



Documentary Film Festival this week

How big is the crowd in Philadelphia?

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Crowds gathered on Benjamin Franklin Parkway Sunday for a Mass to be celebrated by Pope Francis in Philadelphia.

By Matt Rocheleau

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How big is the crowd in Philadelphia? Heaven only knows.

The pope's outdoor Mass Sunday has been billed by the mayor as the largest event in the city's modern history, and organizers are expecting as many as 1.5 million people to attend.

But it will likely be tough for security officials and organizers to come up with an accurate crowd count, an expert said.

“The people who take care of security and so on — they overestimate because they want to say ‘look at how many people we had to take care of,’” said Farouk El-Baz, an expert on crowd estimation and the director of Boston University's Center for Remote Sensing.

“And the people who organize it tend to overestimate because it makes their event seem more successful,” he said.

To calculate the most accurate number possible would require taking aerial photographs of the crowd at one point in time, superimposing those photos over a map of the area divided into equal sections, assessing the crowd's density, and making assumptions about how many people typically stand in one area.

But such an undertaking is labor-intensive and still relies on estimation and subjectivity. And other challenges can arise — trees, other tall structures, and the shadows they create can hide people in the photographs, while short people and children can be hard to spot.

“Counting the number of people congregating for an event in an open area results only in an estimate, not an exact number,” El-Baz said in a [Q&A](#) he published ahead of Francis' arrival to the US.

El-Baz first employed the approach when he and other researchers from his center counted sand dunes in the desert using satellite images.

They later used it [to help solve a controversy](#).

On Oct. 16, 1995, huge crowds descended on the National Mall in Washington D.C. for the “Million Man March,” a gathering consisting of primarily black men aimed at encouraging them to become

The advertisement is for the Institution for Savings, a financial institution. It features a green and white color scheme. The main headline reads "Great Rate. Don't Wait." in a large, bold, serif font. Below this, it states "Loans up to \$2 Million. No Points*!" in a smaller font. A prominent green box on the right side contains two interest rates: "3.750% interest rate" and "3.788% APR*", with "30-Year Fixed Rate Residential Mortgage" written below them. A small button with the text "*Click here for more information." is located below the headline. At the bottom, the Institution for Savings logo is displayed, featuring a small illustration of a building and the text "INSTITUTION FOR SAVINGS BUILDING STRONGER COMMUNITIES TOGETHER SINCE 1820.".

leaders in their families and communities.

While organizers estimated the turnout was between 1.5 and 2 million, the National Park Service estimated that only 400,000 people were there, drawing criticism and even the threat of litigation.

El-Baz and a group of 10 associates and graduate students spent a week meticulously poring over digitally enhanced negatives of 35 mm photographs to come up with an estimate. The research team concluded that the crowd size was somewhere between 670,000 and 1 million, though its best estimate was 837,000.

Since then, the National Park Service has stopped providing crowd estimates, and other agencies have followed suit, particularly for politically related gatherings.

El-Baz said in a telephone interview Friday that it's important to get crowd estimates right, since the numbers say something about people's support for an issue. He encouraged those seeking as much accuracy as possible to follow his methodology.

But he also noted that usually — even people who might be motivated to undercount or overcount turnout a bit — are not far off with their estimations.

“It will usually be in the ballpark because they cannot exceed what is reasonable,” said El-Baz.

Matt Rocheleau can be reached at matthew.rocheleau@globe.com. Follow him on Twitter [@mrochele](https://twitter.com/mrochele)

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