

# Variation in Temperature and Barometric Pressure on STEMI Occurrence

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## Abstract

Warner Robins' Houston Health Care treats approximately 100 STEMI patients every year. The cardiologists involved in the protocol have noticed a variation of occurrence depending on the season. An increase in the number of STEMI patients have been observed in the winter and less during summertime. A large national study, Seasonal and circadian variation of acute myocardial infarctions (MI), observed seasonal variations predominantly in the warmer southern states when compared to the colder northern states. Although seasonal variations contributing to more myocardial infarction events have been shown in the winter, the pathophysiology of the impact of cold temperatures on STEMI occurrence is not known. Even though we know that external stressors could trigger heart attacks, it is not clear how variation of temperature could be related to an increase of STEMI.

## Background

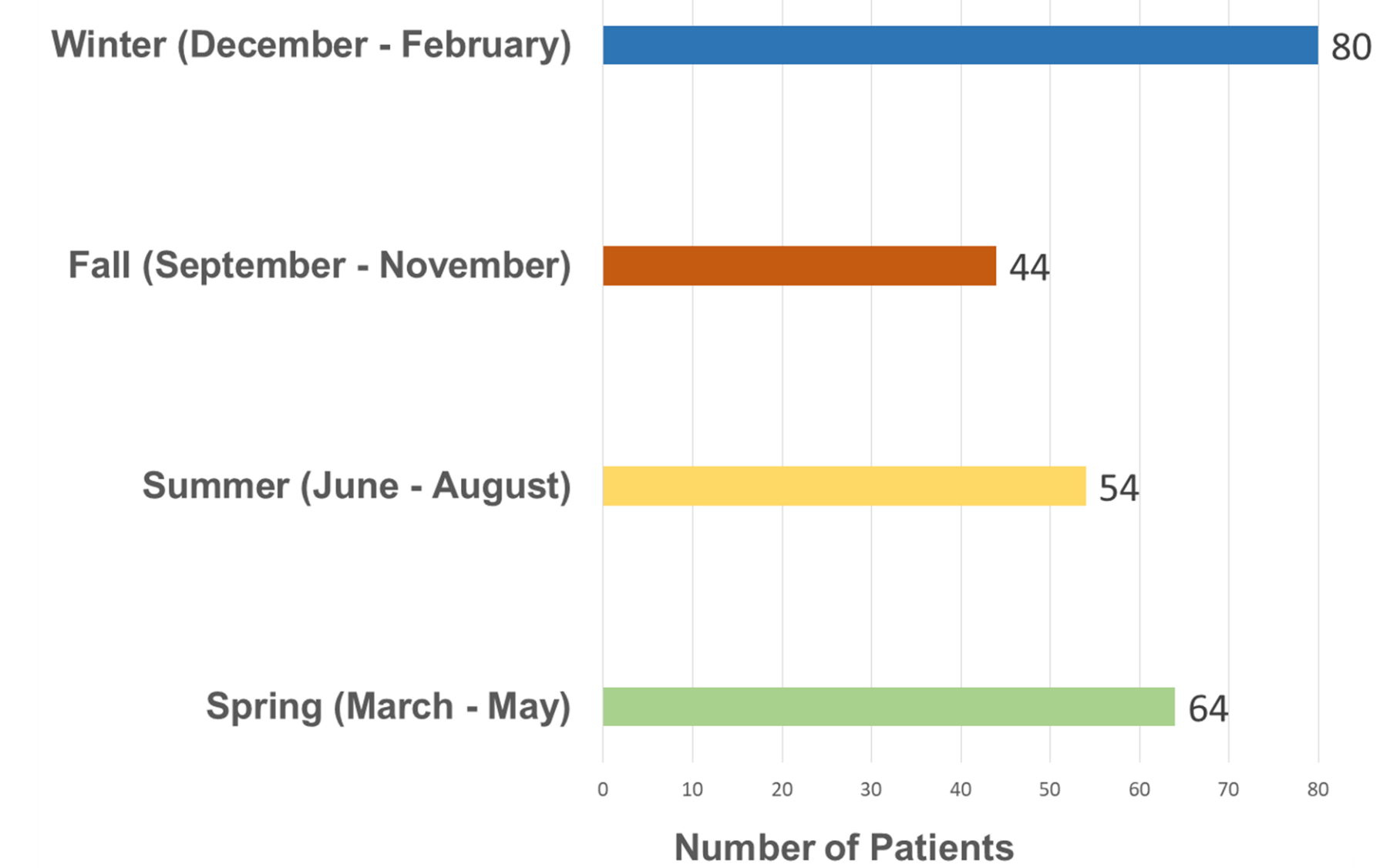
Even if a couple of studies showed that environments stressors can trigger myocardial infarction, there is not a real correlation between low temperatures and pathophysiology of heart attack. This study address the season related STEMI observed in Warner Robins, GA from January 2014 to April 2019.

## Methods

A retrospective analysis was conducted utilizing patients who were admitted for STEMI requiring intervention at the Warner Robins Houston Health Care catheterization laboratory. Data of 242 patients who were admitted from January 2014 to April 2019 was collected. The temperatures and barometric pressures of the day of STEMI occurrence, from January 2014 to April 2019, were collected from the meteorology institute.

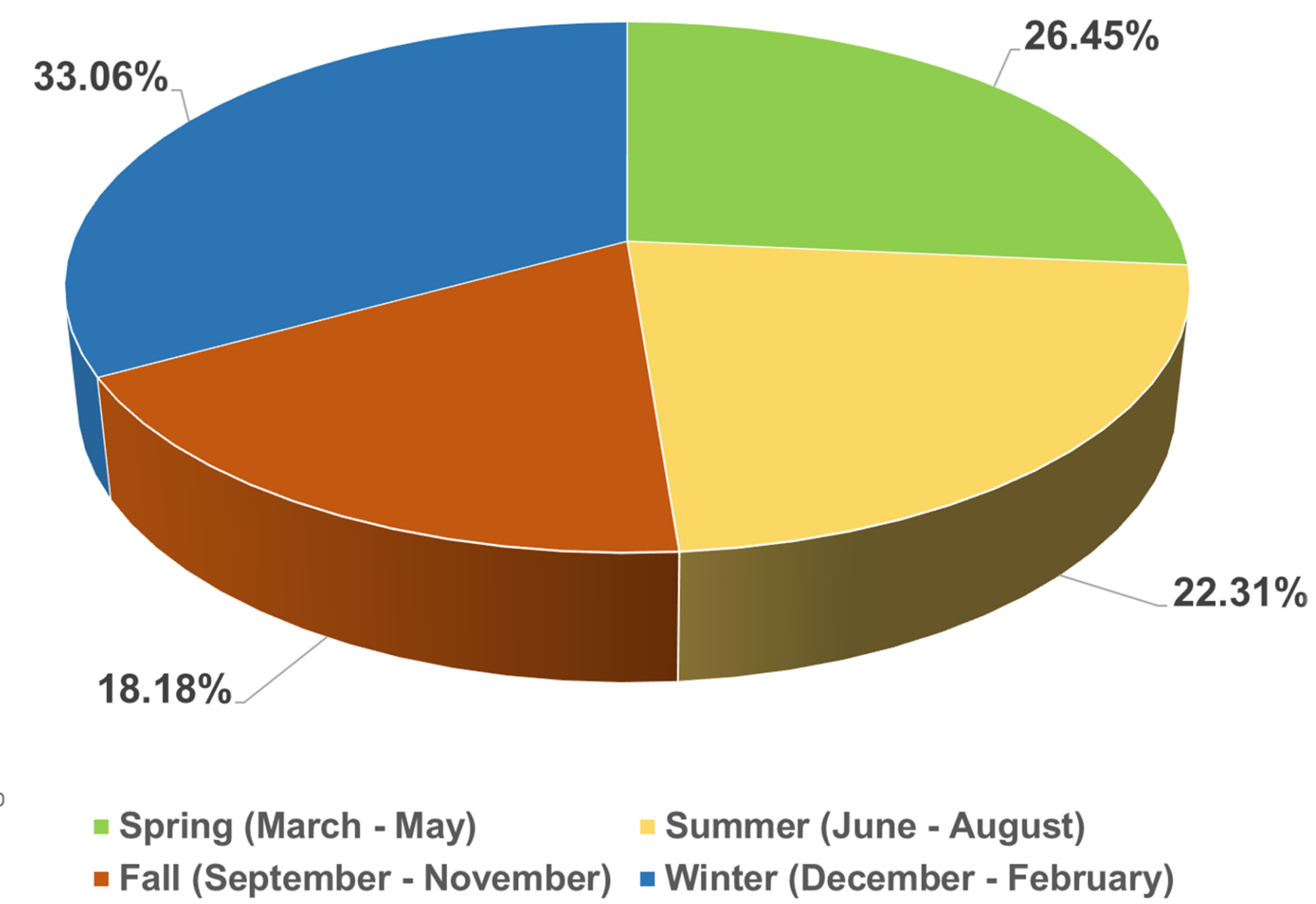
## Results

### Season related myocardial infarctions



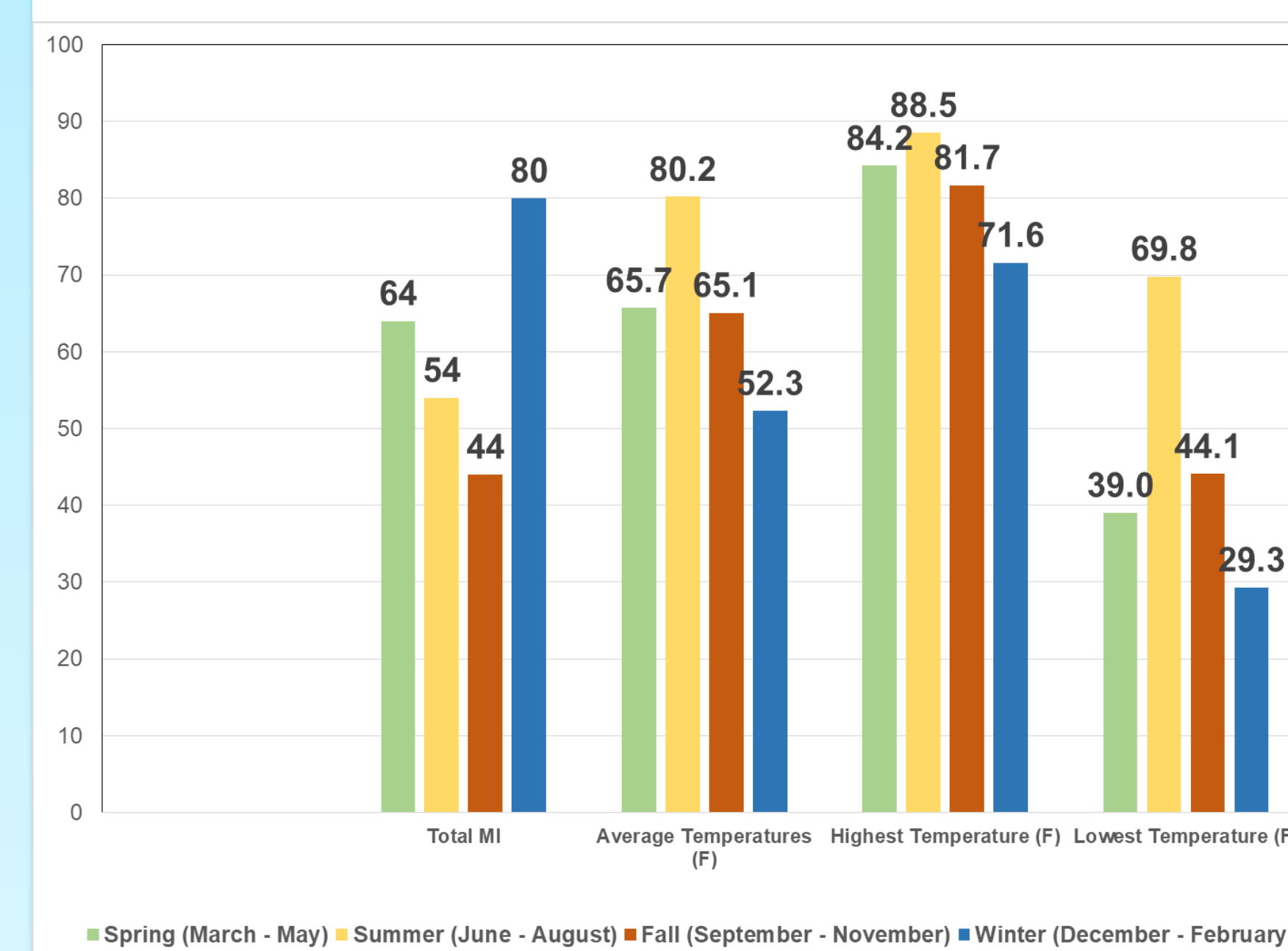
**Figure 1. Myocardial infarctions at Houston Medical from 2014 to 2019.**

Myocardial infarctions requiring heart catheterizations was observed more in the winter compared to the other seasons. 80 patients in the winter had MI whereas 64, 54, and 44 patients had a MI in the spring, summer, and fall respectively.

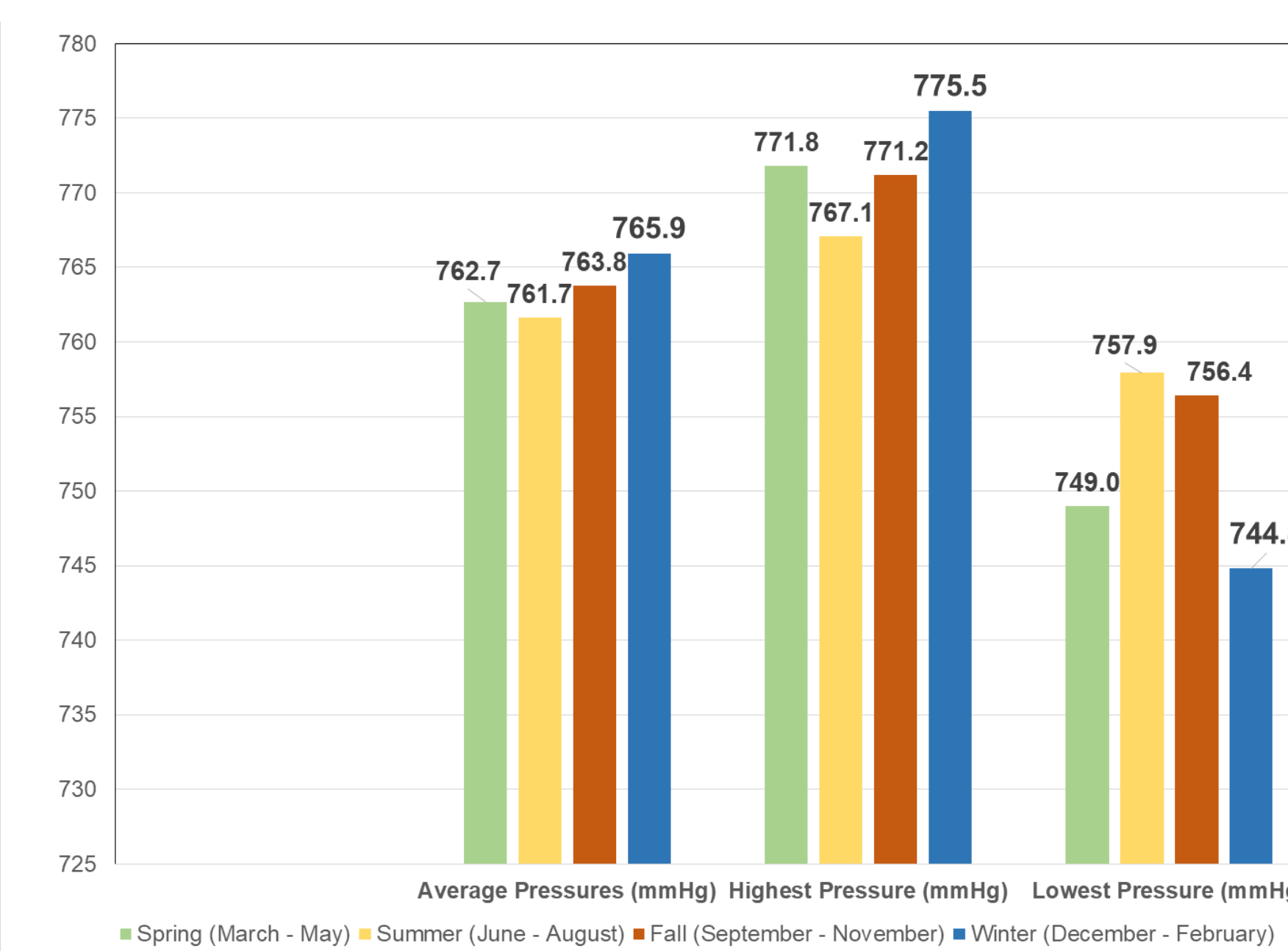


**Figure 2. Percentage of myocardial infarctions during the four seasons.** 33.06 percent of myocardial infarctions occurred during the winter season compared to 26.45%, 22.31%, and 18.18% in the spring, summer and fall respectively.

### Temperatures and Barometric Pressures



**Figure 3. Average temperatures.** The lowest average temperature was observed in the winter compared to the highest in the summer. 52.3 degrees and 80.2 degrees Fahrenheit respectively.



**Figure 4. Average barometric pressures.** The highest average pressure was observed in the winter compared to the lowest in the summer; 765.9 mm Hg and 761.7 mm Hg respectively.

Winter which is associated with lowest temperatures and highest barometric pressures showed an increase in the incidence of STEMI. The opposite was observed during summertime.

## Discussions

The mechanism and pathophysiology associated with higher incidence of STEMI during coldest seasons remains unknown. In addition, higher barometric pressures were also observed in the colder temperatures, and may also have an impact on the occurrence of STEMI during the colder seasons. Although the number of patients involved in this study is minimal, a previous study involving 41,774 patients observed similar variations when comparing the effect of warm and cold seasons on STEMI occurrence. The association of STEMI, cold temperatures and high barometric pressures might allow us to prevent the higher risk of occurrence of myocardial infarctions. While further studies are required to validate these connections, screening and correcting cardiovascular risk factors still remains the key to preventing myocardial infarctions.

## Conclusion

Environmental stressors were shown to have an impact on the occurrence of STEMI event. Since we cannot change the course of the seasons and given the increased impact of the global warming on the environment, could we anticipate and prevent the occurrence of STEMI associated with the variation of temperatures and barometric pressures?