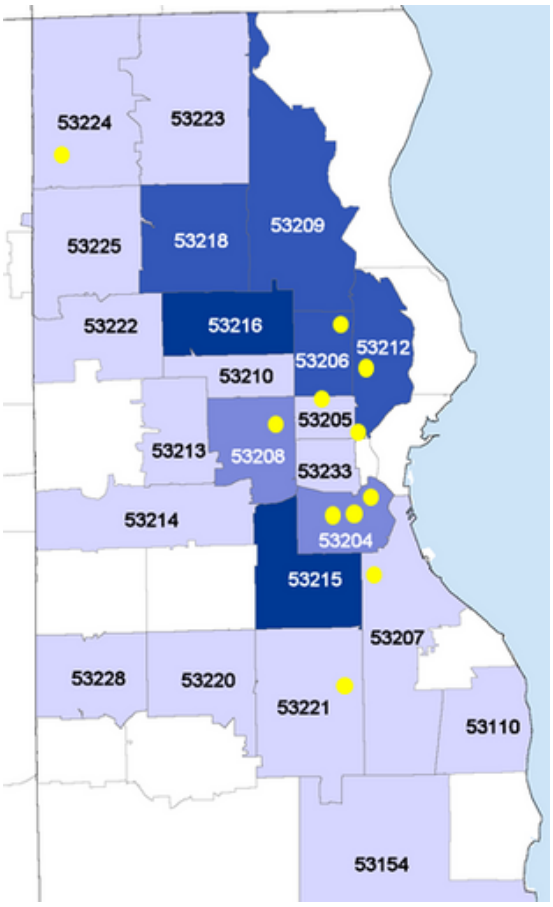
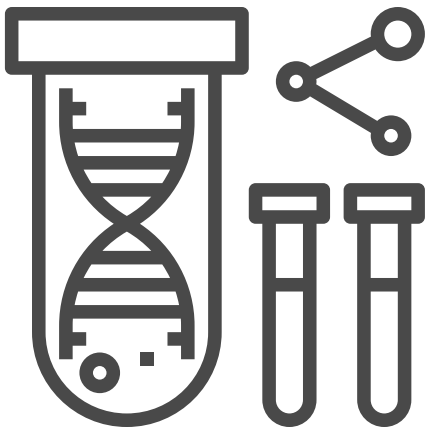
survey of the health of Wisconsin

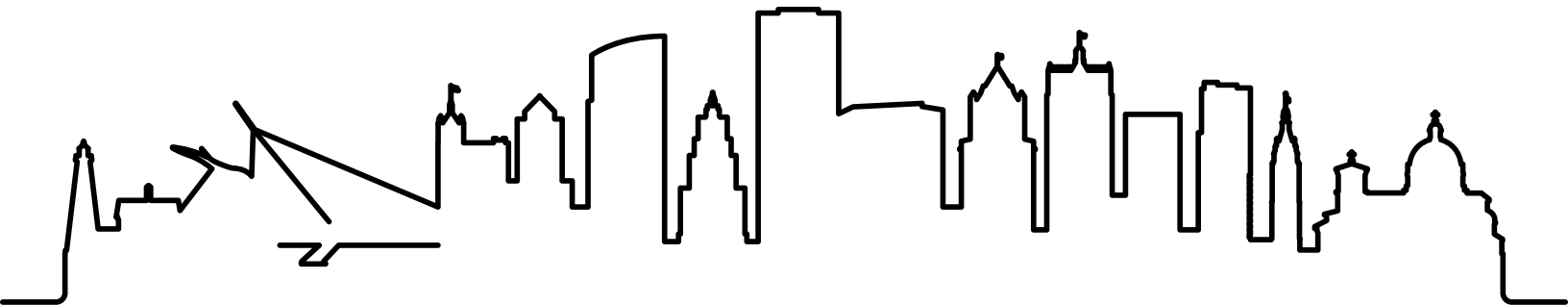
School of Medicine and Public Health
UNIVERSITY OF WISCONSIN-MADISON

SHOW PROGRESS REPORT

- 2019-2020-







The Survey of the Health of Wisconsin (SHOW) remains a one of a kind resource for population health sciences. SHOW at it's very core supports tracking of population health wellbeing across the state of Wisconsin, supports innovative population health sciences research, and education. Recent progress has also supported increased attention to addressing ongoing disparities in health and well-being among African American and Hispanic populations in the state. As such, SHOW embodies the Wisconsin idea and supports the overall mission of the University of Wisconsin (UW)-Madison School of Public Health and larger UW community as well as the greater statewide public health community. In March, 2020 right as the COVID-19 pandemic was unfolding, SHOW presented progress on 2019-2020 study aims to the WPP. At the time, the SHOW program provided an extensive update on activities, including establishment of an SAB, and their recommendations. Recommendations by WPP were to establish an SAB, and seek to identify new opportunities for SHOW to support community based intervention research. This work has been accelerated based on SHOW's current role and response to COVID-19.

SHOW currently plays a leading role in the UW SMPH COVID-19 response and research and was used in a NIH RAD-X proposal. Shortly after stay at home orders were announced across the state in response to the COVID-19 pandemic, the SHOW program requested permission from the WPP to pivot efforts to divert SHOW core funds towards COVID-19 research and surveillance. SHOW rapidly responded to the COVID-19 pandemic by developing an online survey for tracking health and wellbeing of a cohort of past SHOW participants. Within a month SHOW had received IRB approval and identified over 20 investigators (See List of Partners in Appendix J) across SMPH and the UW campus interested in building on this opportunity. Preliminary data from this study were used for one RAD-X application by Dr. Ehrenthal and faculty within the UW Prevention Research Center and ICTR to address disparities in COVID-19 testing and access to testing among women, children and families across the state. This application was submitted in early August 2020.

The first of three planned waves of the COVID-19 impact surveys is complete and initial study findings are being analyzed and results to be shared in the coming months.

When the SHOW COVID-19 impact surveys were initially planned, there was some hope that the Pandemic would be winding down by Fall 2020. As this is not the case, and to ease participant burden, SHOW will launch wave II of the COVID-19 impact study in January of 2021.

SHOW continues to shape and support the statewide public health response to COVID-19 surveillance and research. In late April/early May, SHOW also began an ongoing partnership with The Wisconsin Department of Health Services to support the public health response, building on the vast experience of community based research and biosample collection that SHOW already has in the state. DHS specifically reached out to SHOW to take advantage of its existing statewide cohort, team expertise, and infrastructure to carry out statewide COVID-19 Antibody Testing. The Past Antibody COVID-19 Community Survey (PACCS) was designed and launched in 1.5 months. This ongoing surveillance project, leveraged the existing SHOW cohort and includes over 1.5 million dollars in ancillary study funding to support serological testing among past 2014-2016 SHOW participants, and recruitment of 2018-2019 African American and LatinX participants.

This unprecedented effort, includes collaborations with **Dr. Ryan Westergaard, Chief Medical Officer in the Division of Communicable Diseases, who is also faculty in the SMPH Department of Medicine.** Most remarkable was the ability for the SHOW team to quickly mobilize and collect n=1,121 serological tests in community based sample collection sites across the state of Wisconsin in July and early August. As of August 26, 2020, preliminary

results are finalized and shared with DHS. Results will be disseminated to all past SHOW participants, UW community, local health departments and media.

Based on the success of the ongoing surveillance (PACCS) study, SHOW leadership and staff were also asked to support an outbreak investigation among 162 campers at a Jewish camp in South East Wisconsin. Within 48 hours, SHOW was able to mobilize staff, identify phlebotomists and lead protocols to safely collect serological samples from all campers. This effort was lead by SHOW Assistant Director, Amy Schultz and the SHOW phlebotomy team.

To capitalize on this serological testing, SHOW also consented the majority (978, or 87%) of participants (*kids were counted) to use their samples for COVID-19 research. Investigators who are planning to use the serum samples include **Dr. David Andes in the UW Department of Medicine**. SHOW biological samples were also used in a P30 Cancer Center Support Grant application to NIH submitted by **Kristina A. Matkowskyj, MD, PhD** in the Department of Pathology and Laboratory Medicine for development of a UW COVID-19 biobank. The SHOW samples are being collected as control samples from a general population based sample.

None of these critical COVID-19 research and public health response efforts and success would have been possible without the continued and sustained funding by the WPP.

To meet the goals of advancing health equity research, and expanding the scope and reach of the SHOW program, several new partnerships and collaborations were formed with community organization in the City of Milwaukee, including KidTown Learning Center, Personalized Interventions Varied & On Time (PIVOT), Community Care Inc., and Hayat Pharmacy (See Appendix G). SHOW leveraged its important partnerships in Milwaukee and adapated recruitment methods to complete survey participation on 630 African American and LatinX residents of Milwaukee; surpassing the goal of 500. COVID-19 has hampered community response to dissemination and outreach, however, a presentation was made to the WAI, CCE SAB in June, 2020 regarding updates and findings from the SHOW 2018-2019 data collection efforts among under-represented minority populations and lessons learned. The presentation was well received and the CAB was grateful for the continued partnership and updates. Feedback from this group included the need for continued dissemination even if via web-conference to support dissemination of findings to community partners.

This important community development work and ongoing expertise in community based biosample collection led to SHOW resources being included in a supplemental NIH application submitted by Dr. Carey Gleason in July to support and modify sample collection among older African American adults in Milwaukee and Madison.

Progress on Aims: Following is an abridged summary of **SHOW's achievements towards specific aims** for 07/1/2019-7/30/2020 which were proposed prior to the COVID-19 pandemic.

Aim 1: Maintain a rigorous population-health and translational research infrastructure.

1) Maintain data and biological sample repositories.
2) Increase diversity of the sample.
3) Establish a scientific advisory board (SAB) to support and inform program direction.

In 2019-2020, with the recommendation of the SAB, SHOW focused on maintaining a rigorous cohort of quality survey data and biological samples, and increasing the diversity of the sample through community engagement in the City of Milwaukee. Evidence of SHOW impact includes 9 peer-review publications, 25 presentations, 3 federally funded and 5 pending grants, and 9

new ancillary studies that have resulted from SHOW or are ancillary to SHOW data in 2019-2020 (See Appendices A-C).

At the March 2020 presentation of SHOW to the WPP program, a question was also asked about the specific number of investigators who are or have been using SHOW. **Between July 1, 2019 and June 30, 2020, data and resources have been used by over 35 faculty and students across the entire School of Medicine and Public Health (SMPH), the UW campus and beyond.** Data are also being used for innovative translational health sciences research by faculty in Bacteriology, the UW School of Pharmacy, and prevention research in the School of Nursing. Research into the impact of contextual drivers of health disparities, including housing and transportation are being conducted by faculty in Urban Planning. The UW Department of Sociology is also using SHOW data to better understand health disparities across the life-course related. SHOW data is being used by students and faculty within the Center for Demography and Ecology as well as the Center for Demography Health and Aging. SHOW continues to be seen as a valuable resource to faculty and students outside of the UW, including the University of Wisconsin Milwaukee, the Louisana State University and Medical College of Wisconsin (See Appendices D & E).

SHOW continues to serve as an important resource for training in epidemiology and population health sciences (see Appendix E), with core SHOW data integrated into SMPH and UW-Milwaukee curriculum and over 50 undergraduate, graduate, medical and preventive medicine residents advancing their careers using SHOW resources. In 2019-2020 alone, SHOW supported 2 Preventive Medicine Residents, 3 MPH students, and 5 PhD students with data for their graduate level research in sociology, urban planning, and biomedical research. Examples include MPH student, Alison Rodriguez who was a PA for SHOW and is now supporting the data team and community outreach and dissemination. Bianca Silva is also an MPH student in Population Health Sciences who has supported dissemination of SHOW findings regarding carbon monoxide poisoning among state residents. PhD students include Megan Agnew, funded on a newly awarded R01 to conduct residential histories and track social disadvantage across the lifecourse, and three new PhD students, Lauren Schrader, Rachel Anderson, and Joni Sondello who will use SHOW data for their doctoral dissertation research. Each of their projects uses novel biomarker data available in SHOW, and each has an advisor within SMPH who is a basic science researcher. SHOW thus, is supporting a new generation of translational, team science researchers.

<u>Aim 1.1.Maintain data and biological sample repositories</u>.

- In 2019, 2300+ serum samples and 3300+ urine samples were added from over 630 African American and LatinX participants, who were newly recruited to the SHOW cohort.
- In 2020, SHOW partnered with the UW biotechnology center to have biobank management software, Freezerworks, (purchased by SHOW in 2018) used by GEAM (Genome Editing and Animal Models) and sharing maintaining cost and upkeep.
- The software is critical to maintain the SHOW biorepository and has unique features including enhanced security, HIPAA compliance capabilities, and improved sample tracking.
- Over 200,000 biorepository samples were re-inventoried, re-organized, and entered into the new database. The project began in early 2019, took over 15 months and will be completed in the Fall of 2020 (See Appendix F for biosample inventory) due to unexpected delay caused by COVID-19 campus closures.
- Freezerworks has expedited our process for inventorying new samples, conducting quality control on samples received on consent forms for biosample collection &

storage, and streamlining identification and retrieving samples from the biorepository for data requests and analyses.
- Increased utilization of samples by SMPH and other UW faculty for a wide range of analyses (See Appendix D for more detail on type, and scope of data requests by students and faculty).

Adaptations and responses to COVID-19 (a more detailed description of these efforts impact is summarized above):

SHOW COVID-19 Impact Survey

- In April and May 2020 in response to the COVID-19 pandemic, SHOW quickly developed, received IRB approval and launched a new survey to gather baseline information on SHOW COVID impacts across the state of WI. The survey was designed to be administered as both a web and telephone based survey.
- 24 investigators from across campus submitted COVID-19 reseach proposals with SHOW and assisted in the development of the survey (Appendix J).
- All past adult SHOW participants from 2008-2020 (n=5,249) were invited to complete an online or phone survey about COVID-19 testing, exposure, and the pandemic's impact on their health, daily life and well-being.
- 1,378 SHOW participants completed the COVID-19 survey: Wave I. All eligible past participants will be asked to complete the survey in January 2021 (6 months later), and May 2021 (12 months later).
- Plans are underway to improve participation in subsequent waves of the survey, with guidance from the SAB and Core Scientists at fall 2020 meetings.

SHOW Infrastructure for COVID-19 surveillance and tracking: The Past Antibody COVID-19 Community Survey (PACCS)

- The WI Department of Health Services (DHS) utilized the SHOW infrastructure to conduct a one of a kind statewide population-based serological surveillance, to inform public health efforts. DHS specifically identified SHOW because of it's random population, based sample that included previous data and biosample collection, and the diversity of the SHOW sample, particularly, oversampling in Milwaukee. The PACCS project is ongoing.
- This collaborative effort includes the Wisconsin State Laboratory of Hygiene
- 1,121 SHOW participants from 2014-2016 statewide sample, 2017 follow-up, and 2018-2020 unrepresented populations participated in Wave I of the PACCS survey in July/August 2020 – completing a blood draw for COVID-19 antibody test. This surpassed the goals of completing at least 1,000 partcipants.
- Preliminary results show approximately 1.9% of state residents have PACCS antibodies, rates were much higher in LatinX and African American populations (>6%), these preliminary findings will be released in mid-September, 2020.
- All eligible past participants will be asked to complete COVID-19 antibody testing again in October 2020 (3 months later), and February-March 2021 (7 months later, at the end of flu season).

SHOW Infrastructure for COVID-19 Outbreak Investigations

- In eary August 2020, DHS utilized the SHOW infrastructure for two days of antibody testing of >150 adolscent males at a Mukwonago Jewish Camp where an outbreak had occurred in June/July 2020.

- SHOW proved its unique ability as a research infrastructure to respond quickly in a pandemic and coordinate efforts rapidly to launch COVID-19 antibody testing within less than 2 weeks notice.
- SHOW provided phlebotomists, supplies, equipment, and consulting on logistics and planning in order to successfully conduct blood draws for antibody tests and saliva samples for COVID-19 research for investigators at University of Pennslyvania and Johns Hopkins University.

Supporting Novel COVID-19 Research

- Additionally, 980 participants of the PACCS survey gave permission to participate in COVID-19 related research at the UW and to link their COVID-19 antibody test results to their SHOW health data.

Aim 1.2 Increase Diversity of the Sample.

SHOW reached its goal of collecting survey data on 100 LatinX community members from the City of Milwaukee. The LatinX pilot launched in June 2019 and ended in September of 2019. Additionally, SHOW reached its goals of collecting survey data on > 400 African American (AA) community member from the City of Milwaukee.

- Focused recruitment and retention of AA and Latinx residents began in 2016 with partnership building in the City of Milwaukee. Presentations, listening sessions, and focus groups were held with the UW WAI community advisory board representing Milwaukee's African American (AA) Community and United Community Center (UCC) collaborations represent the LatinX community.
- Recruitment of under-represented racially and ethnically diverse populations began in 2018.
- In 2018, into the early months of 2019, only ~100 surveys had been completed among our focused recruitment efforts in African American communities in Milwaukee.
- In response to the low recruitment rate, in 2019 SHOW field staff increased and improved community outreach and engagement efforts at community events, attending more than 30 local events. (Appendix H).
- In addition to door-to-door recruitment efforts, SHOW pivoted its recruitment approach and adapted to the community by adding convience sampling at recruitment events and at partner organizations in the City of Milwaukee.
- SHOW partnered with The Personalized Intervention Varied On Time (PIVOT), a Male African American community organization in Milwaukee. PIVOT assisted with recruitment and provided space to conduct survey and phlebotomy apppoinments. This effort balanced our participation by gender, as females were more likely to attend tabling events at which we recruited.
- Several additional community partnerships were formed in the summer and fall of 2019 which played an important role in SHOW's success at recruiting >400 African Americans in Milwaukee. Partnering orgranizations include: Community Care Inc., KidTown Learning Center, PIVOT, Walnut Park Apartments, and Hayat Pharmacy. See Appendix G for a complete list of community organizations SHOW collaborates with and what collaborations and mutual support has occurred and is ongoing.
- Community Care Inc and KidTown are now site locations for PACCS COVID-19 Antibody testing. DHS and SHOW were able to provide giveback in the form of free COVID-19 antibody testing for employees at these establishments.

Aim 1.3 Establish a scientific advisory board (SAB) to support and inform program direction.

- The SHOW SAB was established in August 2019 with the goal of forming a team of diverse experts spanning different departments across campus to provide scientific program guidance (See Appendix I for list of SAB members).
- SHOW holds biannual meetings with the SAB and has held two meetings to-date: September 2019 and March 2020. The next SAB meeting is being scheduled for October 2020.
- The SAB advised SHOW to
    1) focus on longitudinal follow-up of adult participants and oversampling in minority communities;
    2) focus research on environment, aging, obesity and microbiome
    3) improve SHOW outreach to researchers by clearly articulating what makes SHOW novel and why others should use it; improving website and data access, having focused meetings, seminars and outreach to researchers and communities; develop a business plan
    4) connect and collaborate with other researchers, research entities and community organizations who have expertise and interest in community evaluation and interventions who are use SHOW infrastructure and/or cohort to carry out their programs.
- Details of how SHOW has addressed the SAB's advice is addressed throughout this report in subsequent aims. Highlights are as follows:
    - In the fall 2019 SHOW leadership and core scientists met to finalize plans for cohort maintenance, retention and to focus the SHOW survey on environment and aging related research. This theme is consistent with recommendations from the SHOW SAB, it is cross-disciplinary and allows for advancements in basic science to be translated and aligns with other well-established programs and centers across SMPH including the UW Carbone Cancer Center, newly evolving initiatives around metabolic health and obesity research, the Wisconsin Alzheimer's Institute and the Center for Demography and Aging. Building on this theme core content for the SHOW follow-up survey planned for launch in Spring of 2020 (now delayed until Spring 2021) included a shortened survey and innovative sample collection protocols that align with environment, aging, obesity and microbiome research. SHOW hired Dr. Amy Schultz, a recent graduate, with over seven years of research experience in SHOW to support efforts towards building the environment and aging infrastructure, and SHOW operations. Much of her work has been delayed due to necessary and important COVID-19 response.
    - Based on SAB feedback, plans were developed to conduct longitudinal follow-up only among adults and in relationship with ongoing NIH funded research by key investigators (Engelman and Malecki).
    - The SAB also encouraged ongoing community engagement and data collection in under-served minority communities. A community engagement and outreach plan was developed in Milwaukee for data dissemination, and grant/evaluation/program development with partners. This work is being led by SHOW's Assistant Director, Amy Schultz.
    - Based on SAB recommendations to increase awareness of the SHOW program, outreach and communication staff revamped the SHOW website in Winter 2020 and moved to self-hosted site.
    - After departure of the previous Associate Director in March, 2020 (Dr. Tammy LeCaire), SHOW hired Dr. Matt Walsh as lead data scientist/data team

supervisor who brings over five years of applied epidemiology, data science and policy background to the program. Dr. Walsh's primary role is to improve data access. This includes development of social media plan, launch of facebook page and weekly posts, increase in presentations, seminars, and outreach to researchers on how and why to use SHOW data. The business plan is in-progess. Focused outreach via newsletter, email, and in-person updates and meetings with investigators has been launched.

- SHOW extended partnerships by formally becoming a member of the ICTR-CAP program, and attended over four ICTR-CAP events, as well as the Neighborhood Dashboard ongoing trainings. These strategic partnerships are in line with overall aims for the SHOW program and to encourage the use of the SHOW program for intervention related research. SHOW staff have been attending Dissemination and Implementation research trainings.
- To further support use of the SHOW infrastructure for intervention research - SHOW has connected with the Community Aging and Action Research Network (CAARN) to develop and encourage faculty to consider the use of the SHOW program to gather data to shape interventions. Key examples include rural physical acivity programs led by Dr. Cadmus Bertram in the Department of Kinesiology, and Dr. Heidi Brown in the Department of Obstetrics and Gynecology who are using SHOW infrastructure and/or cohort to carry out their programs.
- PIVOT used SHOW data collected in the community to fund evaluation and intervention programs.
- SHOW became a member of ICTR-Cab and partered with CAARN and C-POD to develop and encourage community evaluation and interventions using SHOW infrastructure and/or cohort to carry out their programs.
- Based on SAB guidance, SHOW is also carefully considering new funding models and will seek advice from Dr. Jane Mahoney to support this in collaboration with UW ICTR. These efforts were largely put on hold due to emerging COVID-19 activities.

Aim 2: Increase access to and use of SHOW's unique combination of genetic, sociodemographic, behavioral, and neighborhood-level data for population health sciences (including clinical, epidemiologic, basic, translational, and health equity) research.

1) Create, maintain and annually expand data curation, including developing a public use dataset.
2) Improve accessibility to data
3) Build and maintain community-based partnerships to increase the use of SHOW tools by community organizations for program planning, implementation and evaluation.

<u>Create, maintain and annually expand data curation, including develop a public use dataset</u>.

- In March 2020, SHOW hired Matt Walsh, in a newly created lead Data Scientist and Data Team Supervisor position with a primary focus of supporting SHOW compliance with HIPAA risk analysis, guiding the SHOW data team to increase access to data, and planning for and implementing public use data set for the improved accessibility and use of data.
- Since March, much progress has been made. SHOW is now in compliance with all HIPAA risk requirements, the data team developed a working plan for improving processing and tracking of data requests; cleaning and preparing codebooks,

datasets and documentation for researchers; and currently the team is developing a public use data.

- An example of the increased efficiency is a quick turnaround time in processing an analytic data set from the current WAVE I SHOW COVID-19 impact survey which is now in the hands of SMPH and UW investigators. SHOW staff cleaned and made available a public use data set within four weeks of ending data collection, an unprecedented quick turn around. We are leveraging this model to improve SHOW's process for cleaning SHOW's main core survey data and making the data available more rapidly than in prior years.
- Development of the SHOW Core Survey public use data set has started and is on-going. Goals of finishing it have been postponed to January 2021 due to urgent COVID-19 data processing.

SHOW Dissemination via Website and Social Media

- A new SHOW website (add website link) was launched in May 2020.
- New outreach and dissemination staff have been hired to support these efforts.
- A formal social media plan for SHOW, tracking use of and followers of our website and facebook page were put in place. Two Facebook posts are launched weekly.
- Future plans include more activity via Twitter.
- SHOW has begun tracking Facebook use and aims to branch out to new audiences, including using Facebook as a platform for dissemination of COVID-19 related findings and integration on the new SHOW website.

<u>Improve accessibility to data documentation/codebooks</u>.

- The data request process has been re-vamped under Dr. Walsh's leadership. A new Microsoft Access tracking database was created for tracking and processing data requests. Data requests are now responded to within 48 hours and fulfilled within 1-2 weeks.
- SHOW also hired Jacquie Cronin, a recent MPH graduate from Johns Hopkins University as SHOW's Communications, Community Engagement and Outreach Specialist.
- SHOW developed a communication plan which now includes quarterly mailed and e-updates and biannual newsletters to: (1) Participants, (2) Community Partner Organizations, (3) SMPH and other UW investigators.
- The new SHOW website (add website link) launched in May 2020 was designed with improved data dissemination and increased use of SHOW data in mind. The prior website was under auspices of SMPH to update content for us. By hosting our own website we are able to make access to information clearer and continually update the website with ongoing studies and information regarding data access and codebooks.
- Streamlined directions, resources and tools for data access for researchers and students were developed. Products include enhanced codebook visualization and documentation, and data access has been improved upon on, with simpler language, and clear direction and overview on how to access data until a public use data set is available.
- SHOW staff presented on "How to access SHOW data" and "Why SHOW data can help YOU" at Data Hub Conference, PHS seminar, WHEN seminar with statewide local health departments, and WPHA Conference.
- "How to access SHOW data" and "Why SHOW data can help YOU" presentations are planned for graduate students in SMPH, and UW-Milwaukee School of Public Health for Fall 2020.

- "How to access SHOW data" and "Why SHOW data can help YOU" newsletter was planned to go out to scientists and investigators across campus in Fall 2020. This newsletter will also highlight SHOW COVID-19 related findings.

Build and maintain community-based partnerships to increase impact of SHOW and REACH of SHOW data with community organizations. Partnerships are ongoing and actively established to support program planning, implementation and evaluation.

- Several additonal community partnerships in Milwaukee were formed since July 2019. Partnering orgranizations include: Community Care Inc., KidTown Learning Center, PIVOT, Walnut Park Apartments, Clinton Rose Senior Center, BLOC, Hyatt Pharmacy. See Appendix G for complete list of community organizations SHOW collaborates with and what collaborations and mutual support has occurred and is ongoing.
- SHOW presented preliminary data to the Wisconsin Alzheimer's Institute Community Advisory Board under the leadership of Gina Green Harris within the Collaborative Center for Community Engagement (CCE) in Milwaukee. This presentation had two aims: 1) update the existing CAB on how SHOW responded to and used CAB feedback in planning of 2018-2019 sample collection and to gather the CAB's feedback on best ways to continue with outreach and communication efforts with community and statewide partners in light of COVID-19.
- The Personalized Intervention Varied On Time (PIVOT), a Male African American community organization in Milwaukee leadership was greatly interested in using data collected from the 2018-2019 SHOW survey to support grants and inform future intervention-based programs at PIVOT and sister partnership Holy Redeemer Church, specifically around meeting food insecurity needs and mental health and wellness programs (such as yoga or meditation). Data has been shared with PIVOT with plans to collaborate on future grants, evaluations, and interventions of interest.
- SHOW assisted PIVOT with survey development, database setup, field staff training, and data cleaning/analyses for a COVID-19 Community-based survey. PIVOT received funds to launch a weekly food pantry and free meal for the community for the summer/fall 2020 and wants to conduct the survey at this time.

Aim 3: Conduct ongoing outreach, engagement and longitudinal follow-up of the existing statewide sample, to support broad-based population health, environmental and aging research.

1) Support cohort retention and collect 5-10-year follow-up survey, physical exam and biological samples (n=800-1000) from existing statewide representative samples.
2) Develop and implement innovative, cost-effective methods for data and sample collection.

Support cohort retention and collect 5-10-year follow-up health data, physical exam and biological samples (n=800-1000) from existing statewide representative samples.

- The SHOW COVID-19 Survey accelerated cohort retention efforts and utilization of different modes of communication and survey completion.This survey was intended to serve as a follow-up of all adult SHOW participants from 2008-2020 (>5,000 participants). In planning for this survey, SHOW made an attempt to obtain email address, updated mailing addresses and telephone numbers from all past participants. Then all past participants were invited to complete an online or phone survey about COVID-19 testing, exposure, and the pandemic's impact on their health, daily life and

well-being. The response rate for this online survey was approximately 30% which is above what one would expect in an online survey. More importantly, SHOW was able to identify individuals who will require additional follow-up and maintenance efforts in order to continue to maintain the cohort.

- Planned 5-10 year follow-up was postponed to May/June 2021 due to the ongoing COVID-19 pandemic.
- SHOW is currently focused on cohort maintenance, outreach and dissemination as well as follow-up recruitment of past SHOW participants for the SHOW COVID-19 serological testing.
- Additional COVID-19 impact survey follow-ups are planned for January 2021 (6 months) and May/June 2021 (12 months), SHOW pivoted communication and survey mode to online with great success. An adapted survey was created for phone interview for those without online access or literacy.
- Key lessons learned from the WAVE I cohort suggest (not surprising, and in concordance with empirical evidence) that online surveys are not effective methods for reaching under-represented, or lower SES individuals. Thus SHOW will make efforts to include both mail-based surveys and telephone surveys in subsequent waves.
- On-going efforts are in place for tracking non-responders from older cohort years whose contact information is no longer accurate to improve reachability in Wave II of the survey.
- WI DHS' COVID-19 Antibody tracking survey (PACCS) leveraged the 2014-2020 sample and conducted follow-up on the cohort for COVID-19 anitbody testing. Ongoing efforts for cohort retention include follow-up thank you letters to community based survey sites, local health department partners and past participants.
- Another key accomplishment, based on guidance from Dr. Maureen Smith and Dr. Amy Trentham-Dietz, is inclusion of consent language for linkage of SHOW individuals to electronic health records for COVID-19 and other population health research. As of July, 2020 n=877 consented to EHR linkage from wave I of COVID-19 impact survey.

<u>Develop and implement innovative, cost-effective methods for data and sample collection.</u>

- The PACCS survey required scheduling >1000 within 2-3 weeks, a vast ramp-up from what SHOW's current administrative personnel typically manage.
- A new online scheduling software, Acuity, was purchased and leveraged. Participants were able to schedule, cancel, and reschedule their appointments online on cell phone/computer, reducing administrative burden for scheduling over the phone.
- There are plans to consider adapting Acuity Scheduling for SHOW core survey in order to free up administrative staff for other ancillary work.
- SHOW staff developed survey and blood draw protocols for PACCS while in the middle of a pandemic. Appointments required in-person contact at site locations around the state with additional safety protocols put in place.

SHOW will begin additional focus on integrating new sample collection methods for microbiome, and personal exposomic research into planning for Spring/Summer 2021 face to face follow-up.

Aim 4: Support new ancillary study projects including health equity and translational studies advancing evidence-based personalized precision medicine.

The most notable SHOW ancillary studies have been described in detail above with respect to

SHOW's critically important response to COVID-19. In large part SHOW has gained a solid reputation for community engagement with hard to reach populations and an ability to support biosample collection in community settings. This supports the current novelty of the SHOW program which does this while also collecting important individual level data on the social determinants of health which can then be leveraged for novel biomarker discovery. Further, access to address based data and consent among SHOW participants for linkage with health record data have also increased the visibility of SHOW across SMPH, including new partnerships with the UW Carbone Cancer Center (see future directions below).

Nine federal grants to the National Insitutes of Health (NIH), the Centers for Disease Control and Prevention and the United States Environmental Protection Agency were submitted and/or received funding since July 2019. See Appendix C for a summary and status of grants ongoing and submitted since July 2019.

The two NIH R01/R21 proposals funded include:

- Drs. Malecki, Arendt and Nikodemova received R21 for the Obesity, Toll Like Receptor, and Immune Function (TLR) which will use SHOW samples to better understand the impact of obesity on toll-like receptor signaling as a mechanism for altering immune function. Study progress has been put on hold due to COVID-19.
- Dr. Michal Engelman, sociology and co-PI with Dr. Malecki received an R01 funded by NIH/NIA, which is titled Research Epigentics, Weathering and Residential Disadvantage which will use SHOWs unique data to reconstruct contextual data on social determinants of health and use DNA methylation profiles among SHOW participants to examine measures of accelerated biological aging across disadvantaged urban and rural commuunities.

Other NIH and federally funded projects:

- Dr. Judith Simcox received a UW Building Interdisciplinary Research Careers in Women's Health (BIRCWH) award funded by NIH that includes using SHOW samples for lipodomics research to advance understanding of disparities in metabolic health.
- Dr. Noel Stanton, of the Wisconsin State Laboratory of Hygiene receives grant funding from the national Association for Public Health Laboratories (APHL) for biomonitoring of Perflourinated (PFAS) compounds among a subsample of 600 SHOW participants.

Five federal proposals (4 NIH proposals, 1 CDC) have been submitted since March 2020. *These Pending applications include use of SHOW for intervention and community based biosample collection:*

- The "Building a Public Health Reserve with Community-Based Providers and Health Workers" RadX (Ehrenthal) is using SHOW data, and results from the COVID-19 impact survey to support community-based and partner driven intervention research to increase access to and reduce barriers to COVID-19 testing and mitigation.
- Dr. Gleason's NIH supplement to use SHOW for community engagement and community biosample collection is an excellent example of how SHOW has established ongoing expertise in community based biosample collection. A P30 Cancer Center Support Grant application to NIH submitted by Kristina A. Matkowskyj, MD, PhD in the Department of Pathology and Laboratory Medicine for development of a UW COVID-19 biobank will use the SHOW infrastructure for investigators interested in identification of community based controls.

- The Metals, Inflammation, Microbiome and the Metabolome (MIMM grant - formerly named MAM) is a resubmission of an R01 grant submitted by Dr. Malecki in collaboration with Suen, Safdar, Engelman, and Gangnon which scored at 13th% tile. Based on consultation with NIH project officers, this proposal was revised and submitted as a new grant in August 2020.
- Dr. Nasia Safdar submitted a grant to the Centers for Disease Control and Prevention for developing an Epicenter to better uunderstand risk factors for multi-drug resistance organism and antibiotic resistance protection in the general population. The proposal aims to use both SHOW data and data from the Marshfield Epidemiology Study Area (MESA) for project 4 titled "Determining novel risk factors for infection: the DISCERN Project." This application scored a 34 and as of August, 2020 is pending final funding announcement).

Other federal grants also submitted but not funded include:

- Dr. Martin Shafer at the Wisconsin State Laboratory of Hygiene and a collaborative team of environmental scientists across UW Madison submitted a proposal to the US Environmental Protection Agency to address newly emerging perflourinated compounds across the U.S.
- Dr. Dudley Lamming and Dawn Davis submitted an R01 to NIH in January and Dr. Federico Rey and Lamming submitted a microbiome grant to NIH in October. The latter two proposals were not discussed. Investigators are persuing new options.

Other SHOW related Internal UW Grant Initiatives funded Include:

- Dr. Dudley Lamming, Judith Simcox (Co-PIs) collaborators Federico Rey, Dawn Davis, Rozalyn Anderson, Vincent Cryns, and Chris Bradfield received UW 2020 funding "Accelerating Diabetes and Metabolism Research" to purchase new equipment to advance metabolic health which will be housed in the UW Biotechnology Center.

In response to March 2020 request for more information on use of the SHOW by investigators, **Table 1** (below) outlines ongoing translational projects using the SHOW biobank as part of the SHOW's increased translational research efforts, more details are provided in Appendices (A-D).

Unanticipated Challenges and Progress Towards Future Goals

We are living in a new world. SHOW has overcome several staffing challenges in the past 12 months, has increased visibility and accessibility of the SHOW program and is now playing a key role in both the SMPH and statewide public health response to COVID-19. The future of the COVID-19 pandemic remains largely unknown and will shape future efforts for continued in-person follow-up. At the same time, SHOW investigators continue to support applications for NIH funding of exisiting biosamples and longitudinal follow-up of past SHOW participants. Ongoing support for the core infrastructure will continue to be important for these collaborative efforts to be successful and sustained.

SHOW leadership has also been mindful of the need to identify outside funding to maintain the core SHOW infrastructure and will continue to look for these opportunities within NIH. However, these efforts are dependent on some level of continued institutional funding and commitment to the program. The SHOW has recently been asked to take over the role of supporting the Cancer Prevention Outreach and Dissemination shared services within the UW Carbone Cancer Center. Additional institutional support will be sought, however, taking on this new

partnership extends additional administrative reporting and staffing requirements not currently available within the core SHOW program. A request was made that this partnership also support a pilot grant initiative to use SHOW biosamples for novel biomarker discovery. The

Investigator	Department	Project	Biospecimen
John Denu	WID, Dept of Biomolecular Chemistry	SHOW pilot: Dysregulated epigenetic-metabolism axis as a marker of aging	PBMC, plasma
Uma Wesley	SMPH, Dept of Neurological Surgery	SHOW pilot: Identifying plasma inflammatory/angiogenic biomarkers associated with increased risk of stroke and cognitive decline among adults with different co-morbidity	Plasma
Robert Lipinski	SVM, Dept of Comparative Biosciences	R01: Developmental toxicity of the pesticide synergist and hedgehog pathway inhibitor piperonyl butoxide	Plasma
Kristen Malecki	SMPH, Dept of Population Health Sciences	R01: REWARD, Researching epigenetics, weathering, aging & residential disadvantage	Plasma, DNA
Maria Nikodemova	SMPH, Dept of Population Health Sciences	R21: Obesity, Toll-like receptors and human sensitivity to the environment	PBMC
Judi Simcox	College of Agricultural and Life Sciences, Dept of Biochemistry	Improving biomarkers of metabolic syndrome in African-American populations	Plasma
Dudley Lamming	SMPH, Dept of Medicine	SHOW pilot: Dietary isoleucine is a key regulator of metabolic health	Plasma
Noel Stanton	Wisconsin State Lab of Hygiene	Establishment of Serum PFAS testing in Wisconsin	Serum
Christopher Bradfield	SMPH, Oncology	R01, Manuscript Prep. RNA Seq and transcription of the AhR in smokers vs. non-smokers	DNA/RNA
David Andes, MD	SMPH, Department of Medicine	New COVID-19 Anti-body test discovery	Serum (from COVID-19 Study)
Christopher Bradfield	SMPH, Oncology	Development and identification of bio-assay for tracking disrupted circadian rhythms using human RNA transcripts.	DNA/RNA
Vincent Cryns/Joni Sedilloa	SMPH, Department of Medicine	Use of DNA Methylation data to improve understanding of dietary methionine intake and altered epigenetic pathways as risk factors for metabolic health and cancer.	DNA/DNA Methylation

current SHOW budget, aims and expectations do not support this. However, we found this is a good way to extend SHOW reach via ancillary/translational research studies.

Table 1. SHOW Use of Biosamples for Translational Research by Investigator