



# Minneapolis MetroSHAPE Survey Deficiencies and Results

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### Contact:

**Mageen Caines**

612-673-2993

mageen.caines@minneapolismn.gov

**Rick Carlson**

612-673-3948

richard.carlson@minneapolismn.gov

City of Minneapolis Health Department

Research and Evaluation Division

web: [minneapolismn.gov/health](http://minneapolismn.gov/health)

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## Overview of MetroSHAPE

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The 2014 Metro Survey of the Health of All the Population and the Environment (MetroSHAPE) was jointly conducted by six metro area counties — Carver, Dakota, Hennepin, Ramsey, Scott, and Washington — and three metro area cities — Bloomington, Minneapolis, and Saint Paul. The objective of the survey was to assess adult health status along with a variety of factors that influence health and to create local prevalence estimates with enough precision to capture the magnitude of differences among some sociodemographic groups.

## Survey methods

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The survey invitation was mailed several times to a random sample of households. Standard techniques were used to try to ensure that the survey sample would be representative of the adult population in terms of sociodemographic indicators and health status:

- Areas with higher proportions of low-income households and residents of color were oversampled.
- Individuals selected were notified that they could complete the survey by telephone in a language other than English.
- Households with more than one resident were asked to have the adult with the next birthday complete the survey rather than having the residents select the respondent.
- Survey recipients had the option of completing the survey online or by using a paper version mailed to them.
- Efforts were made to promote survey completion through community posters and online videos.

## Survey response rate and nonresponse bias

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**The metro-wide response rate was low (22%)** — meaning that eight of every 10 adults invited to take the survey chose not to or ignored the invitation altogether. A low response rate increases the likelihood of a biased sample. One method to examine the extent of what is called **“nonresponse bias”** is to compare the numbers of respondents in a variety of sociodemographic subgroups in the survey sample with the numbers that would be expected for these groups based on their proportions in the population, as estimated by the U.S. Census 2010 or American Community Survey 2009-2013 (5-year) data.

**Survey respondents were not representative of the general adult population.** The nonresponse bias analyses revealed that the survey sample was substantially skewed in terms of gender, age, educational attainment, race, and ethnicity. Specifically, compared with the general population, the survey sample included disproportionately low numbers of:

- Males
- Residents of color
- Adults under age 45
- Adults age 25 years or older with educational attainment less than a college degree, with the greatest under-representation seen for those without a high school diploma or GED

Furthermore, nonresponse bias analyses revealed that even within all age groups and within most racial/ethnic groups, survey respondents were disproportionately more highly educated than their respective cohorts in the general population.

These analyses did not address language or household income. None of the potential respondents requested to have the survey administered in a language other than English, so immigrant populations were not adequately represented. The income brackets used for the survey responses did not align with those used to categorize household income for the Census Bureau, making exact comparisons impossible. Educational attainment was used instead as a measure of socioeconomic well-being because of its strong association with both individual income and individual health.

## **Why does nonresponse bias matter?**

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Nonresponse bias is detrimental because it affects the validity of survey results — the ability to generalize from the survey sample to the overall population of interest. Survey results represent only the characteristics of individuals who chose to respond — not those who did not respond. The nonresponse bias seen in MetroSHAPE has a strong impact on health-related measures. **Estimates of health status based on survey responses present a more favorable picture of adult population health than is actually the case.** This happens because many segments of the population at higher risk for poor health are not meaningfully represented in the survey sample.

For example, educational attainment is a strong measure of the influence of socioeconomic circumstances on health. For the majority of adults, education level reflects not only the resources of their family of origin, but also the knowledge and skills attained by young adulthood. Therefore, it captures the long-term influence of early life circumstances as well as the influence of adult circumstances on adult health.

One striking example of the relationship between education level and health can be seen by examining the Behavioral Risk Factor Surveillance System survey conducted by the CDC: Adults age 25 or older without a high school diploma or GED were 5.5 times more likely to rate their overall health as fair or poor than college graduates (39.1% versus 7.1%; BRFSS 2011). Because MetroSHAPE included few adults age 25 or older with this lower level of educational attainment, the overall health status for the metro area and participating jurisdictions appears healthier than would be the case if the survey sample were more representative of the populations in these areas.

### **Can weighting survey data reduce nonresponse bias?**

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Weighting survey responses can reduce nonresponse bias, but only if two conditions are met:

- 1) the survey sample includes sufficient diversity in both individual characteristics and health indicators; and
- 2) the numbers of respondents in sample subsets (such as those defined by age, gender, race, and educational attainment) are large enough to assume that they represent the group as a whole.

MetroSHAPE was deficient in both respects. The survey sample lacked sufficient demographic and socioeconomic diversity and the survey yielded very few responses from certain segments of the population. As a result, when age, gender, age, and geographic area weights were applied, they had the unintended effect of producing a healthier portrait of the population than unweighted data.

### **Do confidence intervals help correct for nonresponse bias?**

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The technique of applying a “confidence interval” — a margin of error for an estimate expressed as plus or minus percentage points — does not correct for nonresponse bias. This technique addresses only sampling error which occurs at random — a phenomenon similar to flipping a coin 10 times and not getting 5 heads and 5 tails. The confidence interval is intended to provide an estimate of the range within which the “true” rate for the population surveyed likely occurs. For example, a 15% estimate within a 95% confidence interval of plus or minus 5 percentage points means that if the survey were administered to 100 different randomly drawn samples using the same method each time, the rate would fall between 10% and 20% for 95 of the 100 samples. The nonresponse bias would not be affected. In a survey where nonresponse bias is strong, the use of confidence intervals portray a precision in estimation that can be easily mistaken for “representativeness” of the population — when they are actually measuring precision of a skewed sample.

## **Is nonresponse only a local issue?**

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No. Participation in epidemiologic studies has been decreasing since the 1970s, and the decrease is evident in national, state, and local household surveys. The reasons for the nonresponse bias in MetroSHAPE are not clear, but based on research published related to this trend, locally contributing factors likely include:

- an increasing number of requests to participate in health-related research and other academic and government-sponsored research;
- a large increase in unsolicited mail and phone calls (unsolicited mail tends to get discarded and phone calls are screened with caller ID);
- a general decrease in volunteerism (willingness to participate in research parallels other social participation);
- diminishing enthusiasm for science; and
- distrust of government.

## **Conclusions and implications for Minneapolis survey data**

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Because MetroSHAPE provides a misleading picture of the health of Minneapolis residents, the Minneapolis Health Department will not rely on these data to estimate the prevalence of different health conditions or behaviors or to compare estimates between sociodemographic subgroups of the population. However, because MetroSHAPE data are public, the Minneapolis Health Department will release city data on request accompanied by a disclaimer related to the survey data deficiencies. The data will be unweighted and estimates will not be accompanied by confidence intervals due to the deficiencies described in this report.

- **Table 1** on page 7 presents the unweighted number and percentage of survey respondent characteristics.
- **Table 2** on page 8 presents unweighted survey results for selected health-related outcomes.
- **Table 3** on page 9 presents the number of Minneapolis respondents in selected subgroups defined by gender, age group, race, and by the highest and lowest categories of educational attainment. The final row in this table shows the number of respondents in each age and education group that would be expected in a sample for which both selection and response were truly random. The expected numbers are based on estimates for the Minneapolis population from the Census Bureau.

<b>Table 1. Characteristics of respondents, ages 25 and over*</b>		<b>N<sup>[1]</sup></b>	<b>%<sup>[1]</sup></b>
<b>MINNEAPOLIS TOTAL</b>			
	Ages 25 and over	3323	100%
	Ages 18-24 (excluded)*	117	--
<b>AGE GROUP</b>			
	25-34	652	19.7%
	35-44	521	15.7%
	45-54	576	17.4%
	55-64	772	23.3%
	65+	793	23.9%
<b>SEX</b>			
	Female	2106	63.4%
	Male	1216	36.6%
<b>RACE</b>			
	American Indian or Alaskan Native	53	1.6%
	Asian or Pacific Islander	114	3.5%
	Black	247	7.5%
	White	2798	85.5%
	Multiracial	34	1.0%
	Other	28	0.9%
<b>ETHNICITY</b>			
	Hispanic	71	2.2%
<b>HIGHEST LEVEL OF EDUCATIONAL ATTAINMENT</b>			
	Less than high school	88	2.7%
	High school GED	326	9.8%
	Some college	740	22.4%
	Bachelors or higher	2156	65.1%
<b>GEOGRAPHY<sup>[2]</sup></b>			
	Central	747	22.5%
	North	768	23.1%
	Northeast	835	25.1%
	Southwest	973	29.3%
<b>SEXUAL ORIENTATION<sup>[3]</sup></b>			
	Bisexual	109	3.4%
	Gay, lesbian, or homosexual	263	8.1%
	Heterosexual or straight	2897	89.6%
	Transgender	14	0.4%

SOURCE: MetroSHAPE 2014 – City of Minneapolis

\* The data in this table is based on respondents ages 25 and over.

[1] Unweighted number and unweighted percentage. Missing data is excluded.

[2] *Central*: Central, Phillips, Powderhorn; *North*: Camden, Near North; *Northeast*: Longfellow, Northeast, University; *Southwest*: Calhoun Isles, Nokomis, Southwest

[3] Subgroups are not mutually exclusive (will exceed 100%).

<b>Table 2. Selected outcome measures, ages 25 and over<sup>†</sup></b>		<b>N<sup>[1]</sup></b>	<b>%<sup>[1]</sup></b>
<b>HEALTH STATUS</b>			
	Good or Better	2925	88.4%
	Fair or Poor	385	11.6%
<b>'NOT GOOD' MENTAL HEALTH IN PAST 30 DAYS</b>			
	0 days	1580	48.2%
	1 or more days	1696	51.7%
<b>EVER TOLD BY DOCTOR OR OTHER HEALTH PROFESSIONAL THAT YOU HAD...</b>			
	High blood pressure	865	26.2%
	Diabetes	256	7.8%
	High blood cholesterol	1047	31.8%
	Asthma	460	14.1%
<b>BODY MASS INDEX (BMI)</b>			
	Underweight	54	1.7%
	Normal	1433	45.0%
	Overweight	960	30.2%
	Obese	734	23.1%
<b>SERVINGS OF FRUITS AND VEGETABLES CONSUMED YESTERDAY</b>			
	0 servings	44	4.4%
	1 or more servings	3165	95.7%
<b>CURRENTLY INSURED</b>			
	Yes	3051	92.2%
<b>MEETS HEALTHY PEOPLE 2020 PHYSICAL ACTIVITY GUIDELINE (AT LEISURE)</b>			
	Moderate physical activity	1766	54.8%
	Vigorous physical activity	1498	46.2%
<b>CURRENT SMOKER</b>			
	Yes	354	10.8%

SOURCE: MetroSHAPE 2014 – City of Minneapolis

<sup>†</sup> **MetroSHAPE 2014 methodology note:** The survey invitation was mailed to a random sample of households and recipients could respond to a paper or web-based questionnaire. The Minneapolis survey response rate was 21.5%. While the survey was designed to reach adults aged 18 and older, only a small number of young adults completed the survey so the 18-24 age group was excluded from analyses. An analysis of nonresponse bias revealed that the individuals who responded were not representative of the general population, in terms of age, gender, race/ethnicity, education level, household income, primary language, or immigrant/refugee status. The characteristics of the persons who responded are generally associated with better health and well-being, so survey results underestimate the risk behaviors and health issues of the population.

<sup>[1]</sup> Unweighted number and unweighted percentage. Missing data is excluded.



**Table 3. Number of respondents by gender, race, age group, and educational attainment**

MALES	Ages 18-24*	Ages 25-34	Ages 35-44	Ages 45-54	Ages 55-64	Ages 65+	Less than high school or GED*	College degree, ages 25+
American Indian or Alaskan Native	0	2	1	5	6	4	0	4
Asian or Pacific Islander	0	10	9	6	8	13	3	24
Black	1	5	11	22	32	21	14	32
White	24	184	141	169	233	280	20	674
Multiracial or Other	6	8	4	5	7	3	2	14
FEMALES	Ages 18-24*	Ages 25-34	Ages 35-44	Ages 45-54	Ages 55-64	Ages 65+	Less than high school or GED*	College degree, ages 25+
American Indian or Alaskan Native	0	1	4	9	12	9	3	10
Asian or Pacific Islander	5	22	21	11	3	9	6	43
Black	4	18	14	31	51	40	19	45
White	69	371	298	307	406	404	17	1254
Multiracial or Other	4	17	7	3	3	5	5	21
TOTAL MALES AND FEMALES	Ages 18-24*	Ages 25-34	Ages 35-44	Ages 45-54	Ages 55-64	Ages 65+	Less than high school or GED*	College degree, ages 25+
All race categories	117	652	521	576	772	793	93	2156
Approximate expected number**	653 <sup>[1]</sup>	1082	706	628	498	410	394 <sup>[1]</sup>	1519

\* Column data includes 18-24 year-old survey respondents. The 18-24 age subgroup is excluded from MetroSHAPE analyses in Table 1 and Table 2.

\*\* Age subgroups based on U.S. Census 2010 population for Minneapolis, MN. Educational attainment subgroups based on ACS 2009-2013 population for Minneapolis, MN.

<sup>[1]</sup> Approximate expected number for a dataset that includes respondents ages 18-24; calculation is based on the 18+ population for Minneapolis, MN. Other columns represent the expected number for a dataset that includes only respondents ages 25+; calculations are based on the 25+ population for Minneapolis, MN.