WASHTENAW COUNTY PUBLIC HEALTH
... focused on prevention

Hot Weather and Health

2011 Survey Results

Report prepared by Susan R. Cerniglia, MPH and Angela Parsons, MA
Washtenaw County Public Health, Emergency Preparedness Division and Environmental Health Division

Acknowledgements

We are grateful for the Washtenaw County residents who took time to complete the survey and improve our understanding of our community's strengths and challenges.

Funding for this project was provided through the Michigan Department of Community Health, Division of Environmental Health. Additional thanks to Dominic Smith, MSA, Project Manager/Health Educator and Lorraine L. Cameron, MPH, PhD, Environmental Epidemiologist for their guidance and assistance. Additional guidance and Health Impact Assessment (HIA) resources provided through Human Impact Partners (www.humanimpact.org)

Special thanks to the community organizations that helped us offer this survey throughout Washtenaw County and to the Public Health staff that helped collect, analyze and present this information with the supervision of Cindra James, Emergency Preparedness Administrator:

Fatema I. Boxwala, MPH
Susan R. Cerniglia, MPH
Russel O'Brien
Jessica Moody
Angela Parsons, MA

Introduction

Climate change is often viewed solely as an environmental issue, and the potential health impacts of a changing environment are seldom discussed. Similarly, disasters or health emergencies are viewed by many as affecting entire populations equitably. However, research clearly demonstrates subsets of the population are much more likely to suffer harm or illness and far less likely to recover. Children, older adults and persons with chronic health conditions, disabilities, lower incomes or who speak languages other than English may be less likely to receive alert messages or to have the capacity or willingness to respond fully when emergencies occur.

In particular, extreme heat and heat wave emergencies, which are increasing in frequency due to climate change, are not necessarily perceived as potential health threats. Many area residents, even those at greater risk of heat-related illness, may be unprepared individually, unaware of the health risks or uninformed about community response plans and resources.

The Hot Weather and Health Survey project allowed Washtenaw County Public Health (WCPH) to seek broad community input, provide targeted outreach and pilot elements of a Health Impact Assessment (HIA) process. From May through August of 2011, the Hot Weather and Health Survey was offered online via Zoomerang and in paper form at a variety of community locations. WCPH worked with partner organizations serving low-income or potentially vulnerable residents to collect written surveys on site at the participating organizations. Results were expected to provide critical information about risk perception, emergency readiness, potential response actions and understanding of alert systems among residents specifically related to heat emergencies with a focus on heat-related health impacts more likely to have a disproportionate impact on low-income, vulnerable and medically fragile residents. This report summarizes the results of the survey and provides recommendations for actions.

Background – There is widespread agreement among scientists that climate change is real. The health effects of a warming climate are expected to be both direct (heat-related illness and death) as well as indirect (reduced air quality, which can cause increased asthma and cardiovascular disease, and increased insect- and water-borne illnesses because more pathogens survive during warmer winters).

The causes of our warming climate are more hotly debated. A local meteorologist recently estimated that the number of record high temperatures compared to record low temperatures in the nearby Detroit area has "jumped to six to one record highs versus lows" in the decade just ended in 2010. This compares to a three to one ratio the previous decade, ending in 2000. (see "Column: Q&A with meteorologist Paul Gross: The heat wave, climate change and other weather phenomena." Ann Arbor.com posted Saturday, July 23, 2011.)

The number of heat-related deaths is likely underreported according to the Centers for Disease Control and Prevention (CDC). From 1999-2003, the CDC estimates exposure to extreme heat

was a factor in 688 U.S. deaths per year (CDC 2006). The elderly, the very young and people with mental illness and chronic diseases are at highest risk of death from extreme heat.

About five deaths per year in Michigan are directly attributable to heat, and about 250 people per year are hospitalized with heat-related conditions (MDCH 2011). Heat may also worsen chronic health conditions like asthma and cardiac disease, and there are more deaths due to chronic conditions during heat waves. In addition, the number of annual asthma hospitalizations in Michigan has increased by more than 37,000 from 2001 to 2009. Climate change may be associated with some of this increase (MDCH 2011).

Local incidents are difficult to monitor. According to emergency room records, local hospitals may see five to seven patients per day in the warmer months with possible heat-related illnesses, such as sunburn, heat exhaustion or heat stroke and dehydration.

Environmental and Social Determinants of Health to Consider - The health impacts of heat waves are not likely to affect everyone equally. As a whole, Washtenaw County looks fairly healthy. A closer look at *within* county health reveals stark differences in health status. Income and education are among the factors driving these health disparities according to the Washtenaw County Health Improvement Plan Survey data (local survey data is available at http://hip.ewashtenaw.org.)

Pre-existing poor health status may be related to risk of dying from a heat-related illness (CDC 2006). In addition, air conditioning is the biggest protective factor in extreme heat events. A lack of air conditioning or lack of resources to pay for the increased expense of running air conditioning units can lead to increased, negative health results in lower income areas. Persons with lower income or persons with poorer health status may also have more difficultly evacuating or accessing cooler areas during heat waves with power outages. Climate change will likely exacerbate existing disparities without significant and appropriate adaptations.

Health Impact Assessment – The Health Impact Assessment (HIA) process has the potential to bring health to the forefront of related policy and practice discussions and help shape recommendations for emergency preparedness and response for extreme weather and other potential health emergencies. The current project presented WCPH with an opportunity to pilot the HIA process and apply new, health-related data to the emergency planning process. The data collected may also have application to future HIAs.

Methods

WCPH used parts of an HIA process to examine the impact of climate change on health and preparedness. WCPH conducted a community survey to assess the impact of heat waves on vulnerable and medically-fragile residents and gauge overall community readiness for heat waves and other emergencies.

Survey development – WCPH began more formally exploring potential public health roles addressing climate change in 2010 by compiling data and collecting baseline information on local populations at risk for heat-related illness. WCPH worked with local Meals on Wheels programs in Ann Arbor and Ypsilanti to assess their clients' preparedness levels and vulnerability to extreme temperatures. Among these primarily elderly, homebound residents, 15% of Ypsilanti respondents (n=131) and 11% of Ann Arbor respondents (n=106) reported having no working air conditioning. An additional 12% of Ypsilanti respondents with air conditioning reported not using air conditioning for financial reasons. Among Ann Arbor respondents, 69% said they lived alone and over half (52%) were 80 years old or older. This information helped shape the current survey, partnerships, target audience and process.

In March of 2011, the project team reviewed the results from the Meals on Wheels survey as well as data collected as a part of a post-H1N1 community survey. An instrument for this new project was then drafted, revised and tested. The survey requested information about the respondent's household; health status (chronic conditions, use of adaptive equipment, medications, etc.); emergency readiness and understanding of local alert systems; risk perception or awareness of climate change and heat-related illness; housing and general demographics (income, zip code, race/ethnicity, educational level, employment and English proficiency).

Identifying survey participants and survey administration - WCPH worked with a variety of community partners to promote the online survey and to collect written surveys. Partners disseminated information about the online survey; hosted WCPH staff offering written surveys; and collected written surveys at their own facilities and returned them to WCPH. The survey was available online in English, and in written form at community-based locations in English, Spanish, Arabic, Traditional Chinese and French.

Because vulnerable populations are more likely to be impacted by disasters and less likely to recover, specific data collection strategies were aimed at reaching them. WCPH developed a written version as well as translated versions of the survey and worked with community-based organizations to collect data in the manner best suited to the population served. WCPH offered to attend events and collect surveys or to provide copies for collection over a period of time, as needed. Area senior centers, homeless shelters, public libraries, community mental health providers, health care providers, schools and WIC and public health clinics are among entities who participated.

The availability of the survey and the opportunity to provide input about public services was promoted widely through electronic listservs, the WCPH website, the media, signage and local, partners. WCPH also called or emailed local health and human service providers directly to request participation. Respondents then self selected to actually complete the survey.

Local groups that made the survey available to their constituents:

- Health care providers, including hospitals, health centers, private practices and urgent care centers

- Community organizations serving vulnerable or at-risk populations, such as children, seniors, persons with disabilities or chronic illnesses, low-income or homeless persons, individuals speaking languages other than English, etc.
- Local governmental entities, including safety-net providers, law enforcement, community mental health services, local municipalities, district libraries, public K-12 schools, universities and public employees, including:
    - Washtenaw County Office of the Sheriff, Emergency Services Division
    - Washtenaw County, Environmental Health Division
    - Washtenaw County Head Start
    - Ann Arbor Public Schools
    - City of Ann Arbor
- Local emergency response partners, including the public relations or public information contacts at a variety of key, local organizations as well as local media. There was a formal news release on July 20, 2011 and several local news articles related to the heat wave and activation of the local response plan.
- Traditional and social media sites that carried information about the survey included:
    - WCPH contributor blog on Ann Arbor.com [http://www.annarbor.com/health/inside-washtenaw-county-public-health-how-do-you-keep-your-cool-when-the-weather-is-hot/]
    - WEMU 89.1 Issues of the Environment radio program (August 17, 2011) [https://secure2.ewashtenaw.org/hosting/iote/2011/IotE_110817.mp3]
    - Facebook and Twitter – updates and re-posts monthly during data collection
    - WCPH website and County employee website [www.ewashtenaw.org/heat]

Other organizations hosted WCPH staff in conjunction with regular meetings or special events;

- Senior centers throughout the county, including Ann Arbor, Chelsea, Dexter, Milan, Pittsfield, Turner Senior Center (University of Michigan, Ann Arbor) and Ypsilanti
- Back to School Barbeques at area community centers operated by the local Community Action Agency: Hikone Community Center and Bryant Community Center, Ann Arbor
- Shelter Association of Washtenaw County, Robert Delonis Shelter, Ann Arbor
- Avalon Housing Health Fair, Ann Arbor
- Green Fair, Ann Arbor
- Heritage Festival, Ypsilanti
- University of Michigan School of Public Health, fall Practice Plunge
- Foster Grandparent Program, Employment Training and Community Services, Ypsilanti

Some organizations took surveys and collected them from their clients or constituents over a period of time. Afterward, they returned the completed surveys to WCPH:

- Hope Clinic, Ypsilanti
- Clinics at WCPH including the Adult Health and Immunization Clinics and WIC

The survey was launched in mid-May, 2011. Data were collected online and in community-based locations through August, 2011.

The survey was open to Washtenaw County adults or adults that work or attend school in Washtenaw. Participants self selected by choosing to complete the online version of the survey or by opting to complete the written version when invited to at a community-based location. There was no screening of potential adult survey respondents and participation was voluntary.

Data entry and analysis - The majority of the surveys (56%) were entered by the individual respondent online, and the remaining 44% were written surveys completed at participating community locations throughout the county. WCPH staff entered the written surveys into Zoomerang and spot checked batches to ensure accuracy. Given the anonymous nature of the instrument itself, however, additional spot checking was not feasible. To analyze results, WCPH staff used the system tools available in Zoomerang. Overall results were reviewed, and crosstabs were created to look for differences among subgroups. Subsequently, filters were used to compare results filtered by income, age, gender, race/ethnicity and self-rated health.

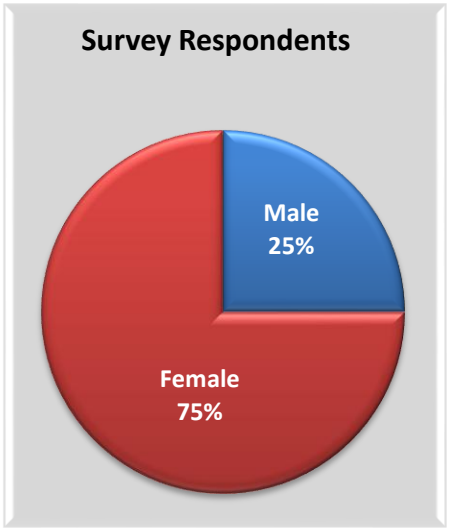
Results

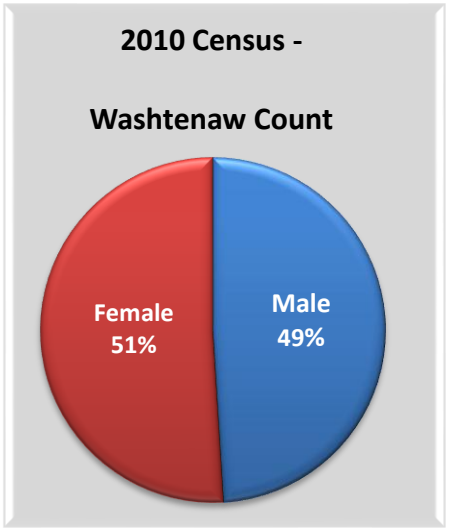
A total of 1322 individuals completed the entire survey. An additional 129 respondents completed at least one page of the survey, making the number of respondents on some questions over 1400. Washtenaw County has roughly 345,000 residents, which does not include significant student populations, visitors or persons employed in Washtenaw that reside elsewhere. The target number of responses (at least 1000) was based on randomized surveys that have been conducted by the CDC and others locally.

The following graphs provide basic demographics on the study population and, in some cases, comparison data from the U.S. Census. The age, ethnicity and race distribution of the study population generally reflected that of the county as a whole according to U.S. Census data.

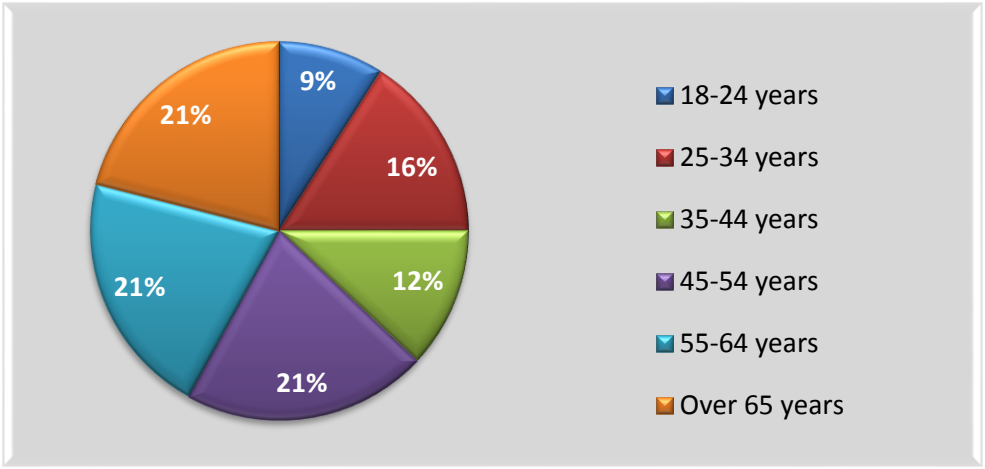
Because not all questions were answered by each respondent, the “N” for each graph varies.

Gender (n=1318):

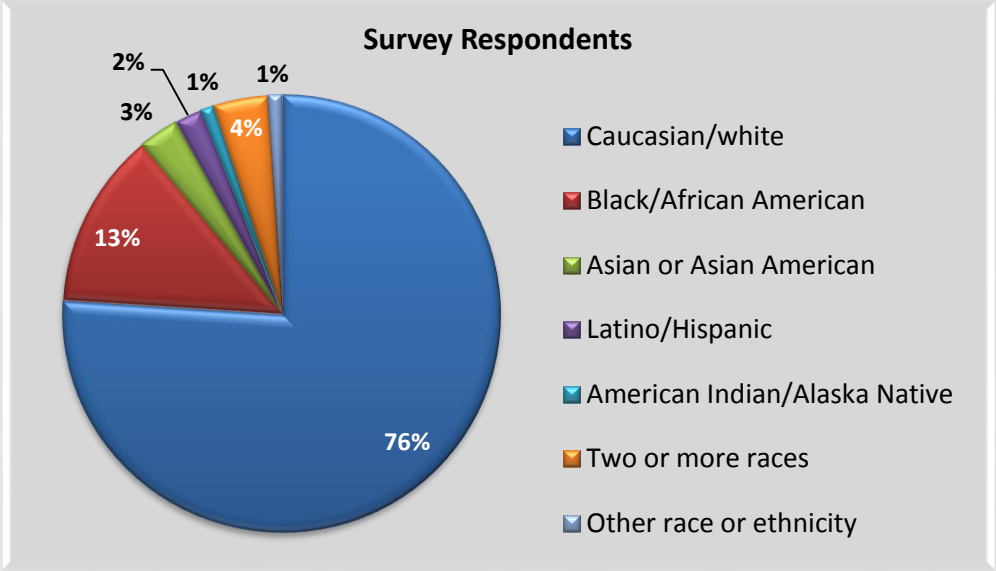


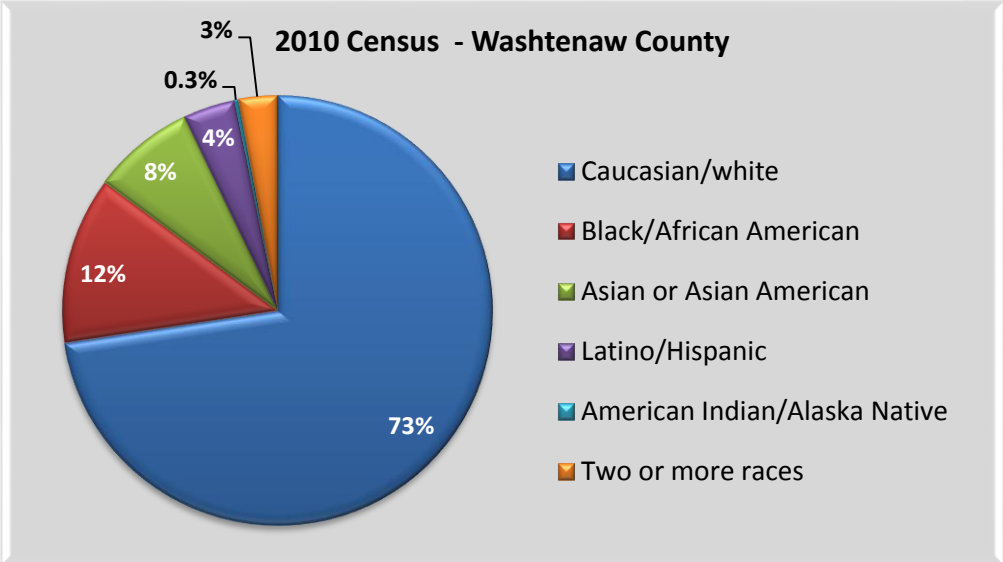


Age (n=1324):

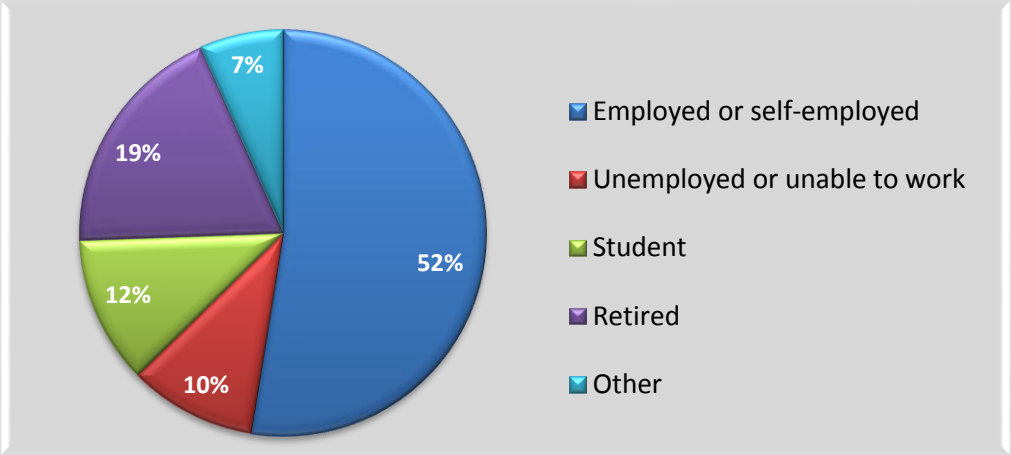


Race/Ethnicity (n=1290):

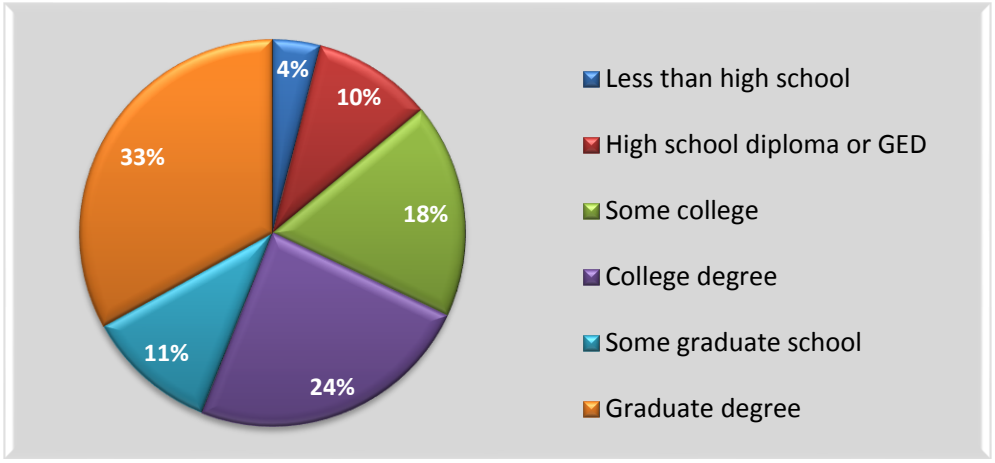




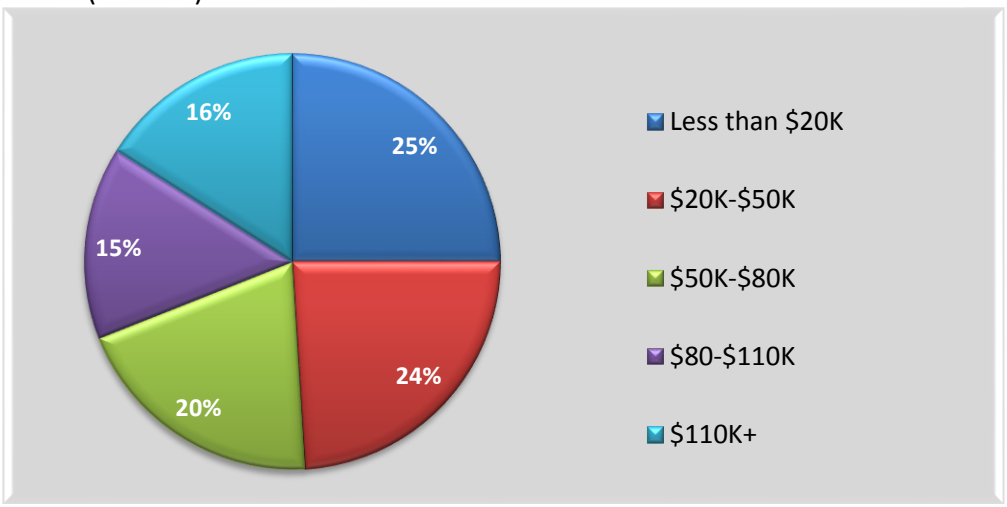
Employment Status:



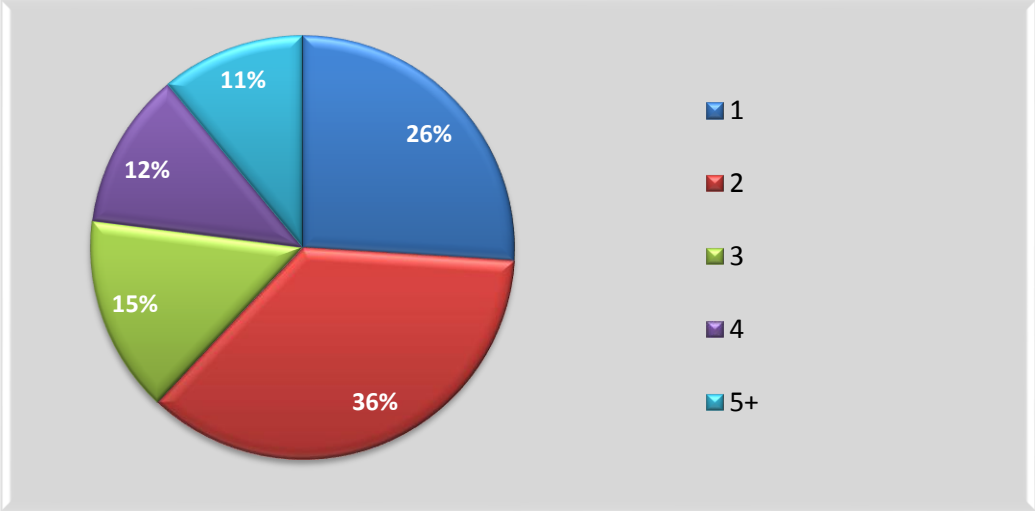
Education (n=1319):



Annual Income (n=1225):

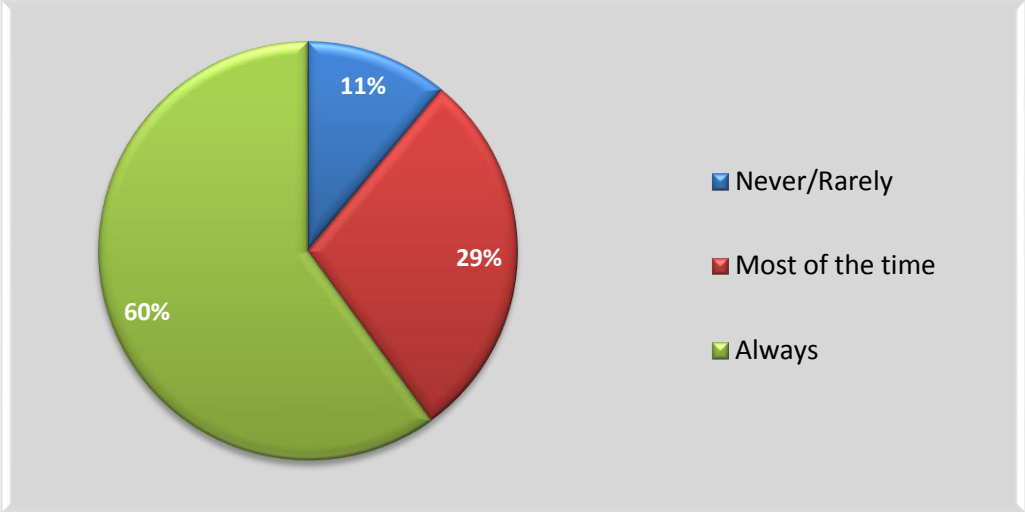


Number of People in Household (n=1428):



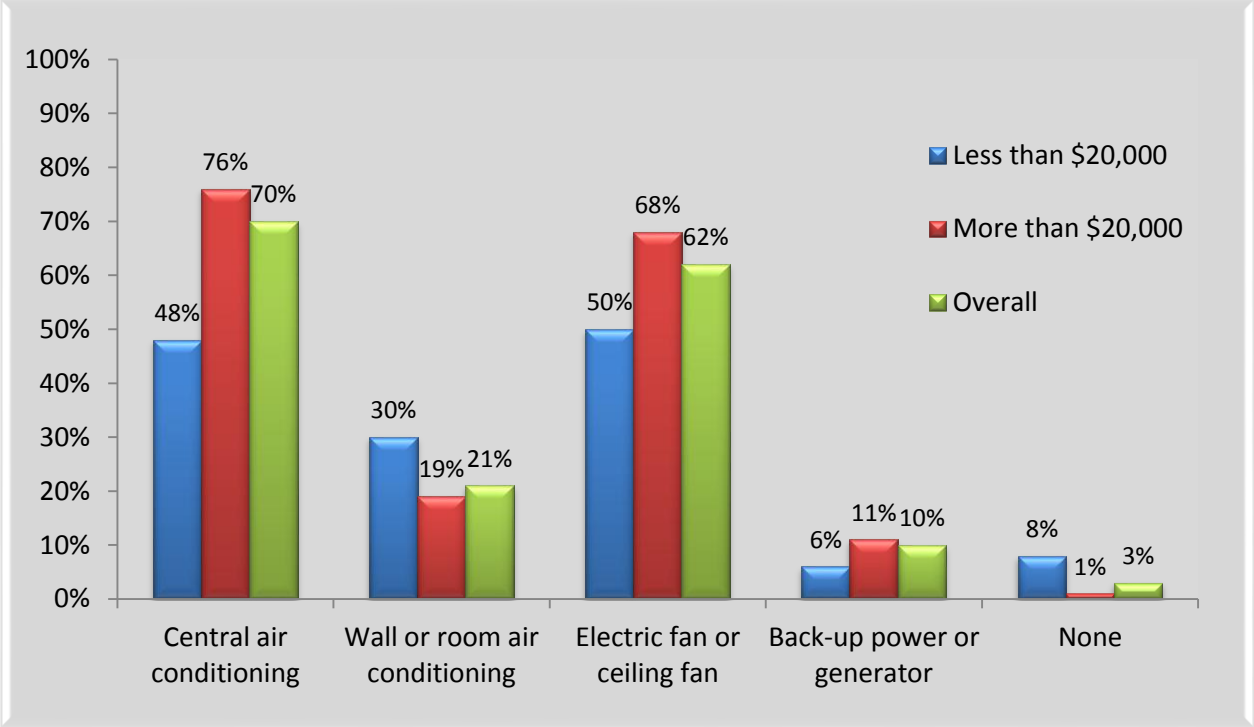
Respondents over the age of 65 were more likely to report living alone (43% vs. 26% overall).

Has Money to Pay for Essentials Such as Food, Housing, Utilities and Medicine (n=1309):

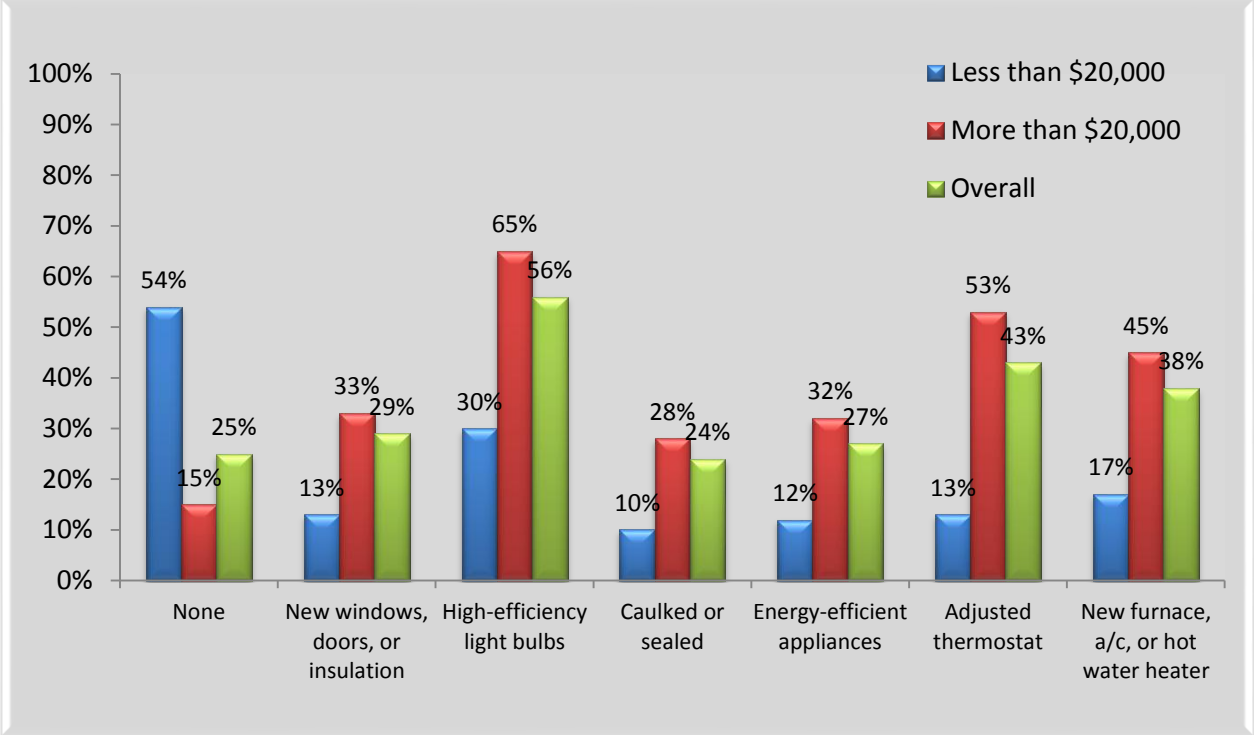


The following charts provide more detailed information about select questions by income or other factors.

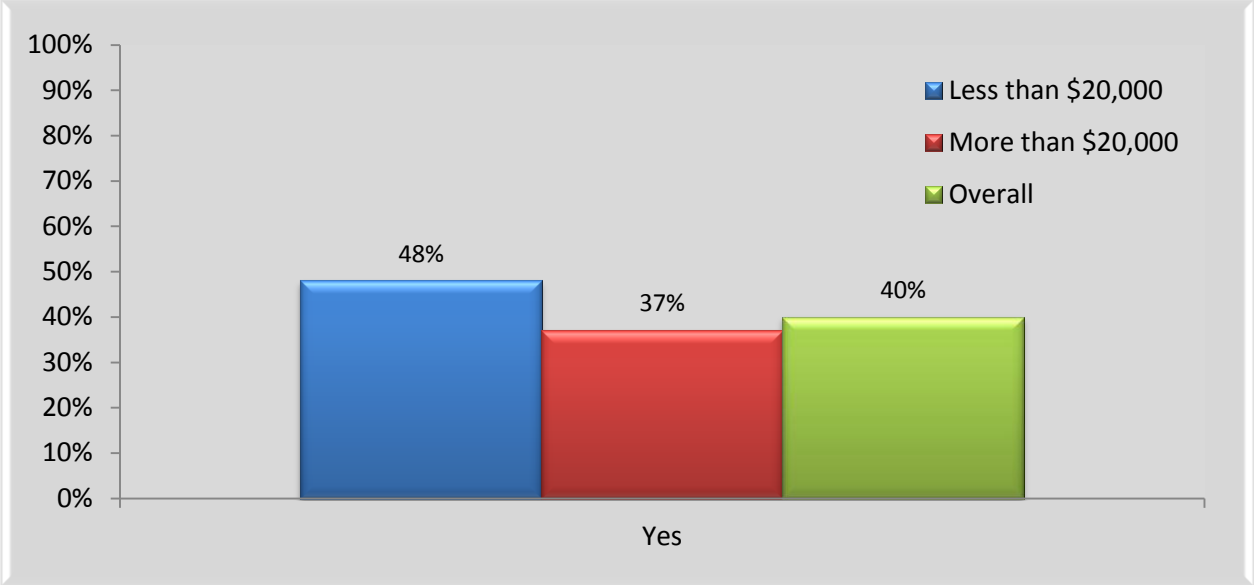
Reported Availability of Air Conditioning, Fans, and Generators by Income:



Energy-Efficiency Improvements to Residence in Past 5 Years by Income:

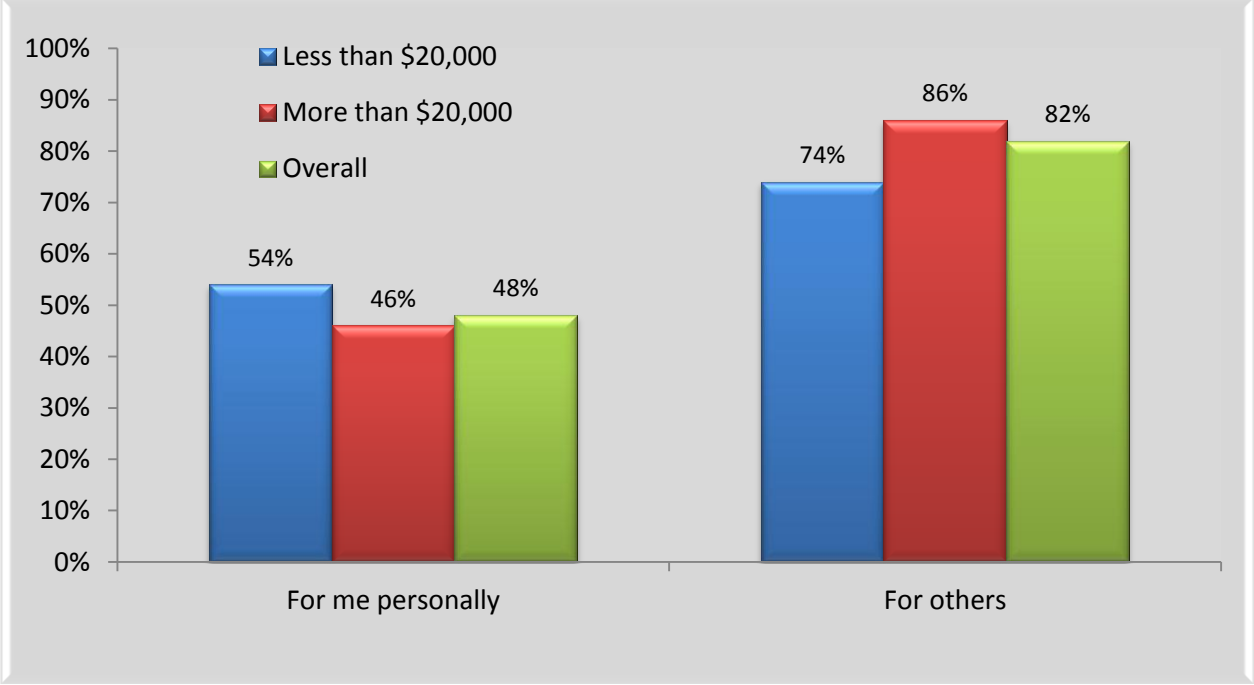


Believes There Has Been an Increase in the Number Heat Waves in Past 10 years by Income (less than $20,000 n=305 and more than $20,000 n=904):

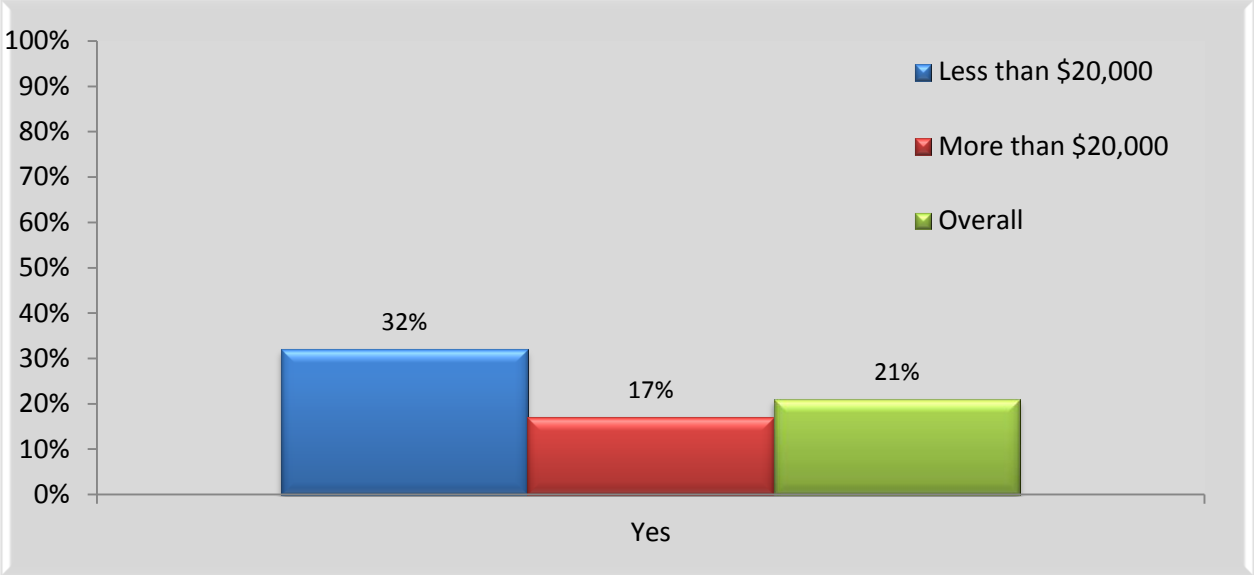


Like those with incomes below $20,000 per year, respondents age 65 and older were also somewhat more likely to believe there has been an increase in heat waves (46%, n=269) than younger respondents.

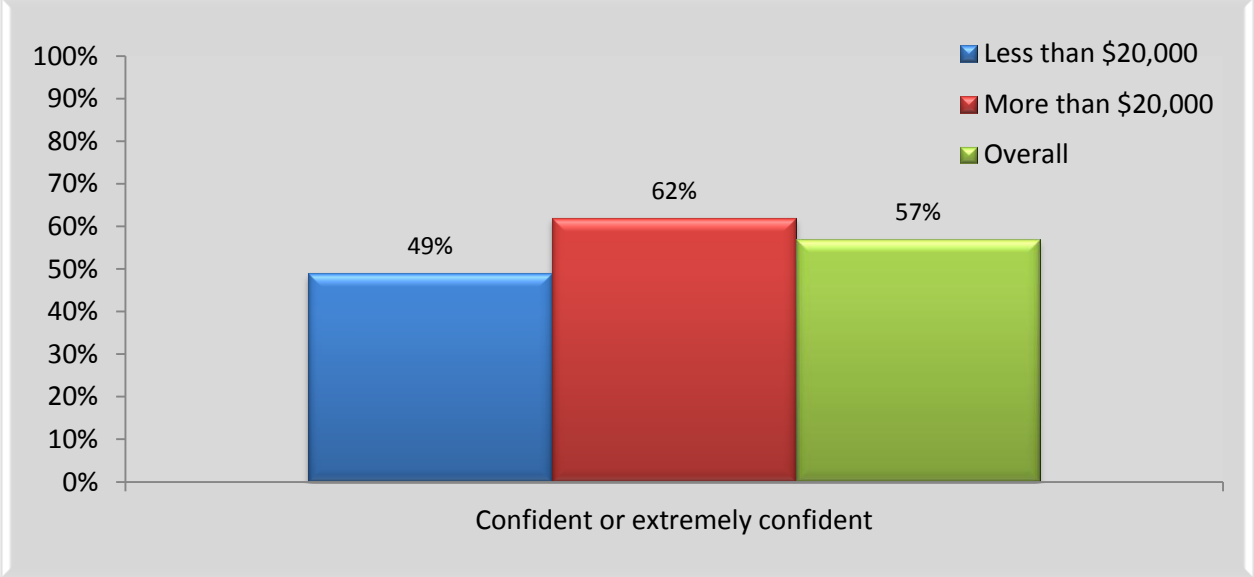
Is Somewhat or Extremely Concerned about the Health Effects of Heat Waves/Heat Wave Emergencies by Income:



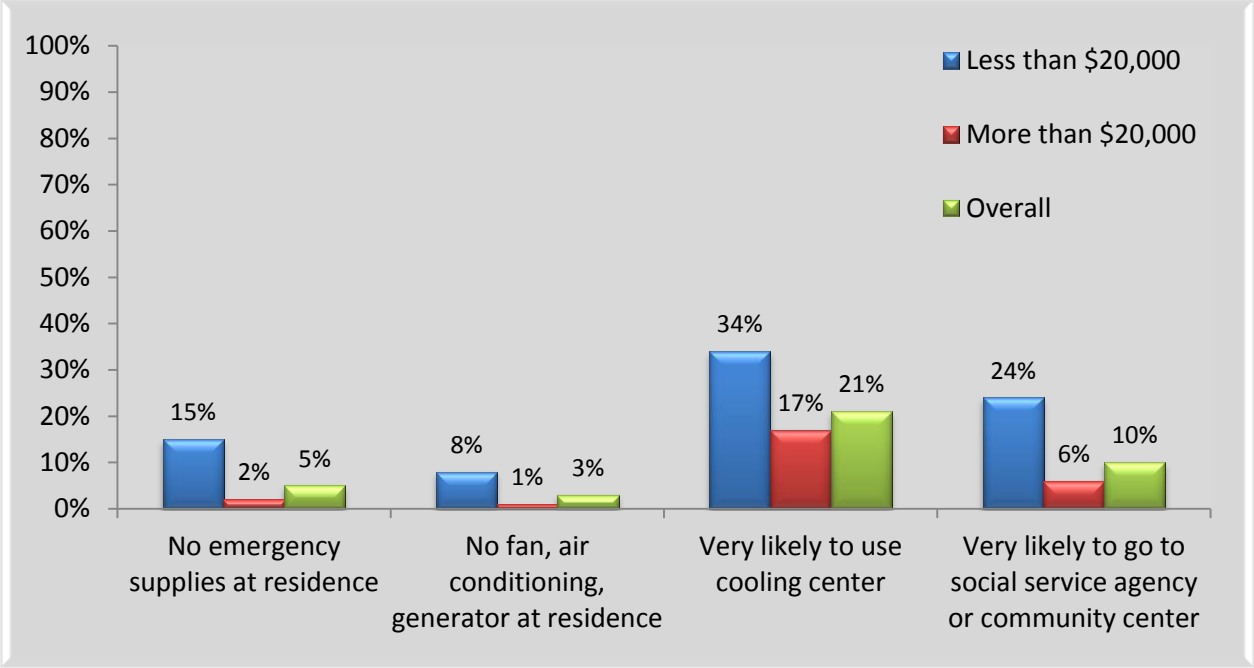
Believes Oneself to be at Increased Risk of Heat-related Illness Due to Age, Work, Living Conditions, Medical/Mental Health Issue by Income (less than $20,000 n=309 and more than $20,000 n=909):



Confidence in Recognizing Symptoms of Heat-related Illness Requiring Medical Attention by Income:

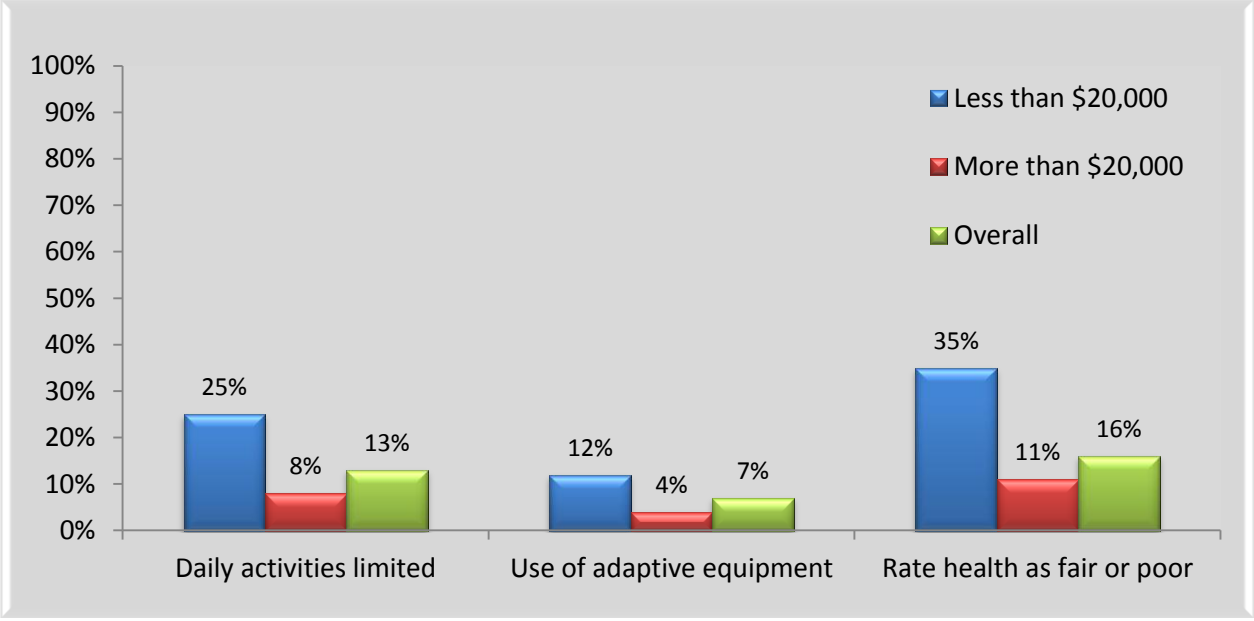


Available Resources for Coping with Extreme Heat by Income:



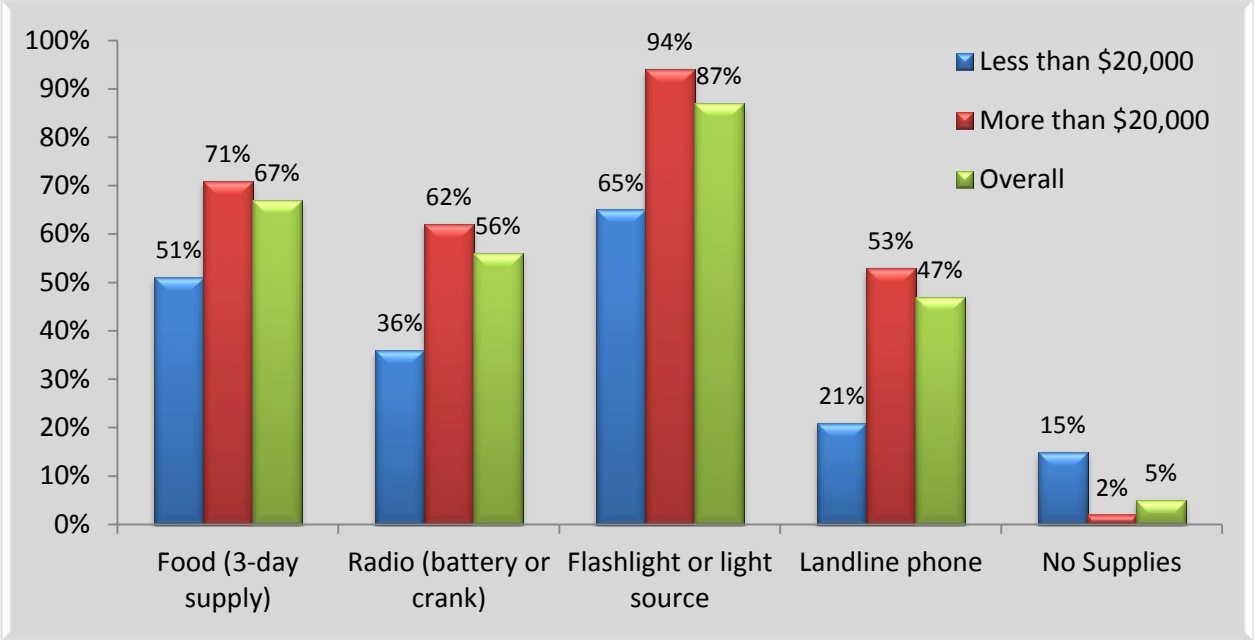
Among black respondents, 42% reported being "very likely" to use a public cooling center during a heat wave or heat wave emergency (n=165). While the number of black respondents is fairly small, the finding is consistent with non-white respondents overall (37%, n=312).

Reported Limitations, Use of Adaptive Equipment and Overall Health by Income:



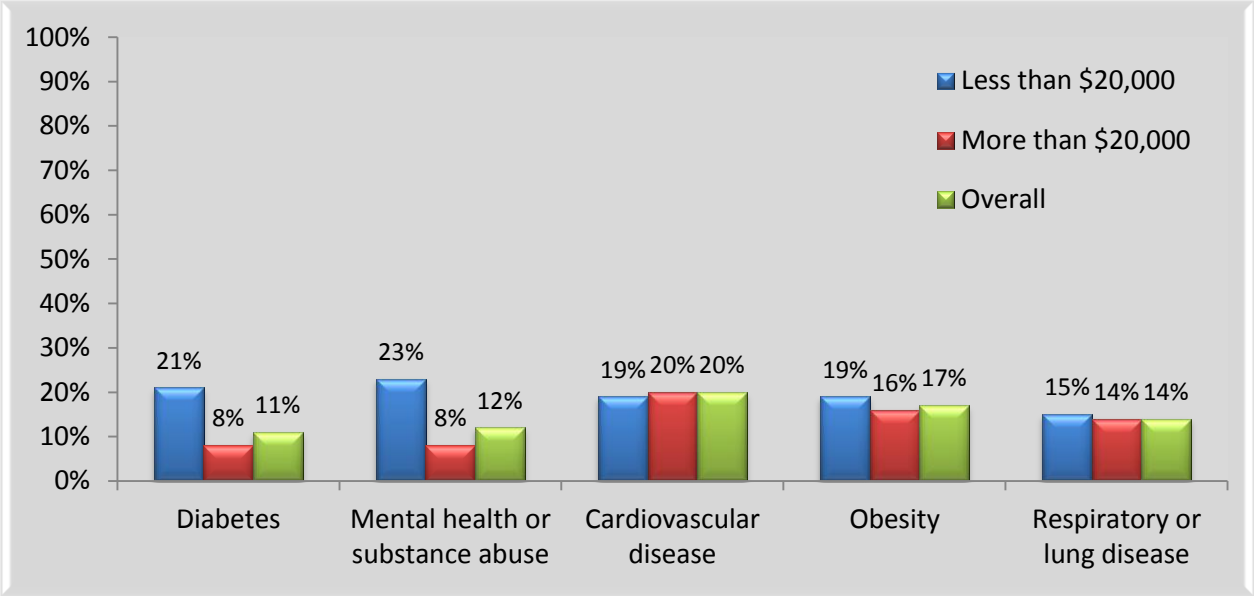
Notably, only 19% of respondents age 65 and older rated their health as "fair" or "poor." Similarly, 18% of older respondents reported limitations in their daily activities; however, a somewhat higher percentage (16) of older respondents reported using adaptive equipment.

Reported Availability of Emergency Supplies by Income:



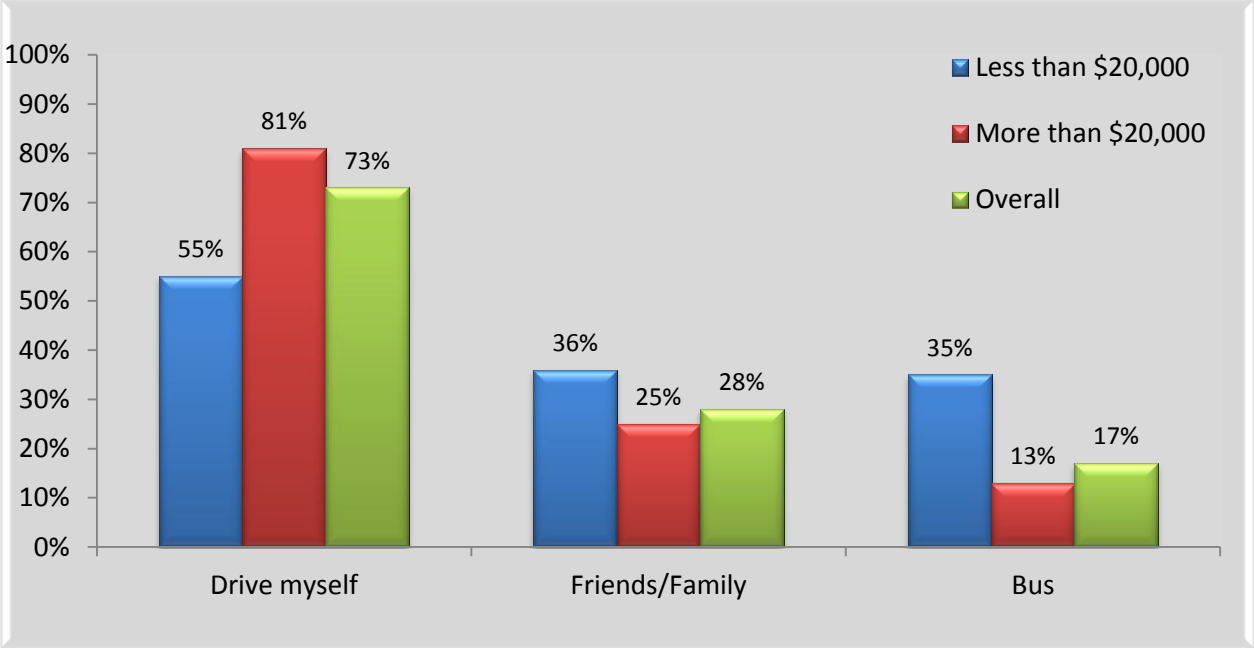
Respondents over age 65 reported an availability of supplies similar to those respondents with incomes over $20,000. Among older respondents, 76% said they had a 3-day supply of food; 93% a light source; and 67% a radio. Older respondents also indicated greater access to landlines than other groups (69%). Of those older respondents taking medications on a regular basis, 91% report having 3-day supply available compared to 69% overall.

Reported Health Conditions indicating increased vulnerability to health heat effects, by Income:



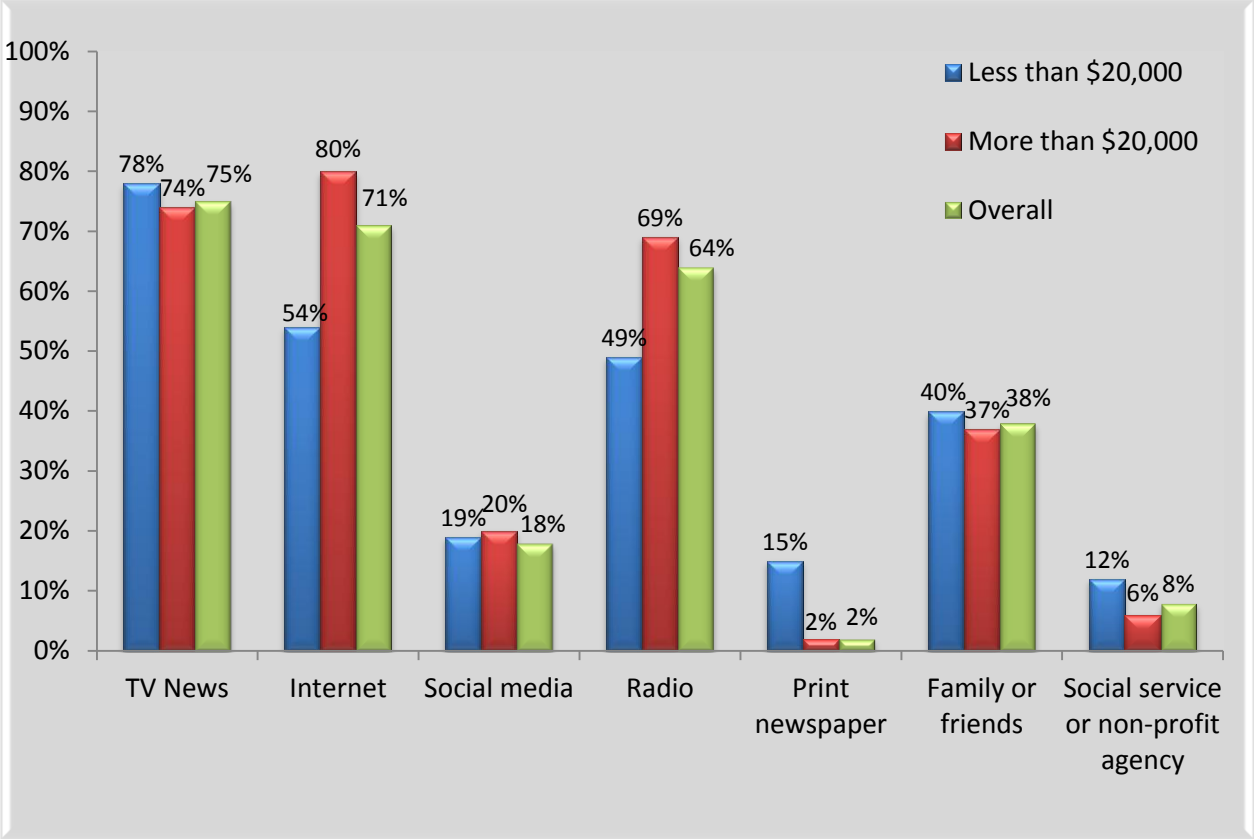
Older respondents reported diabetes rates similar to low-income respondents (22%); higher rates of cardiovascular disease (42%); and lower rates of mental health/substance abuse (3%).

Likely Mode of Transportation to Someplace Cooler during Heat Wave by Income:



Older respondents (65 years and over) indicated they are less likely to drive themselves (65%) and nearly twice as likely to request emergency assistance if they needed to evacuate during a heat wave or heat wave emergency (11% vs. 6% of all respondents). In addition, only 50% of older respondents said it would be easy for them to reach a bus stop compared to 63% of respondents overall and 76% of respondents with incomes under $20,000.

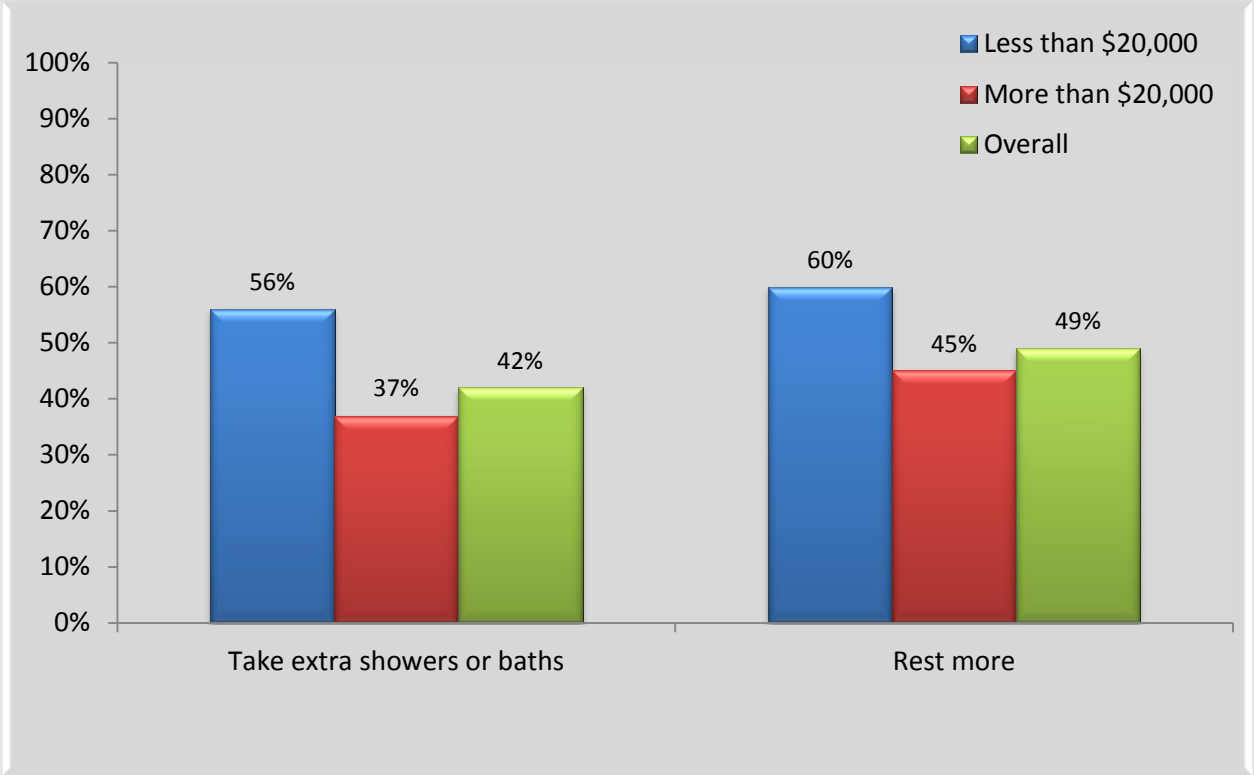
Likely Sources of Reliable Information during Heat Waves by Income:



Notably, higher percentages (93 and 87 respectively) respondents identifying themselves as black or non-white selected the TV news as a likely source of reliable information during a heat wave or heat wave emergency than whites. Like lower-income respondents, black and non-white responders were also twice as likely as whites to report that they would seek information from a social service or non-profit agency (12% of respondents identifying themselves as black and 11% of those identifying themselves as a race/ethnicity other than white).

Not surprisingly, respondents over age 65 were somewhat less likely to use the internet (47% vs. 71% overall) and very unlikely, compared to other respondents, to use social media (4% vs. 18% overall). Older respondents were also more likely to report relying on print newspapers (34%) than respondents overall (2%).

Actions reported as Very Likely during Heat Wave or Heat Wave Emergency by Income:



For the majority of potential actions listed (limit outdoor activity; go somewhere cooler; use air conditioning at residence; use fan at residence; and drink extra water), there was very little variation among respondents by income.

Additional Results - Findings not depicted or discussed above include:

- Ability to use English: The vast majority of respondents (93%) said they understand English "very well." This percentage drops somewhat among respondents with lower incomes (83%), older respondents (86%) and non-white respondents (82%). Note: the written survey was available in multiple languages and in a slightly larger font.
- Awareness/understanding of emergency alerts and resources:
    - Among all respondents 29% reported being aware that WEMU 89.1 FM is the primary Emergency Alert Station for the local area. There was little variation among most subgroups of respondents, although somewhat fewer of those with incomes under $20,000 reported this awareness (24%).
    - Overall, 53% of respondents correctly identified a warning as the most serious type of weather alert; there was only slight variation among subgroups of respondents. The largest difference was between lower-income respondents (47%) and higher-incomes respondents (55%).
    - More variation was apparent where respondents incorrectly identified a watch as the most serious type of weather alert. Eighteen percent of all respondents indicated a watch was serious, compared to 27% of older respondents and 40% of black respondents.

    - Only 16% of all respondents reported knowing that the Ann Arbor Area Transportation Authority will provide free transportation to public cooling centers for qualifying persons during heat waves or heat wave emergencies. This percentage was slightly higher among lower-income respondents (22%) and respondents over age 65 (20%), but lower among higher-income respondents (13%). This question generated more open-ended comments than others, and many requested clarification or more information.
- Available support person: The majority of respondents reported having someone to contact for assistance, if needed, during a heat wave or heat wave emergency (83% overall). There was some variation by income with 77% of those with incomes less than $20,000 indicating available support, compared with 85% of respondents with incomes over $20,000.
- Gender: Only 25% of respondents were male (n=323), and there were no striking differences when compared to respondents overall. The most noticeable difference was income; 21% of male respondents reported incomes over $110,000 per year compared to 16% overall.
- Pets: Just under half of all respondents (46%) said they have no pets. Of those with pets, 35% said they would take their pet or pets with them and 14% indicated they would stay with their pet or pets. Respondents over age 65 were less likely to report pet ownership (69% without a pet or pets) as were low-income and minority respondents (64% and 65% respectively).
- Prior symptoms or diagnoses of heat-related illness: Overall, 26% of respondents reported having been diagnosed or having experienced heat-related illness. There was little variation by income. Among respondents age 65 or older; however, only 15% reported prior illness.

Discussion and Recommendations

Our results are consistent with other studies that have found lower-income populations bear a disproportionate burden of chronic illness; are more likely to rely on public resources such as transportation, cooling centers or social service agencies; and are generally less likely to have the means to endure or recover from emergencies or disasters. In addition, some subgroups face additional risks in spite of being somewhat more prepared. For example, older persons were more prepared in terms of supplies *and*, at the same time, more likely to request emergency assistance. Some of the most notable differences appeared when comparing respondents with annual incomes under $20,000 to those with incomes over $20,000.

Results like these are critical because they demonstrate the importance of clear, accessible and organized public and private services – especially as the disease and injury burden related to climate change and extreme weather intensifies in the coming years. Local public health departments can and should continue to bring the health aspects of climate change to the forefront of policy discussions – especially as it is likely to impact some subgroups of the population more severely than others. Tools like HIA can assist with this process.

Washtenaw County is fairly affluent and well educated when compared to other jurisdictions and often looks quite good in comparisons with other counties. Local information like this survey provides a picture of within- county health and preparedness differences, highlighting differences by income, age and race/ethnicity.

Assumptions – The results assume that respondents both understood the questions asked and answered them accurately and truthfully. They also assume that respondents interpreted the survey questions the same whether completing the instrument online or in written format. Other assumptions include:

- Respondents live, work, attend school or otherwise spend significant amounts of their time within the jurisdiction.
- Respondents completing the survey in written format may be more vulnerable to the impact of extreme weather and/or have a reduce capacity to prepare or adapt.
- In a few cases, respondents completing the written survey requested assistance from a WCPH staff person because the respondent had difficulty seeing, reading, writing, etc. Results assume that the staff person was able to accurately document the respondent's responses.
- The number of responses collected was large enough to provide information about the survey population and reflected the county population as a whole and/or those residents that may be more vulnerable to the impact of extreme weather or other potential health emergencies.

Limitations – The survey population may not necessarily have been a representative sample of the entire county population. Further, respondents opted to participate in the survey voluntarily (self selected) and completed the survey themselves online or using a printed survey (self report).

In terms of survey administration and data analysis, in retrospect, unique numbers could have been assigned to paper surveys and perhaps entered into Zoomerang to make more complex data analyses possible. Notably, Zoomerang does not easily accommodate assigning individual identification numbers to entries. WCPH did not intend to complete complex data analysis when the decision was made to utilize Zoomerang, which is readily available and easy to use. However, if this survey is replicated elsewhere and more sophisticated analysis is planned, we recommend selecting other software for data collection and analysis

Benefits – Overall, the project provided an opportunity to collect broad community input and make preparedness recommendations based on local data. It also provided a framework for health education and targeted outreach on the risks of extreme heat, available community resources and general preparedness. Finally, it helped reinforce local public health's role in promoting and protecting health during emergency events. Other benefits included:

- Offering emergency preparedness incentives via prize raffles gave participating individuals a tangible benefit in exchange for their time and input. It also provided emergency supplies directly to community members with lower incomes or other health risks. (Note: Raffles were open to attendees at community events even if they opted not

to participate in the survey. At some smaller events, all attendees received a small incentive, such as a miniature flashlight, hand sanitizer or can opener.)

- WCPH maintains and regularly updates lists of response partners, nonprofit community organizations and public service providers. The survey provided a concrete opportunity to utilize and update contact lists, offer specific community education and network with a wide range of partners.
- The opportunity to pilot elements of the HIA process developed additional capacity and awareness within WCPH and fostered new partnerships that may led to subsequent HIAs. The City of Ann Arbor, for example, will likely use the health data from the heat survey to inform decision making around planting new trees within the jurisdiction. A variety of data is currently used to inform tree canopy decisions – but none is health related.
- Similarly, local emergency response plans do not always fully incorporate health considerations. WCPH will share the results with local response partners and make recommendations regarding response plans, community outreach and risk or crisis communications.
- Sharing the results and recommendations broadly within the community will enhance risk or crisis communications as well as outreach in the coming year. WCPH will refine a summary of results and recommendations to guide communications in the spring and summer of 2012.

Finally, understanding how local populations perceive emergencies, obtain urgent information and view their own readiness to respond is critical in evaluating comprehensive community response plans for emergencies and disasters. The Hot Weather and Health Survey allowed WCPH health a key opportunity to collect and apply this type of information.

In the coming months and prior to summer 2012, WCPH will use the survey results to update the Heatwave Community Response Plan in conjunction with local response partners. The Heatwave Community Response Plan was updated in 2010 and developed with the American Red Cross – Washtenaw County Chapter, the City of Ann Arbor Office of Emergency Management, the Ann Arbor Transportation Authority, the Human Society of Huron Valley, WCPH and County Sheriff's Office, Emergency Services Division. Results and recommendations will be shared publically and with partners.

The following recommendations are offered, and will be further refined in conjunction with community response partners:

- Use local data to illustrate the potential health burden of climate change and to promote adaption strategies
- Review and revise the Heatwave Community Response Plan in light of survey findings
- Make clear, consistent and specific information about local alert systems and resources more widely available
    - Clarify availability of emergency transportation and how to access it when the Heatwave Community Response Plan is activated

    - Develop clear messaging around weather alerts and misunderstandings of their seriousness.
    - Promote designated local Emergency Alert System radio stations or other reliable media
    - Work to create and utilize more consistent messages across organizations
    - Consider how and if more local notification systems can be consolidated
- Work closely with community organizations and leaders serving more vulnerable persons to improve awareness of risks, preparedness strategies and understanding of available alert systems and resources

References

Heat-Related Deaths - United States, 1999-2003 - Centers for Disease Control and Prevention, MMWR 2006;55(29):796-798 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5529a2.htm

Climate Change: The Public Health Response - American Journal of Public Health
http://ajph.aphapublications.org/cgi/reprint/98/3/435

Climate Change is a Public Health Issue - American Public Health Association
http://www.apha.org/NR/rdonlyres/0BB28118-6236-4586-99DE-294C00199628/0/APHAClimChg_PHissue_4d.pdf

Health Problems Heat Up: Climate Change and the Public's Health - Trust for America's Health
http://healthyamericans.org/reports/environment/TFAHClimateChangeWeb.pdf

Washtenaw County Health Improvement Plan (HIP)
http://hip.ewashtenaw.org

Michigan Department of Community Health (MDCH) "Protecting Michigan At-Risk Populations From the Health Risk of Hot Weather" EPA Poster, Summer 2011.

MDCH Climate Change website
www.michigan.gov/climateandhealth

WCPH Hot Weather & Health webpage
www.ewashtenaw.org/heat