



How Many Gaza Palestinians Were Killed by Hamas Rockets in May? An Estimate

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EXECUTIVE SUMMARY: Much of the coverage and commentary surrounding the fighting in May between Hamas and Israel has focused on numbers, especially the much larger number of Palestinians than Israelis killed. The number of deaths is actually very low for such an intense conflict, a testament to Israel's Iron Dome and civil defense systems, and its use of precision weapons and warnings aimed at minimizing Palestinian civilian deaths. Of course, Hamas aims to kill as many Israeli civilians as possible, but its rockets place both Israelis and Palestinians in peril, because many of those rockets—in this case 680—misfire and explode inside Gaza. The death and destruction caused is, of course, usually blamed on Israel. The question addressed here is how many Palestinians are likely to have been killed by these errant Palestinian rockets in May. The estimate arrived at is 91, amounting to 36% of the alleged Palestinian death toll.

Numbers were at the heart of much of the coverage and commentary surrounding the fighting in May between Hamas and Israel. One example was the front page [New York Times](#) story and photo spread about the number of (mostly) Palestinian children killed. The images were accompanied by charges that because more Palestinians died, Israel must have used disproportionate force and therefore committed a war crime. By this logic, Nazi Germany was the victim in WWII and the US the unlawful aggressor, because 14 times more Germans than Americans were killed.

Beyond this, if one looks at the numbers from the May conflict more closely, they tell a very different story from that propounded by Hamas and most media outlets.

First, some baseline facts. In the 11 days of fighting between Israel and Gaza, Hamas and similar groups launched at least 4,360 rockets and mortar bombs (rockets, for short) at Israel. Of those, 3,573 penetrated Israeli airspace, 280 landed in the Mediterranean, and a significant 680 fell short and landed in Gaza (according to the [Intelligence and Terrorism Information Center \[ITIC\]](#)).

The obvious question arises: How many deaths in Gaza were caused by those 680 errant Palestinian rockets? Hamas might know, but of course it isn't saying.

So estimates will have to do. As explained below, an analysis of the best information currently available indicates that about 91 Palestinians were probably killed by off-course Palestinian rockets.

To arrive at this estimate, let's first look at the Palestinian targeting of Israel. Of the rockets headed for Israel, about 1,963 were ignored by Israel's Iron Dome missile defense system after calculations showed they would miss populated and other sensitive areas, 1,450 were judged to be a threat and were intercepted by Iron Dome, and about 160 were missed by Iron Dome and hit protected areas.

This is extrapolated from the ITIC numbers above and from data published by [Edward Luttwak](#) regarding the number of projectiles missed by Iron Dome and that hit protected areas. A report by [The Institute for National Security Studies](#) at Tel Aviv University published numbers similar to Luttwak's.

Thirteen Israelis were killed in the fighting, but [not all the deaths were directly due to rockets or mortars](#). One of the Israeli victims was an IDF soldier stationed near the border who was killed when an anti-tank weapon hit his Jeep, and three Israeli civilians died after falling while running toward bomb shelters. Thus, nine Israelis were killed as a direct result of mortar or rocket attacks, which gives a measure of the lethality of the Palestinian projectiles. (Also note that it is a sign of how seriously Israelis take civil defense that three people were killed running toward a shelter).

On the Palestinian side, as of May 27 a total of 256 Palestinians were listed as killed in the fighting, according to the [UN Office for the Coordination of Humanitarian Affairs](#).

There is direct evidence that some of these Palestinian deaths were caused by errant Palestinian rockets and mortars that fell in Gaza rather than in Israel. The NGO Defense for Children International-Palestine (an extremely anti-Israel organization) [tweeted](#) on May 11 that on the previous day, a Palestinian rocket landed in Jabalya in northern Gaza that killed eight Palestinians, including two children.

In another tweet, the same organization noted an [explosion, also on May 10, in Beit Hanoun](#) in which six Palestinian children and two adults were killed, though it could not confirm the cause. According to ITIC, those deaths too were [caused](#) by a Palestinian rocket that went astray.

That 16 Palestinians, including eight children, were killed in just one day by two errant Palestinian rockets underscores just how dangerous these projectiles are. Considering that 680 Palestinian rockets and mortars landed inside Gaza during the 11 days of fighting, this one-day toll suggests that a significant number of Gaza residents were killed by those weapons.

To really know how many would require evidence like radar intercepts, eyewitness testimony, and forensic examination of specific locations for each incident, none of which is ever likely to be available. In addition, Hamas has been known to remove evidence from sites where its own rockets caused the damage.

Despite these difficulties, it is possible to come up with a rough estimate based on existing data:

1. We can estimate the average lethality of Palestinian projectiles that were missed by Iron Dome and landed in populated areas. This number is then used in a first estimate of the number of deaths in Gaza from the 680 Palestinian rockets that landed there.
2. In calculating deaths in Gaza due to errant rockets, a possible correction factor should be employed because Gaza has a much higher population density than Israel.
3. Israel has a very effective civil defense system that uses early warning sirens and app alerts to notify people of rockets heading their way so they can rush to a shelter. There are concrete shelters along highways and on roads in Israeli cities close to Gaza, and many homes in Israel have reinforced safe rooms. All new construction is required to have such rooms, and many older homes have been retrofitted at government expense. These measures greatly minimize casualties even for rockets that explode in populated areas and create a further correction factor when comparing to deaths that would be caused by similar rockets falling inside Gaza.

One way to estimate the impact of Israel's civil defense is to look at the early stages of the Second Lebanon War (2006), which included sustained rocket fire by Hezbollah into Israel. This was before Iron Dome, and at a time when Israel's civil defenses were not as robust as they are today. At the start of the

conflict, Israel's early warning system to alert people to seek shelter was [not working very well](#), which reduced the system's effectiveness. We will use this period as a rough proxy for Gaza, which has no civil defense system.

Over the first three days of the 2006 conflict, 367 rockets landed in Israel, causing four deaths. This gives an RPF (rockets per fatality) of $367/4$, or almost 92.

In the recent conflict with Gaza, Israel did have Iron Dome, but we can correct for that and determine the effect of civil defense alone by estimating how many Israelis would have been killed by rockets had Iron Dome not been present. Because Iron Dome shot down 1,450 threatening rockets but missed 160, and nine people were killed, the number who would likely have been killed without Iron Dome is approximately $9 \times (1,450+160)/160$, or about 91.

We can thus determine that the RPF without Iron Dome would have been $3,573/91$, or about 39.

Therefore, the effect of civil defense in saving lives (i.e., the civil defense factor) can be estimated as $92/39$, or about 2.4.

It should be noted that there have been other estimates of the impact of Israeli civil defense. According to [The Effectiveness of Rocket Attacks and Defenses in Israel](#) (Armstrong 2018), that factor is as high as 8.8, while according to [Mass Casualty Potential of Qassam Rockets](#) (Zucker and Kaplan, 2014, a study that looked specifically at the Israeli city of Sderot, which is adjacent to Gaza), the factor was between 3 and 9.

As a very conservative estimate, we will use the figure calculated above of 2.4, meaning that without Israel's civil defense measures, casualties and deaths would have been at least 2.4 times higher.

We start by calculating, before any correction factors, the probable death toll from 680 errant rockets based on the lethality of the 160 rockets that landed in populated areas in Israel. This number is: $680/160 \times 9$, or just over 38.

Now we consider whether a correction factor is needed for the difference in population density between Gaza and Israel. According to [data](#) from the Palestinian Central Bureau of Statistics, the population density of Gaza is 5,772 people per square kilometer. According to Israel's [Central Bureau of Statistics](#), Israel's population density is 402 people per square kilometer (of land).

However, because we're looking at rockets that landed in populated areas in Israel, the relevant number is the [population density](#) for typical Israeli communities that have been targeted by Hamas rockets, such as:

Community	Population Density
Lod	6,375.4
Ashdod	4,864.0
Sderot	4,378.2
Ashkelon	3176.1

Because these are roughly comparable to the population density for the whole of Gaza, as a first approximation we omit a correction factor for population density.

Next we apply the civil defense correction factor, giving the final result: $38 \times 2.4 =$ just over 91.

Recalling that on the first day of fighting 16 Palestinians were killed by Palestinian rockets and mortars, it is plausible to extrapolate an estimate that in 11 days of fighting, 91 Palestinians would be similarly killed.

There are several other factors and some possible improvements to be considered.

1. Buildings that collapse due to nearby explosions cause extra deaths. This is significant because many buildings in Gaza may have been undermined by Hamas tunneling, adding to their inability to withstand shaking and increasing the Palestinian death toll.

In at least one case an Israeli bomb targeting a Hamas tunnel is believed to have caused such a [collapse](#) of an adjacent building, causing over 20 deaths.

However, it does not seem possible to account for these differences in a quantitative way, so they are ignored in the above analysis.

2. From long and unfortunate experience with wars and Palestinian terrorism, Israel has developed [a world-class system for dealing with life-threatening injuries](#), meaning that a significant portion of the Israelis who sustained serious wounds in the current round of fighting would have died with the lower level of trauma care typical in Gaza.

This would again increase the estimate of Palestinian deaths, but as with the building factor, it does not seem possible to account for this difference in a quantitative way, so it is ignored in the above analysis.

3. It would be helpful if Israel released information on the number and types of mortars and rockets fired from Gaza, and their intended targets (such information has sometimes been released in the past). These data would enable a more precise calculation of the population density correction factor.
4. It is possible that Israel knows, via radar intercepts and other sources, details of what types of Palestinian projectiles went astray, and where and what they hit in Gaza. This information would allow a definitive accounting of the casualties caused by errant Palestinian projectiles.

However, if such data exists, publicizing it might reveal sensitive sources and methods, so its release seems unlikely.

5. If Hamas insists on attacking Israel, the least it could do is use some of the large amounts of foreign aid it has received (for example, the [\\$2.7 billion pledged in 2014](#)) to build, as Israel has, civil defenses to protect its population. Instead, it has devoted almost all its efforts to attacking Israel with weapons such as rockets, mortars, incendiary balloons, snipers, and anti-tank rockets.

But perhaps its greatest spending has been on the construction of extensive tunnels and facilities under Gaza to hide its fighters, leaders, arms caches, and rocket launchers. Each mile of tunnel is [estimated to cost](#) \$800,000. Up to 2014 alone, it was estimated that [Hamas had spent over \\$1.25 billion](#) on tunnel construction.

Consider how much good could have been done for the Palestinian people of Gaza had that money been spent on civilian development. Instead, even though Hamas knows full well that attacking Israel will provoke a response, rather than providing protection for Gaza's civilians Hamas digs tunnels underneath those civilians—in fact, hides behind them—at enormous cost.

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