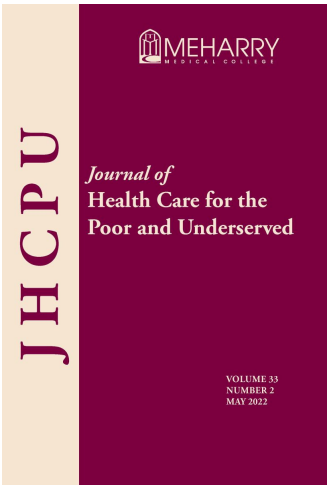
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ORIGINAL PAPER

Rethinking the Digital Divide: Using an Internet Survey in a Flint Water Crisis Medicaid Population

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Abstract: This project examined the preferred mode of response (internet, phone, mail) to a health services survey. Data were collected via survey responses from a subsample of Flint Water Crisis Medicaid Expansion Waiver enrollees (N=2,584). Analyses were stratified by age, residency, race, and income. Chi-square tests were used to detect categorical differences. The majority of participants responded by internet (55.5%), followed by mail (39.4%), and phone (5.2%). Of those responding by internet, 75% used smartphones for connectivity. Black and White respondents used the internet at a greater rate than Hispanic respondents ($p<.01$). Respondents at 200% federal poverty level (FPL) or higher used the internet mode at greater rates than those below 200% FPL ($p<.01$). Our findings suggest greater internet use in a vulnerable population than expected, but the digital divide persists. In the advent of COVID-19, this finding can inform future health programming using digital communication and telehealth.

Key words: Internet survey, Medicaid, health equity, digital divide.

Studies suggest low-income populations have limited access to use the internet compared with higher-income populations.[1–2] In 2019, the Kaiser Family Foundation reported that 7% of Americans did not have internet access at home and 42% were on Medicaid or uninsured and the larger share were African American and Hispanic.[3] With regard to income, 18% of people 100% below the federal poverty level (FPL) had no internet access at home compared with 3% of people earning 400% or more of FPL.[4] Further, a 2019 study shows that 97% of adults earning over $100,000 owned a smart phone compared with 71% of those earning $30,000 or less.[5] Computer literacy, unaffordable internet services, and lack of access to internet-ready devices (e.g., smartphones,

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computers, tablets) have been suggested as barriers to internet use.[5–8] Reports indicate those who make less than $30,000 per year are less likely to adopt or have access to internet technology.[1,9] Thus, individuals with low economic resources are believed to have low access to internet services and equipment.

Federal programs have been implemented to address the disparity in internet access. Among these is ConnectHomeUSA,[10] intended to provide internet accessibility in public spaces and low-income housing. In addition, the Federal Communications Commission (FCC) Lifeline Support for Affordable Communications (Lifeline) program offers reduced fees for mobile phones and internet services for individuals at or below 135% of the poverty level.[11] This includes individuals and families who qualify for Medicaid, Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), and/or Public Housing Agency (PHA) programs.[10–12] While these programs address some access issues, barriers still exist in the form of low internet literacy, affordability, and access to internet-ready devices.[13–15]

A study conducted by Deloitte[16] found that Medicaid enrollees have increased accessibility to smartphones and tablets since 2013, but continue to have a significantly lower access rate than employed medically-insured people. Similarly, fewer Medicaid-insured people than privately insured people have access to personal computers in the home and instead primarily use smartphones to access the internet.[17] The coronavirus pandemic (COVID-19) has made the digital divide even wider.[18,19] For instance, residents of poor, rural geographic areas with no broadband or cell tower service experience greater difficulties in the ability to access the internet.[20]

This continued disparity can be problematic for low-income patients accessing health care portals that are optimized for computer monitor screens and limit usability for people who do not own a computer.[21] Few empirical and qualitative studies examine Medicaid enrollees' access to the internet and related devices, and how they use the service. Furthermore, technology used for personal health quickly becomes outdated because of frequent changes in computer and software technology, requiring regular updates that presuppose a certain level of computer literacy.[1,19]

Internet service provides access to a variety of tasks formerly conducted via telephone or paper. In particular, the ability to complete surveys online can remove barriers (e.g., transportation, scheduling) and allow individuals to participate at their convenience in a secure, anonymous manner. Survey platforms such as SurveyMonkey (SurveyMonkey Inc.) and Qualtrics (Qualtrics Inc.) accommodate participation validation methods as well as allow participants to complete a survey in more than one sitting resulting in improved response rates. These platforms further provide a seamless approach to ensure participants accurately follow complex skip patterns and jumps based on key responses. Thus, internet-based surveys allow for increased completion rates and minimize the occurrence of invalid responses.[23] Another benefit of online survey methodology is the immediate availability of analyzable data. Online survey participants contribute not only to direct data entry but reducing delay from data collection to analysis. Due to the minimization of subsequent data entry and the need for data entry validation, online survey processes are more resource-efficient. Rapid turnaround of findings may support more timely program evaluation efforts and facilitate more assessments of implemented program modifications.[23–24]

We planned an enrollee survey as a component of the Flint Water Crisis Medicaid Waiver evaluation.[25] Adding an online response mode in addition to mail and telephone modes provided the evaluation team with an opportunity to examine response rates of different participation modes. Based on current reports of lower internet use in low-income Medicaid populations, we hypothesized that internet survey response rates would be lower than phone or mail participation rates. Further, we planned to identify how differences in response mode (internet, phone, mail) varied by race/ethnicity, income, and geographic residency.

Methods

A description of activities for the 1115 Waiver Evaluation plan was submitted to the Michigan State University (MSU) Human Research Protection Program (HRPP) and determined not to be research involving human subjects. All communications including enrollee letters, reminder postcards, and surveys were submitted to the Michigan Department Health and Human Services (MDHHS) for review and approval.

The Center for Medicare & Medicaid Services (CMS) funded the Flint 1115 Medicaid Expansion Waiver that was implemented in 2016.[25] The waiver offers additional family support coordination services for pregnant women and children exposed to lead during the Flint Water Crisis. The Flint water crisis occurred when the municipal water source was switched in April 2014, resulting in the corrosion of lead pipes that required new treatments for the water source. As a result, an increased amount of lead leached from the pipes and was released into the water supply. Water lines are being replaced and, while lead levels have declined since the water switch, the water has not yet been deemed safe. The waiver was developed to ensure those who were exposed had access to appropriate health resources in an effort to address anticipated adverse outcomes of lead exposure.[25] In addition to expanded health care services, the qualifying income increased from at or below 133% FPL to 400% FPL. Individuals above 400% FPL may also enroll in the waiver through cost-sharing.

The 1115 waiver authorization required a formal evaluation of the degree to which key objectives were achieved. The Institute for Health Policy (IHP) at Michigan State University managed the evaluation process. One component of the evaluation plan was to conduct enrollee surveys to gather information about the utilization of and satisfaction with waiver services and participation. The survey also served to provide an opportunity for participants to report on changes to their health outcomes attributed to waiver enrollment.

Survey design and procedures. Hypotheses included in the approved federal and state evaluation-proposal guided the enrollee survey design and question development. Surveys were designed to address child and adult outcomes. The child version included additional questions pertaining to developmental and educational factors known to be related to lead exposure. The child version of the survey was distributed to parents or guardians of enrollees 0–17 years of age at the time of enrollment. Survey questions regarding self-reported health status were included based on existing national surveys. An IHP evaluator with experience in psychometric testing and survey design formulated initial questions for topics where no nationally accepted questions were

identified. The surveys were reviewed by the full evaluation team and survey experts affiliated with the Office for Survey Research (OSR) at MSU's Institute for Public Policy and Social Research.

Due to concerns about internet accessibility, the evaluation team originally developed a plan including only telephone and paper response options. Prior to survey implementation, the evaluation team sought community feedback from two groups: A Flint Area Community Advisory Board and the Michigan State University-Hurley Children's Hospital Pediatric Public Health Initiative Parent Partners Group. The Parent Partners Group included 15 representatives from all nine wards of the City of Flint as well as parents from the Greater Flint area. Group members included parents, foster parents, grandparents, and guardians. Key feedback from the group included input on survey content, language for instructions, and delivery mechanisms. Particularly, members suggested a web-based survey participation option accessible by smartphone in addition to the proposed telephone and mail options.

The study design included three waves of enrollee surveys occurring at nine-month intervals. Wave 1 represented baseline measurements with Wave 2 (9-month) and Wave 3 (18-month) follow-up points planned. Here, we report on Wave 1. Based on the Flint residents' feedback, revised survey mode options included 1) web-based participation using two-factor authentication, 2) telephone call-in to the survey center, and 3) postal mail option for paper surveys. This report describes response rates by mode for the Wave 1 survey.

To increase the odds of internet response, a short bitly web address and assigned study IDs and passcodes were utilized. This information was disseminated to individuals selected for the sample through the mailed introductory letters. The baseline survey provided an opportunity for individuals to enter an email address and telephone number with permission to contact them by SMS (text) so that invitations to upcoming survey waves could be more efficiently directed by the online survey system.

Enrollee sampling method. The sampling pool (N = 24,082) included all waiver enrollees having at least six months continuous enrollment at the time of the survey (i.e., the target population). The data for the sampling pool were acquired from the MDHHS Data Warehouse in a manner compliant with MSU HRPP. Stratified random sampling was used to select the survey sample. Table 1 shows the sampling proportions by strata.

Enrollee age class, Genesee County residency, race/ethnicity, and FPL as documented in the Data Warehouse administrative files were used as strata. Three age groups were established: 0–6 years, 7–17 years, and 18 years and older at the time of waiver enrollment. The residency category included three groups: Always lived in Genesee County, lived in and out of Genesee County, and Never lived in Genesee County. Individuals exposed to the Flint water did not necessarily live within the City of Flint or in Genesee County. Exposures through employers, daycare or schools, and health care facility location(s) were possible. In recognition of the potential for geographic dispersion, the waiver further permitted ongoing coverage for individuals relocating outside of the greater Flint area after documented exposures. Race/ethnicity strata included non-Hispanic White, non-Hispanic Black, Hispanic, and Other categories. Federal poverty level included three strata of up to 99% FPL, 100–199% FPL, and 200% or above.

Due to the longitudinal nature of documenting health outcomes and concerns over

Table 1.

CHARACTERISTICS OF ALL ELIGIBLE ENROLLEES AND SELECTED SURVEY PARTICIPANTS

Category	All Waiver Enrollees (N=24,082)	Selected Sample (N=11,453)	p-value
Age Class			.29
0–6 years	8,675 (36.2)	4,126 (36.0)	
7–17 years	13,023 (54.1)	6,158 (53.8)	
18 or older	2,384 (9.9)	1,169 (10.2)	
Residence Class			<.01
Always in Genesee	21,584 (89.6)	10,068 (87.9)	
In and Out of Genesee	384 (1.6)	384 (3.4)	
Never in Genesee	2,114 (8.8)	1,001 (8.7)	
Race/ Ethnicity			.63
Non-Hispanic White	7,923 (32.9)	3,756 (32.8)	
Non-Hispanic Black	14,352 (59.6)	6,822 (59.6)	
Hispanic	830 (3.4)	413 (3.6)	
Other/Unknown	977 (4.1)	462 (4.0)	
Federal Poverty Level (%)			.51
0–99%	12,204 (50.7)	5,843 (51.0)	
100–199%	9,422 (39.1)	4,437 (38.7)	
200% and above	2,456 (10.2)	1,173 (10.2)	

participant attrition, the sampling rate was 50% for the first survey wave. For some categories where small numbers of enrollees were documented, all eligible people were included in the sample. Over 11,000 (n=11,453) enrollees were selected for inclusion into the Wave 1 survey. Table 1 displays the characteristics of total eligible enrollees by strata and the count of selected sample individuals. Generally, the characteristics of the selected sample reflect the population except for residence class where oversampling was intentional due to small cell size.

Another concern leading to the large sampling frame was the national interest in conducting research on people in the region after the water crisis. Many research projects were simultaneously recruiting community participation, and the success of encouraging participation was a concern. In view of this, we considered survey fatigue for the population and offered a straightforward, uncomplicated design at accessible reading level. This also led the evaluation team to secure approval to provide small monetary incentives of $10 per completed survey to promote participation. The incentive payments were structured so that if a participant submitted all three survey waves, they would receive a $20 bonus payment.

After sample selection, the MDHHS Data Warehouse was accessed to extract most currently available enrollee mailing information. An honest broker approach was used to obtain the identifiable data necessary to execute the mailing. This identifiable data

file was hand-delivered on an encrypted and password protected external drive to the OSR for survey implementation. Survey response data were returned to the evaluation team with a random survey ID assigned by OSR.

The survey was programmed into Qualtrics for the web-based option. Qualtrics is an online survey platform that organizes data intended for statistical analyses. A short web address was created to reduce the keystrokes required of participants to reach the survey page. Access to the survey was controlled using the unique, single-use study ID to prevent participants from completing the survey more than once. The online survey was further protected from non-waiver enrollee participation by the use of two-factor authentication along with restrictions imposed on the ability of internet search engines to locate the survey. All survey materials regardless of mode were provided in English.

Due to the large sample, OSR used a batch number procedure to manage the mailing process. The sampled enrollees were randomly divided into four batches to track and expedite the mailing process. Each batch included 2,863 individuals, except for batch four, which included 2,864 totaling 11,453.

The recruitment process used the information accessible from the Medicaid enrollees for our selected sample. Only enrollee mail address was used for recruitment because the mailing address maintained by the State of Michigan Medicaid program is considered the official address of record. All Medicaid communications are sent to this address. If an enrollee relocates, they are responsible to notify the department of new addresses. Maryland HHS files did not have complete telephone information for all enrollees. Preliminary notification letters introducing the purpose of the survey and requesting for were mailed for each batch and included instructions on available modes through which to complete the survey as well as information regarding the participation incentive. These letters included the individual's assigned study ID with instructions on accessing the web-based survey system, the web link, and toll-free telephone numbers to call in to the survey center in order to complete the survey. Participants also were informed they would receive a paper version if no response was recorded through internet or telephone after two weeks.

If no response was documented within two weeks of the initial mailing, a second mailing with a paper copy of the survey was disseminated through the postal service using the same batch assignment. The cover letter accompanying the survey also informed the participant about the options of telephone or web-based participation. A third mailing was sent after three weeks in the event no response was recorded. This letter again reminded individuals of the telephone and web options and invited individuals to request another paper version if they had misplaced the one originally sent. Finally, a fourth reminder letter was mailed to all non-responders encouraging them to participate.

Data collection. All paper surveys were entered by OSR staff using a blinded, double data entry process. Surveys completed by telephone were monitored by OSR supervisory staff with data entry managed through a Computer Assisted Telephone Interview (CATI) system. Web-based survey responses were directly entered by participants and captured by Qualtrics software in a format readily exportable to spreadsheet and statistical software. All forms of data were compiled and cleaned using SAS 9.4 software (SAS Institute, Inc.)

Statistical analyses. The randomness of the survey sample was assessed by comparing the population with the sampled survey participants by age class, residence class, race/ethnicity, and FPL. Response rate was also compared by participant's characteristics using chi-square test. The association between the respondent's characteristics and the response mode was tested using a chi-square test. In the case of cell sizes less than five, we used the exacted p-value estimated by Monte Carlo simulation. All chi-square and exact tests were performed by SAS 9.4 software.

Results

The selected survey sample was representative of the population as presented in Table 1. There were no significant differences of proportion between the eligible population and selected sample for age class, race/ethnicity, and FPL. Because the residence category of *In and out of Genesee County* contained few individuals, we oversampled this group. Thus, there was a statistically significantly ($p<.01$) higher proportion of this class in the selected sample.

Of the 11,453 survey invitations mailed across the four batches, 2,584 (22.6%) of participants responded (Table 2). There was no mailing batch effect for response (data

Table 2.

COMPARISON OF SELECTED SAMPLE BY SURVEY RESPONSE CATEGORY

	Survey Response		
Category	**No N=8,869**	**Yes N=2,584**	**p-value**
Age Class			<.05
0–6 years	3,199 (36.1)	927 (35.9)	
7–17 years	4,726 (53.3)	1,432 (55.4)	
18 or older	944 (10.6)	225 (8.7)	
Residence Class			.67
Always in Genesee	7,786 (87.8)	2,282(88.3)	
In and Out of Genesee	304 (3.4)	80 (3.1)	
Never in Genesee	779 (8.8)	222 (8.6)	
Race/ Ethnicity			<.01
Non-Hispanic White	2,804 (31.6)	952 (36.8)	
Non-Hispanic Black	5,386 (60.7)	1,436 (55.6)	
Hispanic	306 (3.5)	107 (4.1)	
Other/Unknown	373 (4.2)	89 (3.4)	
Federal Poverty Level (%)			<.01
0–99%	4,544 (51.2)	1,299 (50.3)	
100–199%	3,469 (39.1)	968 (37.5)	
200% and above	856 (9.7)	317 (12.3)	

Table 3.

WEIGHTED POPULATION CHARACTERISTICS BY RESPONSE MODE

	Response Mode				
Characteristics	**Internet (55.6)**	**Paper (39.3)**	**Phone (5.2)**	**Total N=24,802**	**p-value**
Age Class					<.01
0–6 years	5175 (59.7)	3032 (35.0)	468 (5.4)	8,675	
7–17 years	6739 (51.7)	5584 (42.9)	700 (5.4)	13,023	
18 or older	1473 (61.8)	837 (35.1)	74 (3.1)	2,384	
Residence Class					<.01
Always in Genesee	12031 (55.7)	8371 (38.8)	1182 (5.5)	21,584	
In and Out of Genesee	197 (51.3)	182 (47.5)	5 (1.3)	384	
Never in Genesee	1143 (54.1)	895 (42.3)	76 (3.6)	2,114	
Race/Ethnicity					<.01
Non-Hispanic White	4344 (54.8)	3387 (42.8)	191 (2.4)	7,923	
Non-Hispanic Black	8125 (56.6)	5167 (36.0)	1059 (7.4)	14,352	
Hispanic	427 (51.4)	396 (47.7)	8 (0.9)	830	
Other/Unknown	472 (48.3)	461 (47.2)	44 (4.5)	977	
Federal Poverty Level					<.01
0–99%	6404 (52.7)	4878 (40.1)	880 (7.2)	12,161	
100–199%	5122 (56.8)	3548 (39.4)	346 (3.8)	9,016	
200% and above	1843 (63.4)	986 (33.9)	77 (2.6)	2,905	

not shown) therefore all responses were combined to create a single cohort of respondents for analysis. Of the 2,584 returned surveys, 2,359 (91.3%) were for child enrollees and 225 (8.7%) were for adult enrollees. After data cleaning, 2,356 (99.8%) of the child surveys and all the adult surveys were retained for reporting.

Table 2 compares the survey respondents with the non-responders. Chi-square tests revealed significant differences in age group, race/ethnicity, and poverty level between these groups. Respondents were more likely to be enrollees between 7–17 years of age, White, and over 200% FPL. Black participants had a lower participation response rate than all other groups except for the Other/unknown group ($p<.01$; Table 2). There was no statistically significant difference between White and Hispanic groups.

Demographic characteristics and survey response mode. Since there were significant differences in response rates by demographic characteristics for age, race, and FPL, weights were used to adjust for sampling bias. Table 3 presents associations between population characteristics and response mode based on the adjusted weight. The overall proportion of online participation exceeded other survey modes among all respondents. More than half (55.6%) completed the survey using the internet method. Nearly 40% (39.3%) participated using the postal mail option while just 5.2% used

the telephone option. Significant differences with internet response mode as the preferred method were observed for all demographic characteristics. Overall, regardless of demographic characteristics, internet response showed the highest rate compared with paper or telephone.

In the case of age group, adults showed the highest rate of internet response (61.8%) with nearly a 10% difference between adults and the 7–17 years of age group. With respect to residence class, the *In and out of Genesee* group had significantly lower use of internet response compared with *Always in Genesee* and *Never in Genesee*. The use of internet and paper response in the *In and out of Genesee* was similar with less than a 5% difference. Chi-square revealed these categorical differences as significant ($p<.01$). Black enrollees had higher response rates using the internet and telephone and were less likely overall to respond by mail than individuals in other categories. Conversely, individuals classified as Hispanic and Other/Unknown race were more likely to respond by mail than were White or Black individuals ($p<.01$). Figure 1 presents response rate by race/ethnicity. The internet response rate increased with increasing FPL (Figure 2). However, regardless of FPL level, the internet survey was the preferred response mode. More than 50% used the internet survey for the 99% or less FPL group. For FPL

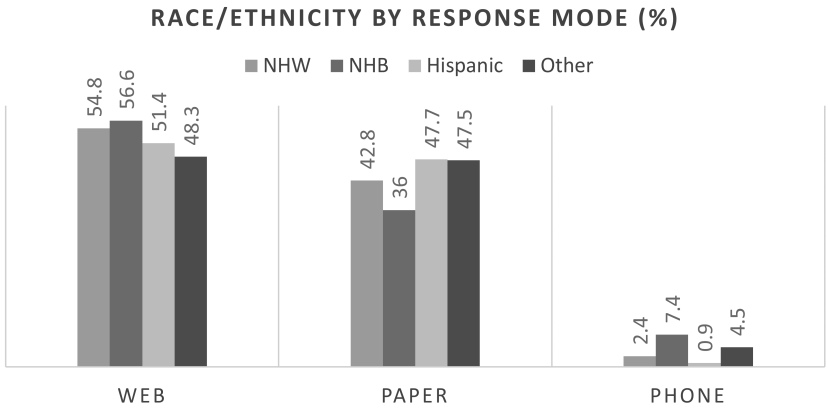


Figure 1. Race and ethnicity by type of response to survey.

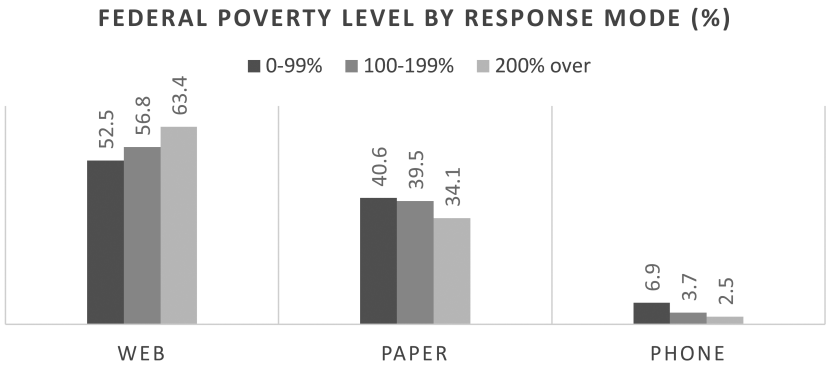


Figure 2. Federal poverty level by type of response to survey.

200% or above group, 63.4% used the online survey, 33.9% used the mail-in survey, and 2.6% used the telephone.

An operational benefit from internet participation was that over 70% of respondents provided email addresses and/or mobile numbers to receive email or text messaging to notify them of follow-up surveys.

Discussion

Prevailing opinions are that accessible survey methods for a vulnerable population include only paper and telephone.[1–3] Thus, web-based survey methods are generally overlooked due to perceptions regarding lack of access to internet services and technology. This evaluation team's original survey plans followed prevailing opinion. However, input from community advisory groups recommended the evaluation team consider internet and smartphone technology as a means to access the survey. The recommendation proved fruitful.

In this report, we documented higher participation with a web-based survey compared with telephone or mailed paper survey options for a population of Medicaid beneficiaries. Respondents were drawn from enrollees of the Flint Water Medicaid Expansion Waiver. The ordered preference for survey participation method was consistent regardless of race/ethnicity, residence category, or FPL of selected enrollees. Of the 2,584 respondents, the majority (55.5%) responded using the internet option, followed by mailed paper surveys (39.4%) with the fewest respondents (5.2%) choosing the telephone option. A recent systematic review of survey studies published in counseling journals reported the average web-based response rate was 34.2%.[26–27] Other reports indicate that our rate is lower than desired, but our respondents were a vulnerable population, in a region that had experienced an environmental crisis, possibly experiencing survey fatigue, and asked to respond on the quality of governmental services. These factors may have truncated the ability to achieve a higher response rate.[28–29]

While the greatest proportion of respondents within each race/ethnicity category used the online option, the rates of postal mail versus telephone option did vary. Notably, those who were identified as Hispanic or categorized as "Other/Unknown" based on the MDHHS administrative enrollment data were significantly less likely to use the telephone option compared with Black or White. This may reflect the availability of and/or comfort with conducting the survey using English as a spoken language. We note, however, that U.S. Census reports racial and ethnic makeup for Flint are 56.6% African American and 3.9% Hispanic or Latino suggesting that the predominant language used in Flint is English. Nevertheless, those having English as a second language may prefer options that permit them more time to look up unfamiliar words and/or take advantage of friends, family, or professional interpreters to translate. Unfortunately, since these data were not collected, we cannot evaluate this idea.

This particular waiver allowed those at higher income levels (>212% FPL) to enroll without cost. Even individuals exposed to the Flint water exceeding 400% FPL were eligible to enroll by paying a monthly fee. This enabled the evaluation team to assess for participation differences among varying income levels. Across all income levels, the internet participation mode was most prevalent.

In addition to concerns regarding internet access, another potential barrier due to an online survey process was the lack of email addresses that are used by these systems to deliver invitations and participation links. Despite not having email addresses for enrollees for Wave 1, the survey coordinators used the available postal contact information to invite participants with the web address and found that most respondents used the web-based survey taken from the mailed invitation. The finding that 70% offered their email address for contact for the follow-up of the survey revealed access and willingness to use digital communications.

Among the majority who completed the online version of the survey, we documented 75% used smartphones as the means of access. Since most of the respondents who accessed the internet used smartphone technology, it appears there is great potential to address health status and disparities using digital platforms.[15] In addition, smartphone access can mitigate the need for more costly in-home personal computer and internet service for people having low incomes.

Investing in tools and education to increase the opportunity to use internet-accessible technology would not only support health equity but improve other facets of life. A significant amount of societal involvement involves internet technology. This has become apparent during the COVID-19 pandemic as schools, health care, human services and businesses have shifted from in-person interactions to telehealth and social networking platforms.[22–23] The online survey participation experience of this cohort of Medicaid enrollees demonstrates potential to address other health needs that leverage digital technologies. Current studies have not emphasized the ability of those with fewer economic resources to participate in informing service delivery improvement using digital technology. In addition to inquiries about quality or access to health care services, web-based services may result in further cost-savings. As an example, this evaluation process was able to maximize technology to reduce administrative costs associated with printing, stuffing, mailing, and manually entering survey data.

These findings are encouraging, but further evidence is needed to discern associations between uses of technology and specific characteristics of medically underserved populations. These results show the degree to which this particular cohort was able to overcome the presumed barrier of access to the internet. If a reasonable likelihood exists that access is available, these findings may support testing technology with the goal of increasing health literacy, communicating with health providers and insurers, and advocating for health concerns.

Substantial gaps will continue to exist for those Medicaid enrollees who lack direct access to the internet or do not use the internet[18,19] and we see continued evidence of the digital divide in health disparities during the COVID-19 pandemic.[16] However, it is imperative that internet technology be made available universally for vulnerable populations to reduce health disparities and reduce administrative costs that could be reinvested into direct care. In order to fully test this, we suggest further investigation among those who still remain unable to connect and interact with technology. Solutions may include individual education about gaining access to the internet as well as social supports to address socioeconomic hurdles such as subsidized smartphones or public computers and wireless connectivity.

The use of online resources also has the potential to build trust for individuals who may have difficulty communicating with their physician or disclosing adverse or risky health behaviors.[18] Eliminating the shame and embarrassment of disclosing health concerns preliminarily via secure health care internet portals may mitigate fear and discomfort of talking about health concerns when meeting health providers in person.[24,25]

Limitations. Our response rate of 22.5% might be considered low, but that was not unexpected in a population with high needs, that might have survey fatigue, who are consumers of Medicaid, and who are geographically hard to reach for many. Flint as a vulnerable community historically has seen distrust of institutional entities, and the water crisis further eroded trust. Nevertheless, more than 2,500 responses were received. We describe participation rates by survey mode using a natural experiment associated with implementing a survey with Flint Water Medicaid Expansion enrollees. This evaluation was not designed, nor participants randomly assigned, to empirically compare the use of various survey response options. All selected individuals in the sample were offered an opportunity to select among all three response options (internet versus telephone versus postal mail). Individuals self-selected their preferred method with the internet option offered first. Given a hard-to-reach population an internet option, particularly using a smart phone may increase response rates. However, there is some suggestion that concurrent, rather than sequential, offering of multiple options reduces response rates.[28–29]

Another limitation was the inability to determine the influence of respondent age. The available age categories reflected the age of the enrollee rather than that of the individual completing the survey on behalf of the enrollee. This prevented the evaluation team from evaluating the impact of differences in internet use by age cohorts which documents younger individuals are more apt to use the internet to attend to daily activities.[30] While it may be reasonable to expect those 18 or older to be answering on their own behalf, we cannot say anything about the surveys that targeted minors, as surveys were directed to the parent or guardian as reflected in the state's administrative data.

Conclusion. The evaluation process was able to take advantage of a community-based suggestion to measure the degree to which a vulnerable population would participate in an online survey. The outcomes of this experience have practical implications for further exploration of digital health equity initiatives targeting lower-income families. Use of digital health technology can inform and educate individuals who face barriers to equitable health services. The findings warrant a larger study to identify preferred mechanisms of low-income populations who use digital technology. Such a study may yield information that can be used to train and educate providers on meaningful ways to incorporate technology into their practice and increase health literacy in patients who are not currently using technology to communicate about their health care.[30]

The methodological design of this study may be helpful to other entities involved in quality improvement and evaluation of health care delivery. The online participation option provided a number of benefits to the evaluation process. Specifically, the promptness of the information was improved compared with the paper survey option. Further, complex skip patterns were embedded in the online survey and seamless to

the end-user resulting in only applicable questions being asked. Additionally, fewer resources were needed to collect these data as individuals carried out their own data entry. Demonstration programs needing information in a relatively rapid timeframe or wanting to adjust programs as they are used may wish to consider this option.

Providing low-income populations with internet access options including health record portals can improve their access to appropriate health services as well as provide pertinent health information and education.[31] This study demonstrates widespread willingness in a low-income population to use the internet for health-related reasons. Additionally, the need to connect low-income individuals to internet technology is critical as it becomes an increasingly integral part of the fabric of our environment as demonstrated during the COVID-19 pandemic.[20,32] Future directions may call for specificity in assisting Medicaid populations by making the internet and personal health more accessible such as offering and educating vulnerable population publicly available Wi-Fi.

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