
ISyE 2028C – Basic Statistical Methods - Fall 2015
Bonus Project: “Big” Data Analytics
Final Report

Waiting time in emergency room

Abstract

I would like to perform a study on average waiting time in emergency room in USA. Going to the emergency room is never fun. Especially when you consider how much time you spend there. I believe many of you had an experience of suffering in ER to receive immediate care. As you know, it is almost impossible to get immediate care unless you have suffered life-threatening injuries like as heart attacks. So I want to analyze how much the system has been improved over time.

Analysis

The chart below represents that average number of minutes spent and change in average number of minutes spent from 2008 to 2009.

Mean: 247 minutes, Variance: 2689.714, Standard deviation: 51.862

The chart shows that in 2009, patients spent an average of 4 hours and 7 minutes in ER.

Utah is the worst state, people spent over 8 hours for receiving help.

The bottom five states are Kansas, Arizona, New York and Mississippi.

The best state is Iowa with average waiting time of 175 minutes.

Difference between 2008 and 2009

Mean: 4.98 minutes, Variance: 390.458, Standard deviation: 19.760

Average number of minutes spent in U.S. emergency departments

Rank	State	2009 Average Number of Minutes Waited	Change in Average No. of Minutes Waited from 2008 to 2009
1	Iowa	175	-7
2	South Dakota	179	7
3	North Dakota	187	1
4	Nebraska	188	7
5	Minnesota	191	1
6	Idaho	194	19
6	Montana	194	8
8	Wyoming	195	18
9	Wisconsin	197	1
10	Hawaii	204	-8
10	Maine	204	3
12	Vermont	207	5
13	Indiana	214	-5
14	West Virginia	215	13
15	Louisiana	225	-11
16	New Hampshire	227	23
16	Oregon	227	-12
18	Tennessee	228	6
19	Oklahoma	233	17
20	Arkansas	234	18
21	Missouri	236	3
22	Pennsylvania	237	-2
23	Ohio	239	3
24	Colorado	241	-1
25	Illinois	241	-8
26	Massachusetts	244	-4
26	New Jersey	244	-3
26	Texas	244	-14
29	Connecticut	247	0
30	Alabama	248	0
30	Michigan	248	-8
32	Georgia	249	-11
32	Kentucky	249	5
34	Washington	250	0
35	Alaska	256	6
35	North Carolina	256	-5
37	Nevada	262	-66
37	Virginia	262	-1
39	Florida	264	3
40	California	274	2
40	South Carolina	274	0
42	Delaware	275	33
43	Rhode Island	284	3
44	New Mexico	285	-8
45	Maryland	292	30
46	Mississippi	296	41
46	New York	296	18
48	Arizona	329	19
49	Kansas	343	21
50	Utah	497	89

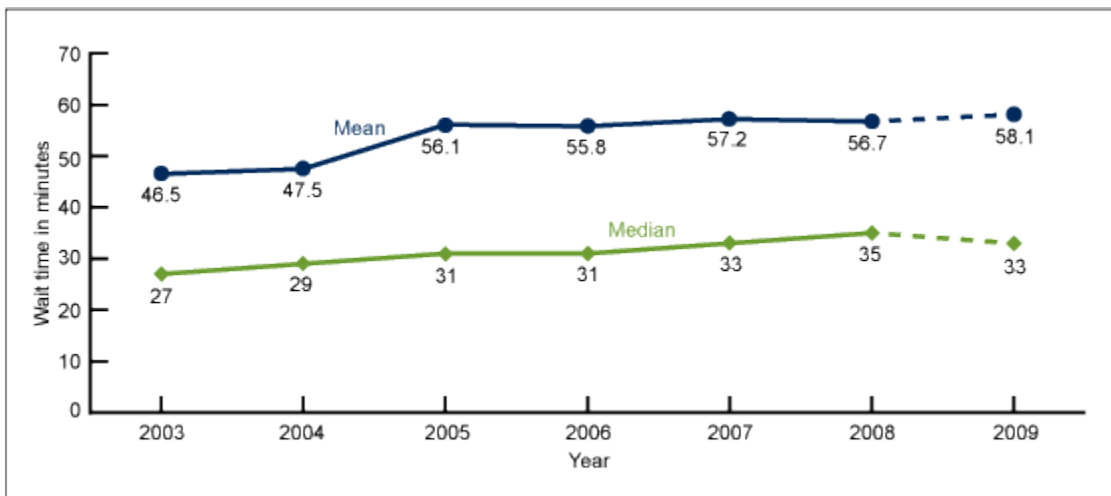
I found that the average waiting time spent in ER had been increased 4.98 minutes from 2008.

The emergency room system has not been improved, even worse.

I collected more information to see how it had been changed over time.

Has wait time for treatment in EDs increased?

- Between 2003 and 2009, mean wait time to see a provider increased 25%, from 46.5 minutes to 58.1 minutes.
- Because wait time is highly skewed, that is, a small percentage (5%) of visits have very long wait times (greater than 3 hours), median wait time is less affected by the skewed distribution and provides an alternative way of describing ED wait time.
- Between 2003 and 2009, median time to see a provider increased 22%, from 27 minutes to 33 minutes.



-The figure above represents that mean and median emergency department wait time to see a provider.

In 2009, ED wait time data were reported for visits seen by a physician, physician assistant, or nurse practitioner ($n = 30,904$). Prior to 2009, only wait time to see a physician was reported. The trend in mean wait times was minimally affected by the wording change; the 2009 mean wait time to see a physician (57.2 minutes) was not statistically different from mean wait time to see a physician, physician assistant, or nurse practitioner (58.1 minutes). The median wait time to see a physician (33 minutes) was also not affected by the wording change in NHAMCS. In this report, wait times were not presented for visits not seen by a physician, physician assistant, or nurse practitioner (4.1%).

Conclusion

The result that I expected to see was that the mean wait time in ER had been decreased over time. However, the result was different from what I expected. From 2003 through 2009, the mean wait time in U.S. emergency departments (EDs) increased 25%, from 46.5 minutes to 58.1 minutes. Also, the average waiting time spent in ER had been increased 4.98 minutes from 2008. As the result of this study shows that the average time spent in ER has not been improved. I used five numerical summaries, chart, and graph to analyze the data.

References

1. Esther, Hing, and Bhuiya Farida. "Wait Time for Treatment in Hospital Emergency Departments: 2009." *Centers for Disease Control and Prevention*. Centers for Disease Control and Prevention, 28 Aug. 2012. Web. 01 Dec. 2015.
2. Goldschein, Eric. "The Average ER Wait Time Reached A New U.S. Record In 2009." *Business Insider*. Business Insider, Inc, 03 Nov. 2011. Web. 01 Dec. 2015.