



Published in final edited form as:

*J Am Coll Cardiol.* 2018 February 20; 71(7): 808–809. doi:10.1016/j.jacc.2017.10.104.

## Awareness of Heart Attack Signs and Symptoms and Calling 9-1-1 Among US Adults: National Health Interview Survey 2008 and 2014

Ashruta Patel, MS<sup>1</sup>, Jing Fang, MD, MS<sup>1</sup>, Cathleen Gillespie, MS<sup>1</sup>, Erika Odom, PhD<sup>1</sup>, Cecily Luncheon, MD, MPH, DrPH<sup>1,2</sup>, Carma Ayala, RN, MPH, PhD<sup>1</sup>

<sup>1</sup>Division for Heart Disease & Stroke Prevention, National Center for Chronic Disease Prevention & Health Promotion, Centers for Disease Control & Prevention, Atlanta, GA, USA

<sup>2</sup>IHRC, Inc., Atlanta, GA 30346

Healthy People 2020 (HP2020), the primary objectives monitoring the nation's health, has called for increased awareness of the early warning signs and symptoms of a heart attack and the importance of accessing emergency care by dialing 9-1-1.<sup>1</sup> Poor knowledge of the signs and symptoms of a heart attack has been associated with delayed hospital admission and unfavorable health outcomes.<sup>2</sup> There are five classic symptoms of heart attack: 1) pain or discomfort in the jaw, neck or back; 2) feeling weak, lightheaded or faint; 3) chest pain or discomfort; 4) pain or discomfort in the arms or shoulder; and 5) shortness of breath.<sup>3</sup> Healthy People 2020 (HP2020), the primary objectives monitoring the nation's health, has called for increased awareness of the early warning signs and symptoms of a heart attack and the importance of accessing emergency care by dialing 9-1-1.<sup>1</sup> To complement national objectives, it is important to understand sociodemographic disparities associated with the awareness of the signs and symptoms to target public health messages. To address this gap, we used data from the National Health Interview Survey (NHIS) in 2008 and 2014 to: 1) assess the disparities in the prevalence of awareness of signs and symptoms of a heart attack and calling 9-1-1 in 2014; and 2) determine the change in prevalence of awareness of the signs and symptoms of a heart attack and calling 9-1-1 between 2008 and 2014.

We accessed the recommended heart attack knowledge, which was defined if the participants knew or were aware of all five heart attack symptoms and who knew or were aware of the importance of calling 9-1-1. The adjusted prevalence of having the recommended heart attack knowledge in 2014 are presented in the Table. Large disparities in having the recommended heart attack knowledge were noted by sex, age group, race/ethnicity, level of education, marital status, access to health care, region of residence, and history of coronary heart disease. After adjusting for sex, age, race/ethnicity, and education attainment, logistic regression models showed a significant absolute increase of 10.1% with recommended heart attack knowledge. Compared with 2008, participants in 2014 were 60% more likely to have the recommended heart attack knowledge. Compared to 2008, the odds ratio of change in

Name and complete address for correspondence: Jing Fang, MD, MS, Division for Heart Disease & Stroke Prevention, National Center for Chronic Disease Prevention & Health Promotion, Centers for Disease Control & Prevention, Atlanta, GA, USA, 4770 Buford Hwy, NE, Atlanta, GA 30341, jfang@cdc.gov.

recommended heart attack knowledge in 2014 ranged from 1.3 for those with history of heart attack to 1.9 for those with PIR less than 1.0.

National education campaigns highlight the role individuals play in the chain of survival, which include quick, accurate identification of the signs and symptoms of a heart attack and the importance of calling 9-1-1 emergency services to support health systems in implementing urgent, life-saving clinical measures upon patient arrival.<sup>4</sup> Future studies should focus on efforts to develop strategies that target translating knowledge into action, emphasizing the seriousness of symptoms, reinforcing the importance of 9-1-1 emergency services access, and tackling psychological barriers (e.g., denial, embarrassment).<sup>5</sup> Although HP 2020 benchmarks have been met for heart attack awareness, the results presented identify continuing disparities. Diverse, community-based and health system supported public education campaigns are needed to improve awareness and should be culturally tailored and linguistically appropriate for target audiences.

## Acknowledgments

CDC Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## Abbreviations:

<b>NHIS</b>	National Health Interview Survey
<b>HP 2020</b>	Healthy People 2020
<b>CHD</b>	Coronary Heart Disease
<b>PIR</b>	Family-income to poverty ratio

## References

1. U.S. Department of Health and Human Services. Healthy People 2020. Office of Disease Prevention and Health Promotion. <https://www.healthypeople.gov/2020/>. Accessed February 12, 2016.
2. Fang J, Keenan N, Dai S. Disparities in Adult Awareness of Heart Attack Warning Signs and Symptoms - 14 states, 2005. *Morb Mortal Wkly Rep.* 2008;57(7):175–178.
3. Ornato JP, Hand MM. Warning signs of a heart attack. *Circulation.* 2014;129(11):393–396. doi:10.1161/CIRCULATIONAHA.113.006126.
4. Centers for Disease Control and Prevention. Heart Attack Signs and Symptoms. [https://www.cdc.gov/heartdisease/signs\\_symptoms.htm](https://www.cdc.gov/heartdisease/signs_symptoms.htm). Published 2015 Accessed January 12, 2016.
5. Lutfiyya MN, Lipsky MS, Bales RW, Cha I, McGrath C. Disparities in knowledge of heart attack and stroke symptoms among adult men: An analysis of behavioral risk factor surveillance survey data. *J Natl Med Assoc.* 2008;100(10):1116–1124. doi:10.1016/S0027-9684(15)31483-8. [PubMed: 18942272]

Logistic Regression results to assess disparities in Recommended Heart Attack Knowledge in 2014 and changes between 2008 and 2014 - National Health Interview Survey

Table 1.

Characteristics	Prevalence (2014)		Change in Prevalence (2008 and 2014)	
	%	OR (95% CI)	%	OR (95% CI)
Total	47.2	(0.5)	10.1	(0.6) 1.6 (1.47—1.64)
Sex				
Men	43.3	(0.6) 1.0	10.0	(0.8) 1.6 (1.45—1.67)
Women	50.9	(0.6) 1.4 (1.30—1.46)	10.2	(0.8) 1.6 (1.44—1.67)
Age (years)				
18–44	41.7	(0.7) 1.0	9.5	(0.9) 1.5 (1.42—1.67)
45–64	52.7	(0.7) 1.6 (1.47—1.72)	10.7	(1.0) 1.6 (1.44—1.71)
65	51.0	(0.9) 1.5 (1.35—1.62)	10.8	(1.3) 1.6 (1.41—1.73)
Race-Ethnicity				
Non-Hispanic White	51.7	(0.6) 1.0	9.7	(0.8) 1.5 (1.40—1.60)
Non-Hispanic Black	42.9	(1.1) 0.7 (0.63—0.77)	13.3	(1.5) 1.8 (1.60—2.09)
Non-Hispanic Asian	28.2	(1.9) 0.4 (0.29—0.44)	3.7	(2.7) 1.2 (0.92—1.6)
Hispanic	36.1	(1.0) 0.5 (0.47—0.57)	10.3	(1.2) 1.7 (1.51—1.95)
Other	41.6	(1.8) 0.7 (0.56—0.77)	13.4	(2.8) 1.8 (1.42—2.38)
Completed Education (age ≥25 years)				
Less than High School	39.9	(1.2) 0.6 (0.56—0.70)	12.0	(1.4) 1.8 (1.56—2.05)
High School graduate	44.9	(0.8) 0.8 (0.72—0.85)	9.8	(1.3) 1.5 (1.37—1.70)
Some College	50.7	(0.7) 1.0 (0.92—1.08)	10.7	(1.1) 1.6 (1.43—1.72)
College graduate	50.8	(0.7) 1.0	8.4	(1.2) 1.4 (1.29—1.56)
Family Income-Poverty Ratio (PIR) <sup>  </sup>				
PIR <1.0	43.5	(1.1) 0.8 (0.73—0.89)	12.6	(1.3) 1.9 (1.64—2.12)
1.0 PIR <2.0	46.0	(1.0) 0.9 (0.82—0.98)	10.9	(1.3) 1.6 (1.43—1.83)
PIR ≥2.0	48.6	(0.6) 1.0	10.1	(0.8) 1.5 (1.43—1.64)
Marital Status				
Married or living with partner	47.9	(0.6) 1.0	9.2	(0.8) 1.5 (1.38—1.58)
Not married or living with partner	46.3	(0.6) 0.9 (0.88—0.99)	11.6	(0.9) 1.7 (1.55—1.83)
Health Status				

Characteristics	Prevalence (2014)		Change in Prevalence (2008 and 2014)	
	%	OR (95% CI)	%	OR (95% CI)
Good to excellent	47.3 (0.5)	1.0	10.1 (0.7)	1.5 (1.46–1.65)
Fair to poor	47.2 (1.0)	1.0	10.0 (0.92–1.09)	1.5 (1.37–1.71)
Health Care: Usual place				
Yes	48.0 (0.5)	1.0	10.0 (0.7)	1.5 (1.44–1.62)
No	42.3 (1.1)	0.8 (0.71–0.86)	10.4 (1.4)	1.7 (1.45–1.94)
Health insurance				
Yes	47.9 (0.5)	1.0	9.9 (0.7)	1.5 (1.43–1.62)
No	43.0 (1.0)	0.8 (0.74–0.89)	10.3 (1.3)	1.7 (1.46–1.90)
Deferred medical care due to cost				
Yes	47.0 (1.1)	1.0	10.6 (1.6)	1.6 (1.37–1.81)
No	47.3 (0.5)	1.0	10.0 (0.7)	1.5 (1.45–1.64)
Region				
Northeast	45.1 (1.2)	0.8 (0.76–0.95)	11.6 (1.7)	1.7 (1.45–1.92)
Midwest	47.6 (1.0)	0.9 (0.85–1.05)	7.8 (1.3)	1.4 (1.24–1.56)
South	49.0 (0.7)	1.0	11.9 (1.1)	1.7 (1.52–1.84)
West	45.7 (0.9)	0.9 (0.79–0.96)	8.5 (1.2)	1.4 (1.29–1.62)
History of Heart Attack (MI)				
Yes	51.4 (2.2)	1.2 (1.00–1.44)	7.3 (2.8)	1.3 (1.05–1.67)
No	47.1 (0.5)	1.0	10.2 (0.7)	1.6 (1.47–1.65)
History of CHD				
Yes	55.1 (1.9)	1.4 (1.21–1.65)	9.2 (2.7)	1.5 (1.16–1.83)
No	46.9 (0.5)	1.0	10.2 (0.7)	1.6 (1.46–1.65)