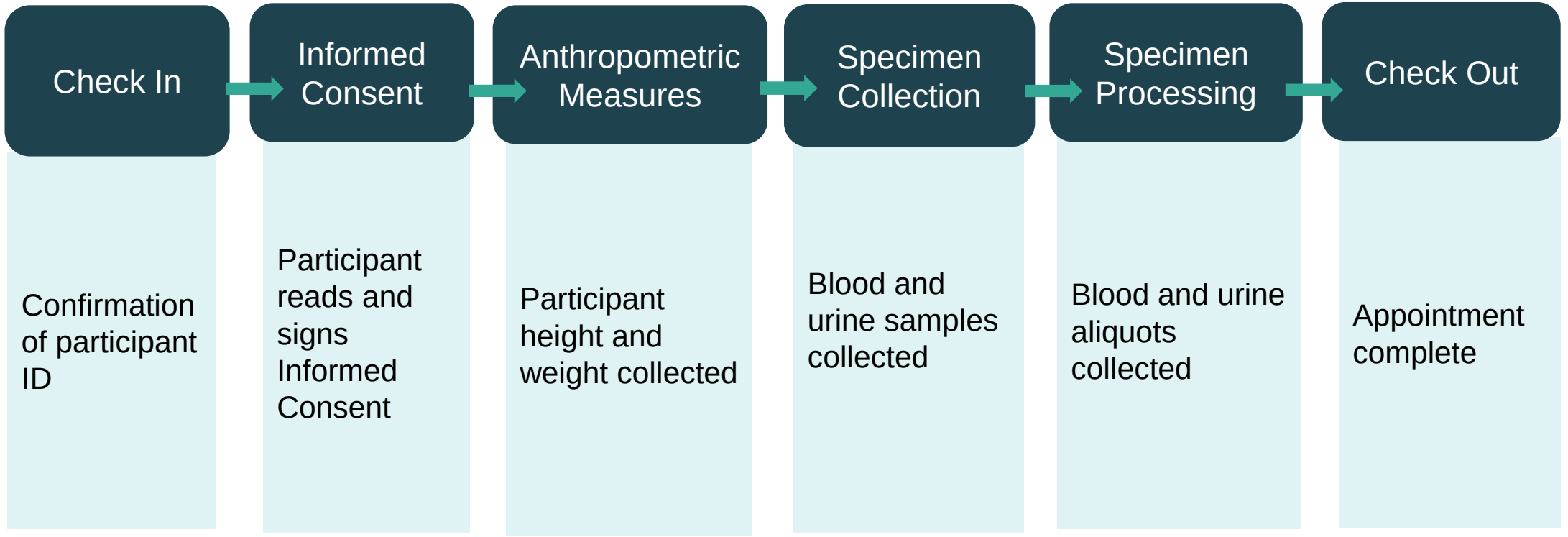
MiChEM Staff



Lab Appointment Flow

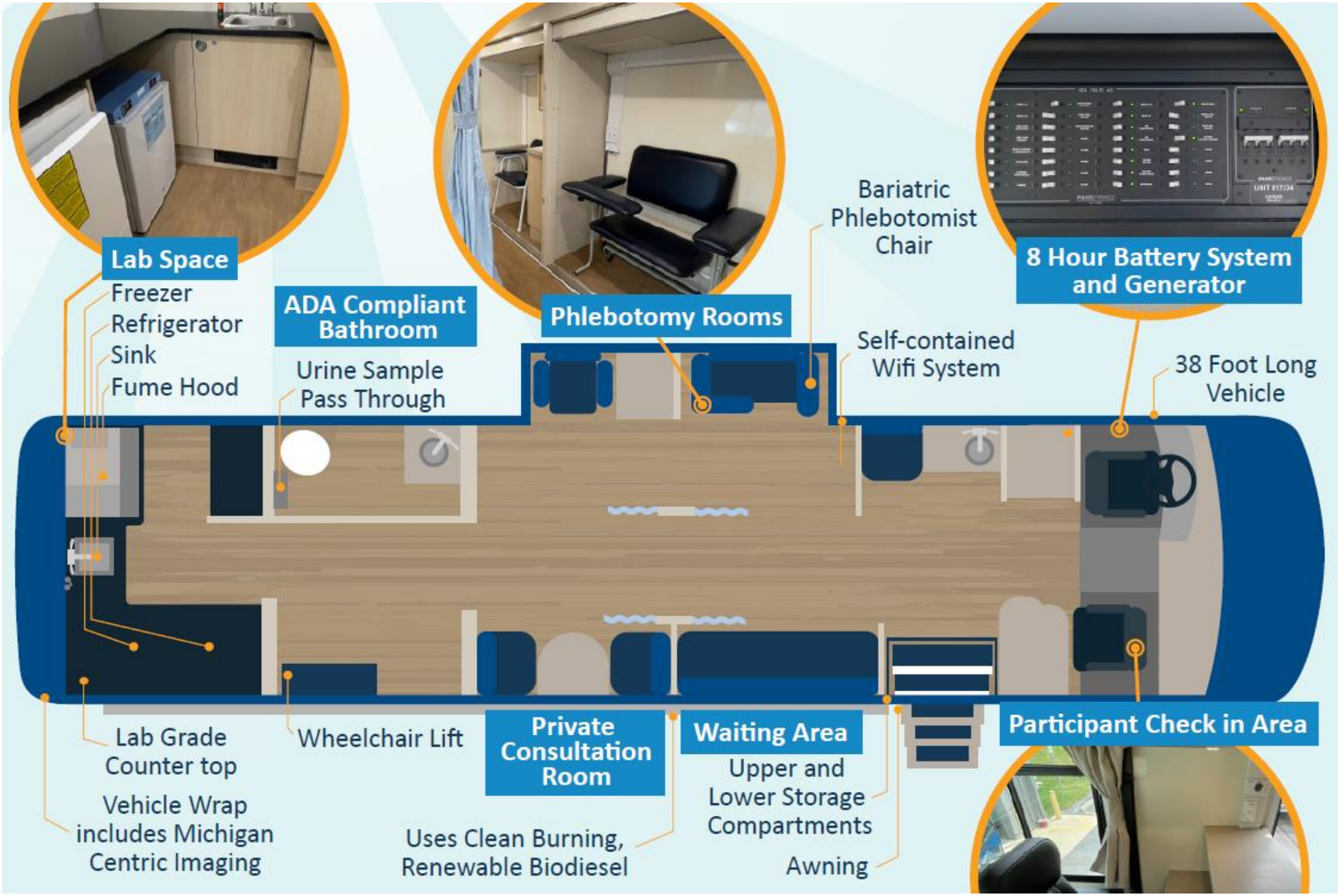


Gift Cards

Participants who complete the project receive a $65 Visa gift card:

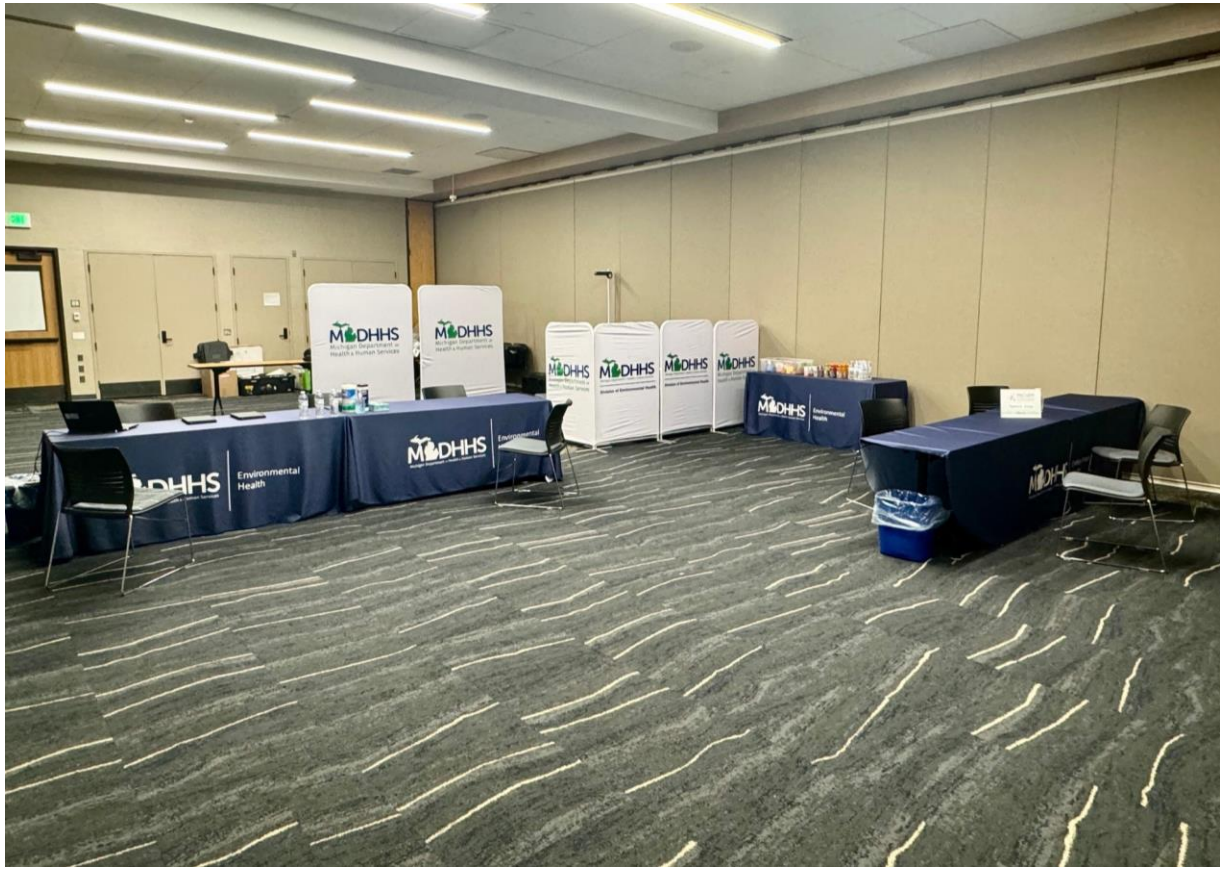
- Gift cards given at the end of each completed appointment
- Gift cards pre-loaded Visa credit cards and can be used anywhere

Mobile Lab Layout



Mobile Lab Virtual Tour

Stationary Sites



Results

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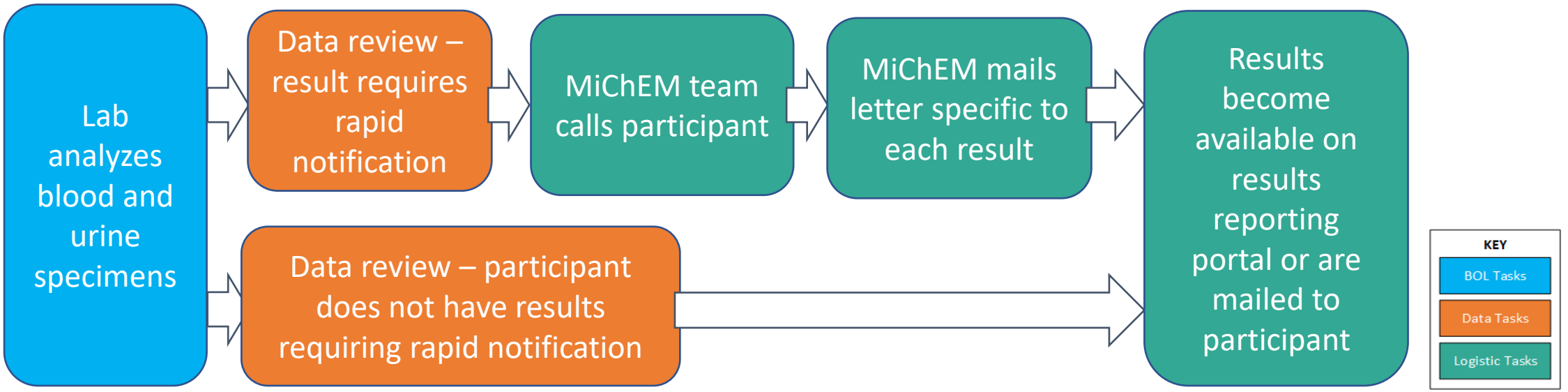
Results Communication



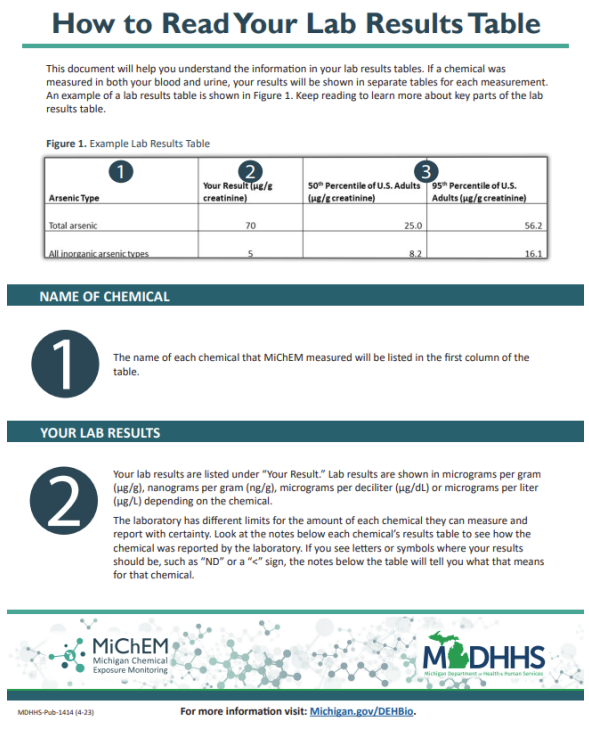
Results Packets

Results Packet includes:

- Tables with participants' results and NHANES percentiles
- Factsheets on how to read and understand MiChEM results
- Flyer to share with health care provider
- FAQ-style factsheets with chemical-specific exposure sources and reduction strategies

MDHHS Michigan Department of Health & Human Services

MiChEM Michigan Chemical Exposure Monitoring



How to Read Your Lab Results Table

This document will help you understand the information in your lab results tables. If a chemical was measured in both your blood and urine, your results will be shown in separate tables for each measurement. An example of a lab results table is shown in Figure 1. Keep reading to learn more about key parts of the lab results table.

Figure 1. Example Lab Results Table

1 Arsenic Type	2 Your Result (µg/g creatinine)	3 50th Percentile of U.S. Adults (µg/g creatinine)	3 95th Percentile of U.S. Adults (µg/g creatinine)
Total arsenic	70	25.0	56.2
All inorganic arsenic types	5	8.2	16.1

NAME OF CHEMICAL

1 The name of each chemical that MiChEM measured will be listed in the first column of the table.

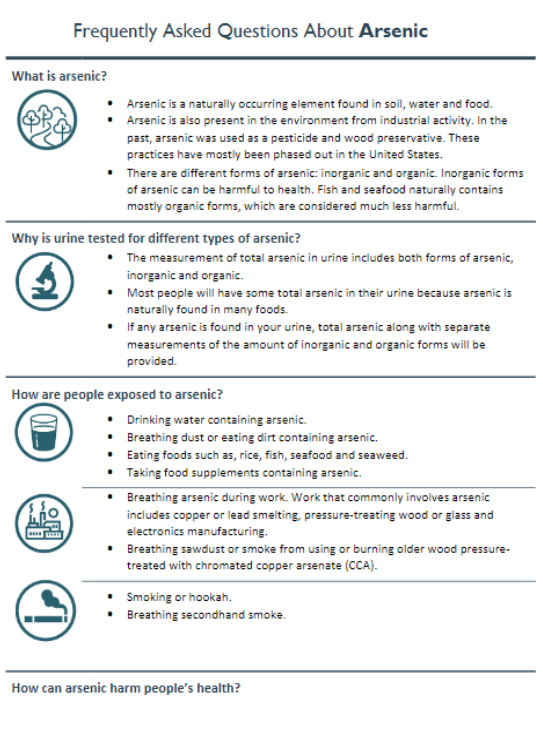
YOUR LAB RESULTS

2 Your lab results are listed under "Your Result." Lab results are shown in micrograms per gram (µg/g), nanograms per gram (ng/g), micrograms per deciliter (µg/dL) or micrograms per liter (µg/L) depending on the chemical.

The laboratory has different limits for the amount of each chemical they can measure and report with certainty. Look at the notes below each chemical's results table to see how the chemical was reported by the laboratory. If you see letters or symbols where your results should be, such as "ND" or a "<" sign, the notes below the table will tell you what that means for that chemical.

MiChEM Michigan Chemical Exposure Monitoring MDHHS

MDHHS-Pub-1414 (4-23) For more information visit: Michigan.gov/DEHBio.



Frequently Asked Questions About **Arsenic**

What is arsenic?

- Arsenic is a naturally occurring element found in soil, water and food.
- Arsenic is also present in the environment from industrial activity. In the past, arsenic was used as a pesticide and wood preservative. These practices have mostly been phased out in the United States.
- There are different forms of arsenic: inorganic and organic. Inorganic forms of arsenic can be harmful to health. Fish and seafood naturally contains mostly organic forms, which are considered much less harmful.

Why is urine tested for different types of arsenic?

- The measurement of total arsenic in urine includes both forms of arsenic, inorganic and organic.
- Most people will have some total arsenic in their urine because arsenic is naturally found in many foods.
- If any arsenic is found in your urine, total arsenic along with separate measurements of the amount of inorganic and organic forms will be provided.

How are people exposed to arsenic?

- Drinking water containing arsenic.
- Breathing dust or eating dirt containing arsenic.
- Eating foods such as, rice, fish, seafood and seaweed.
- Taking food supplements containing arsenic.
- Breathing arsenic during work. Work that commonly involves arsenic includes copper or lead smelting, pressure-treating wood or glass and electronics manufacturing.
- Breathing sawdust or smoke from using or burning older wood pressure-treated with chromated copper arsenate (CCA).
- Smoking or hookah.
- Breathing secondhand smoke.

How can arsenic harm people's health?

Lessons Learned

Challenges in:

- Recruitment in rural areas
  - Limited transportation
  - Unreliable Wi-Fi/service
- Interpretation services
  - Obtaining and scheduling interpreters
  - Door knocking field materials only available in English, Spanish, and Arabic
- Notifications
  - Automatic notifications sent in languages other than English
  - Unable to text "C" to confirm appointments
- Maintaining inventory due to supply chain challenges from COVID
  - Bulk mailing envelopes
  - Paper
- Awareness of communities' cultural customs and holidays
- Use of 2 separate scheduling systems

Thank you!

For more information about MiChEM, please visit Michigan.gov/DEHBio

For questions, please reach out to MDHHS-MiChEM@michigan.gov