

THE BEGIN-SADAT CENTER FOR STRATEGIC STUDIES
BAR-ILAN UNIVERSITY
Mideast Security and Policy Studies No. 91

The Missile Threat from Gaza: From Nuisance to Strategic Threat

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Bar-Ilan University, Ramat Gan 52900 Israel
www.besacenter.org
ISSN 0793-1042
December 2011

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This research paper was supported by the
Greg Rosshandler Family

The Missile Threat from Gaza: From Nuisance to Strategic Threat

*Uzi Rubin**

INTRODUCTION

When the first Qassam rocket landed in the town of Sderot in October 2001, few observers, if any, perceived it as the harbinger of a protracted and increasingly furious campaign by the radical Palestinian groups in Gaza against Israel's population centers adjacent to the Gaza Strip (the so called "Gaza envelope" communities) by ballistic weapons. This campaign, in the ensuing eight years, would see the firing of close to 5,000 rockets and 2,500 mortar bombs, killing 27 people,¹ causing heavy economic losses and leading to partial evacuation of residents. It would swell to such intolerable proportions as to compel the State of Israel to embark on a high intensity offensive that threatened regional stability, jeopardized its peace agreements with neighboring countries and eroded its international status.

In hindsight, the scant attention paid to the campaign at its onset in 2001 is easy to justify against the backdrop of violence of the Second Intifada and the suicide terror offensive raging at the time through the heart of Israel's major cities, an offensive which reached its peak in April-May 2002. This absorbed all the attention of the general public as well as Israel's political and military leadership. The few hits, the negligible damage and the insignificant casualties inflicted by the primitive rockets launched at the time from Gaza were justifiably regarded as a minor nuisance compared to the ongoing terror campaign against Israel's traffic, public transportation, shopping malls and civic centers. Daily life in the border town of Sderot – the town

*The author was head of the "Arrow" defense program against long-range missiles in the Israel Ministry of Defense. This paper is an updated version of an original Hebrew study, published in January 2011 by the Begin-Sadat Center for Strategic Studies (BESA Mideast Policy and Security Studies No. 87).

that would be subsequently hit by more rockets than any other community – was calmer and more secure at the time than metropolitan areas like Netanya, Hadera or Jerusalem.

It is more difficult, however, to explain the continued lack of attention to the Gaza rockets after Operation Defensive Shield in April 2002, which broke the momentum of the Second Intifada and led to a gradual but steady decline in its ferocity. It would be reasonable to assume that the declining number of suicide attacks on the one hand and the escalating number of rocket attacks on the other hand would eventually redirect public and government attention to the threat coming from Gaza, a threat rapidly growing in volume, range and lethality. During the peak of the suicide offensive from the West Bank, only 35 rockets were fired from Gaza. In comparison, when the suicide offensive was clearly petering out in 2004, the number of rockets from Gaza grew eightfold to 281 confirmed impacts. In 2006, Gaza-launched rockets first landed in downtown Ashkelon – an occurrence of profound symbolic significance given the declarations of the Israeli leadership during the Oslo Agreement period that there was no danger of Ashkelon being hit by Katyusha rockets from Gaza.² The possibility that the Palestinian groups in Gaza intentionally targeted Ashkelon due to the symbolism of this act cannot be dismissed.

While the Second Intifada was reaching new peaks of violence, the impression within Israel was that of a demoralized society and a clueless leadership. In retrospect, the opposite was true: Israeli society faced the crisis with fortitude and endurance, and its soldiers showed impressive resourcefulness in combating the terror attacks from the West Bank. With the decline of these attacks it was reasonable to expect that the same civil determination and military resourcefulness would be redirected toward the menace of the intensifying rocket offensive from Gaza. This, however, did not occur. For many years, the State of Israel adopted a mixture of ineffective military and civilian measures, controversial policies, and a budget policy which was interpreted at the time as dismissive of the threat and its implications. Moreover, the same Israeli public that withstood so determinately the suicide attacks from the West Bank, demonstrated a

lack of unity and determination in contending with the Gaza rocket campaign.

The political leadership chose to trivialize the seriousness of the threat. In a notorious statement from 2005, Dov Weisglass, a senior advisor to Prime Minister Ariel Sharon, referred to the rockets launched during that period as "flying objects" and declared that "in terms of national risk management, they do not constitute a significant factor."³ The defense establishment, too, chose to tone down the severity of the threat and the wider implications of the Gaza rocket offensive. In an interview with *Ynet* news in early 2006, Koby Toren, then Director General of the Ministry of Defense, dismissed the Qassam rockets as a mere "psychological threat" due to their low lethality.⁴ It is reasonable to assume that he was representing the position of Israel's high command at the time. Such statements by senior government officials did not raise any outcry and were seemingly accepted by the public.

One particularly surprising finding of this study is that the threat's significance was trivialized as well by the local leadership in the afflicted communities – this was done for various reasons, both rational and emotional. It seems that in the first three years of the rocket attacks against southern Israel there existed an informal yet strong coalition of local and national leaders whose purpose was to downplay the severity of the rocket attacks and their consequences. With rocket fire disrupting and endangering life and property in the Gaza envelope communities, particularly in Sderot, and with the first signs of residents abandoning their towns and villages, Israeli Prime Minister Ehud Olmert still found it expedient to voice his objection to the provision of shelters for the threatened residents with his now infamous statement: "We will not shelter ourselves to death."⁵ Only when the rate, range and accuracy of the rocket fire started to exact an intolerable price in casualties, damages and disruption of daily life were some concreate measures taken – some slow and ineffective, others quick and helpful – to contend with the threat.

The response measures taken by Israel had two goals: First, to stop the rocket fire or at least reduce its intensity, and second, to minimize its casualties. To achieve the first objective, the Israel Defense Forces

(IDF) launched air strikes against the rocket production facilities and against the launching teams, invaded and occupied nearby launching areas and used artillery fire against the more distant ones. To realize the second objective, a civic alert system ("Color Red") was established, protective shelters were built for pedestrians, and public institutions and residences were structurally shielded. At the same time, active defense – that is, anti-rocket systems that could destroy Gaza rockets in flight – was shunned repeatedly until about five years into the campaign when the shock of the Second Lebanon War prompted Israel's incumbent minister of defense to initiate the development of an active defense system against short-range rockets. The failure to do so earlier is another indication of the low significance attributed to the rocket campaign against the south of the country by the political leadership of the time.

There is no doubt that in the race between the rocket offensive, with its ever increasing volume, range and lethality, and Israel's responsive and preventive measures, the rocket offensive had the upper hand. By the end of 2008, the situation came to a head and Israel was compelled to launch a powerful military offensive in order to change the situation on the ground. At the time of writing, there is a lull – but not a total cessation – of rocket attacks, and the situation remains fragile, its duration unclear. This partial and probably temporary lull has been achieved at a heavy political cost to Israel's image and stature in the global arena.

Those very same primitive rockets from the earlier part of the decade, the "flying objects" referred to by Weisglass, have turned out to be one of the gravest strategic challenges ever faced by the State of Israel – the significance of which will only grow with the increase in range and power of the rocket weapons held by the hostile organizations in Gaza. In retrospect, two important questions spring to mind: First, could Israel have crafted an alternative political and military strategy that might have prevented the Gaza rocket offensive from ever being launched? And second, once the rocket campaign began, could Israel have responded to it more effectively?

The first question, that of a hypothetical alternative strategy that would have dissuaded or disabled the Palestinian organizations in

Gaza from firing rockets at Israel, warrants in depth historical research, which is beyond the scope of the present study. Rather, this study focuses on the second question, namely, did the various Israeli governments, the Israeli armed forces, the local leadership and the public act appropriately in facing the rocket fire from Gaza? Were all the necessary and possible steps taken to optimally withstand this trial and to minimize the costs in casualties, property damage and social stress?

Addressing this question has practical and immediate significance. The Gaza rocket campaign is not yet behind us, and is likely to be resumed with greater intensity than before, targeting larger populations in the south and center of the country. Furthermore, renewed fighting could bring hitherto unaffected areas under rocket attack, such as the southern Negev and the Sharon district. While hoping for the best, the lessons of the past must be used to prepare for the worst.

The attrition war along the border of the Gaza Strip has been going on for almost a decade, mainly featuring incessant rocket fire from Gaza on the communities of southern Israel. The present study reviews the characteristics of the campaign and its evolution, as well as the Israeli offensive and defensive responses to it. One of the major conclusions derived from a quantitative analysis of the rate of rocket fire from Gaza is that the watershed event that transformed the rocket fire from a nuisance to a strategic threat was Israel's Disengagement from Gaza in August 2005. The quantitative analysis offered in this study shows clearly how, in the wake of this event, a leap occurred in the capability of Palestinian groups in Gaza to manufacture, store, transport and fire rockets into the Gaza envelope communities.

The present study does not offer a comparison of the Gaza rocket campaign with previous attrition wars such as the 1968-1970 attrition war along the Jordan valley or the decades-long attrition war along the Lebanese border. A cursory comparison, however, shows that Israel's overall response to the Gaza rocket offensive ran along similar lines to that of previous attrition wars. Yet, the impression is that the response this time was feeble and less decisive than in previous campaigns – predominantly in the defensive realm. In order to justify

this hesitant response, some of the country's leaders adopted a public stance that trivialized the severity of the offensive against its own citizenry.

The apparent motivation for downplaying the Gaza threat was the priority Israeli leaders assigned instead to the economic recovery following the Al-Aqsa Intifada. This prioritization, however, came at a heavy cost – that of the loss of social cohesion and increased feeling of abandonment by the residents in the attacked areas. While this motivation is understandable, it cannot in any way be condoned. It is the duty of the national leadership to lead the nation rather than merely acting as its bookkeeper.

Israel currently faces a complex and dynamic military threat. The present study commenced during a shaky ceasefire with Hamas (November 2008) that collapsed one month later. The study was concluded about 18 months after Operation Cast Lead, which saw for the first time rocket attacks against large Israeli cities like Be'er Sheva and Ashdod. At the time of writing, Hamas already possessed rockets with a range reaching cities beyond Tel Aviv. Hopefully, then, this study will contribute to overcoming the challenges Israel has yet to face.

For research purposes, interviews were conducted with several senior officials and public figures who were decision makers during most of the surveyed period and whose positions influenced Israel's responses to the Gaza rocket campaign. They are: Lt. Gen. (res.) Dan Haloutz, who served as Commander of the Israel Air Force between 2000 and 2004, Deputy Chief of General Staff of the IDF between 2004 and 2005 and Chief of General Staff of the IDF from 2005 to 2007; Knesset member Shai Chermesh, who was Head of Sha'ar Hanegev Regional Council from 1987 to 2002 and was elected in 2006 to the Knesset as a member of the Kadima party. In both capacities, Chermesh was intimately involved in the debates and decisions pertaining to the rocket campaign against the south; Maj. Gen. (res.) Amos Yaron, Director General of the Ministry of Defense between 1998 and 2008; Alon Schuster, who replaced Shai Chermesh as Head of Sha'ar Hanegev Regional Council in August 2002 and is still serving in this capacity; and Eli Moyal, Mayor of Sderot from 1998 to

2008. All interviewees generously dedicated their time and gave detailed responses, which were invaluable for clarifying numerous points – for this, the author expresses his gratitude to them. Additionally, extensive use was made of the many reports available in the open literature. Two of those sources were particularly useful: the series of reports by the Israel Intelligence Heritage and Commemoration Center (IICC), whose publications shed light on all the operational aspects of the rocket campaign, from the detailed technical descriptions of the rockets themselves to the comprehensive statistical data on the campaign's development and intensity; and the State Comptroller's January 2006 report on the Disengagement: "Population Sheltering of Communities around the Gaza Strip, Decisions and Implementation."⁶

Regrettably, the IDF spokesperson did not respond to a request for cooperation. A further difficulty in collecting materials was the apparent "evaporation" of information. Despite the abundance of sources available on the internet, important details on crucial dates and key events were not accurately recorded and the possibility that many details were intentionally deleted cannot be dismissed, particularly pertaining to quotes by political figures.

The task of collecting and sorting out material was ably and diligently carried out by Mrs. Hila Shalmon, to whom I owe a debt of gratitude.

BACKGROUND: ROCKET WEAPONS WORLDWIDE AND IN ISRAEL

Origins of Artillery Rockets⁷

The use of rockets as weapons of war rather than for entertainment (such as firework shows) probably began in China about 1,000 years ago. In the 17th century, local rulers of India already possessed effective rocket artillery with a range of several kilometers, some with explosive warheads fired from multiple-barrel launchers. The rapid rate of fire achieved by simultaneous launchings ("salvo fire") compensated, to a large extent, for the poor accuracy of each individual rocket. The British, embarking upon the conquest of the Indian sub-continent, were so impressed by the rocket weapon of their local foes that they adopted the idea for themselves. In the 18th century, the British military engineer Sir William Congreve developed an artillery rocket similar to that of the Indians. This weapon was used by the British Army for decades and left its historic mark in the lyrics of the US national anthem.⁸

The rapid development of highly accurate barrel artillery in the 19th century eventually eclipsed the role of rocket artillery. Nevertheless, it was reintroduced by the Soviet Union at the onset of the Second World War since its mass production was cheaper than that of barrel artillery. The Soviet rocket weapons were immortalized in military history by their nickname, "Katyusha", given to them by the troops of the Red Army due to their crushing effect on the Nazi army – a nickname that to this day strikes fear among army veterans and civilians who have experienced first hand the terrifying effects of Katyusha fire. While rocket artillery was also used by other armed forces during WWII (mostly by the US and Germany), the Soviet Katyusha became etched in historical memory as representing, more than any other, this type of weapon. Artillery rockets are today included in the order of battle of most world armies. They were recently used extensively in the short Russo-Georgian War of August 2008.

Rocket Artillery in Israel's Wars

Rocket artillery was first introduced to the Middle East in the mid-1950s as part of extensive military acquisitions from the Soviet Union by Egypt and other Arab states. An early model of the Katyusha was used by the Egyptian Army against the IDF during the 1967 Six Day War. The IDF captured Egyptian Katyusha launchers and ammunition which it later used in the October 1973 War. Shortly afterward, the IDF lost interest in this type of weapon, probably due to its poor accuracy, and removed it from its order of battle. The IDF currently deploys heavy rocket artillery,⁹ but does not purchase or deploy light rocket artillery with a diameter equivalent or similar to that of the Katyusha (122 mm).

Katyushas were first used for terror attacks against Israel when the Palestine Liberation Organization (PLO) fired them from its bases in Jordan toward the communities in the Beit She'an district at the end of 1968.¹⁰ Following the expulsion of the PLO from Jordan in September 1970 ("Black September") and its regrouping in Lebanon, the PLO launched a war of attrition using Katyusha fire against northern Israel, particularly the town of Kiryat Shmona. The intensifying PLO rocket offensive precipitated the First Lebanon War in June 1982, the aim of which was to halt the rocket threat against Israel's northern border.

In the wake of the Lebanon War, Hizballah replaced the PLO, which had been forcibly evicted to Tunisia. In 1985, Hizballah opened a guerrilla campaign against IDF forces in Lebanon, accompanied by persistent rocket attacks on Israel's northern towns. The intensifying Katyusha fire on Kiryat Shmona, Nahariya and other towns in the north, which killed Israeli civilians and caused extensive property damage, elicited two Israeli counteroffensives against Hizballah: Operation "Accountability" in 1993 and Operation "Grapes of Wrath" in 1996. In neither operation did the IDF succeed in halting Hizballah's rocket fire, and both operations ended with a ceasefire brokered by external mediators. Following Israel's unilateral withdrawal from Lebanon in May 2000, Hizballah embarked on a massive buildup of its rocket arsenal, including heavy rockets such as the 250 km-range Iranian-made Zelzal.

A border skirmish instigated by Hizballah in July 2006 escalated into the Second Lebanon War, during which about 4,200 artillery rockets rained down on northern Israel, most of them "Katyushas" (122 mm BM 21 Grad rockets). Over 33 days of fighting, these attacks claimed the lives of 53 soldiers and civilians, injured hundreds, damaged thousands of buildings and compelled about a quarter million Israeli civilians to abandon their homes and head south. In this case too, despite the IDF's efforts, Israel was unable to suppress Hizballah's rocket fire, which continued unabated until the war's end.¹¹

The Use of Artillery Rockets in Other Asymmetric Conflicts

The extensive use of rockets as weapons of terror against population centers has, until recently, been a unique feature of the confrontation between Arab and Palestinian armed factions and Israel. In the last quarter of the 20th century, intense armed struggles were carried out by nongovernmental entities against government forces in several regions of the world, predominantly in northern Ireland (the IRA against the British government), Sri Lanka (the Tamil Tigers against the Government of Sri Lanka) and Afghanistan (Afghan guerillas against Soviet forces; the Taliban against the post-Soviet government and later against NATO forces). All of these confrontations employed terror tactics familiar to Israeli citizens – roadside ambushes, suicide bombings, assaults on buses and airplanes, etc. – but until fairly recently, almost none made significant use of rocket weaponry against civilian populations.

The most intense asymmetric armed struggle took place in Sri Lanka. The Tamil Tigers employed mixed tactics, which included urban terror, guerrilla warfare and conventional warfare between two armies. The organization was exceptionally adept at purchasing arms from abroad as well as resourceful and innovative in developing indigenous weapons such as suicide boats, light aircraft modified for ground attacks and even miniature submarines. The Tigers carried out a particularly ferocious level of urban terror that included assassinating leaders, detonating truck bombs inside government compounds, and killing civilians in suicide bombings. The organization preferred frontal tactics, including direct contact between the guerillas and their targets, rather than using standoff weapons and

other indirect approaches. As far as is known, rockets were seldom if ever used. Towards the insurgency's end, when the Tigers' arms caches were seized, they were found to contain imported, factory-made multiple barrel rocket launchers, probably intended for use in conventional warfare against the government's army. (The booty also included anti-aircraft guns, ground-to-air missiles and, somewhat incredibly, a single battle tank). In addition, sophisticated, independently manufactured weapons were discovered, such as a manned torpedo.¹² The Tamil Tigers could have easily acquired or self manufactured rockets for terror attacks but refrained from doing so.

Similarly, the Irish Republican Army (IRA), in its protracted campaign against British presence in northern Ireland, employed the usual terror tactics including assassinations of public persons, terror bombings within major British cities, and attacks against government centers. Perhaps the most daring operation perpetrated by the IRA was the use of improvised mortars against the residence of the British prime minister at 10 Downing Street in London. Yet, this organization, like its Sri Lankan counterparts, did not use artillery rockets despite having no difficulty in obtaining or developing them.

After the Soviet retreat from Afghanistan in 1989, a bloody civil war erupted, which ended when the Taliban occupied the capital city of Kabul as well as most of the Afghan countryside. Throughout the civil war, both sides made use of the vast weapons arsenal left behind by the retreating Soviet troops, including artillery rockets of various calibers. Kabul was bombed with every type of weapon possessed by the warring sides, including Katyushas similar to those used by the PLO, and later Hizballah, against Israel. Presumably, the decision to use these rockets was based on expediency, as they were abundantly available.

It seems, therefore, that until the onset of the Gaza rocket campaign, the extensive and deliberate use of rockets as weapons of terror against civilians was more typical of Arab and Palestinian nongovernmental entities than other terror groups.¹³ The reason for this, it seems, has to do with geographical factors. First, the population density in Israel offers a large number of big targets that

do not require much precision for hitting them. Second, the aggressors were based in territories inaccessible to Israel (i.e. within Jordan until September 1970 and later on deep inside the sovereign territory of Lebanon). Third, due to their residence within the sovereign territories of host countries, these guerillas had direct access to the seaports and airports of their hosts, which meant they could import as many rockets as they wished without hindrance. The combination of convenient targets and acquisition opportunities gave standoff rocket weaponry a clear advantage over proximity weapons that could be used only by physical infiltration into Israeli territory. Such conditions did not exist in the struggle of the IRA against Britain. In contrast, the Tamil Tigers were able to purchase and import a large variety of weapons and had ample large-scale civilian targets in Sri Lankan cities. It remains unclear then why they did not opt for standoff warfare.

THE ROCKET OFFENSIVE AGAINST SOUTHERN ISRAEL

The Offensive's Early Stages

The first rocket was fired from the Gaza Strip toward the Israeli town of Sderot, located northeast of Gaza, in October 2001 – about one year into the second Palestinian uprising (the "Second Intifada" or "Al-Aqsa Intifada," which broke out on September 28, 2000). In contrast to the rockets hitherto fired on Israel, mostly from Lebanon, this harbinger of the Gaza offensive was a homemade rocket designed and manufactured by the Izz ad-Din al-Qassam Brigades, the military arm of Hamas. The available literature does not offer many details on the motives of Hamas' military wing in selecting rocket artillery as its main instrument of warfare against Israel. In all likelihood, this idea took shape as a result of the vivid impressions of Saddam Hussein's ballistic missile attacks on Haifa and Tel Aviv in 1991, or possibly as an offshoot of Hizballah's success in wearing down Israel in its rocket barrage on the country's northern cities in the 1990s.

Opting for rocket artillery was not an easy decision to make. In contrast to Hizballah's capabilities to import rockets from abroad and store them almost anywhere within Lebanon, Israel's control of the maritime and land borders of the Gaza Strip (including the "Philadelphi Route" that runs alongside the Egyptian border) made the smuggling of rockets into Gaza extremely difficult. Israel's security fences enclosing the land borders of the Gaza Strip also made it difficult for Hamas terrorists to cross into Israel proper and launch suicide attacks within Israeli population centers as done at the time by West Bank Palestinian organizations. This limitation threatened to rob Hamas of the prestige within Palestinian society gained at the time by killing as many Israelis as possible. The solution was to "leap" over Israel's security fence by technological means – that is, by rockets.

Since acquiring ready-made rockets from the outside was nearly impossible, the rockets needed to be developed and manufactured locally. This innovation was attributed by Hamas to Adnan Al-Ghoul who is lauded in the organization's literature as a "first-class explosives engineer" and who has served as the main explosives devices expert of its military arm since 1988.¹⁴ Probably Ghoul and

his assistants received their technical know-how from the Internet and via cyber communication with terror groups in Saudi Arabia and other terror experts. The core innovation of these independently developed rockets was the use of locally obtained raw materials – mainly sugar and fertilizers imported from Israel – for producing the rocket propellant. The manufacturing process is simple and can be carried out in most domestic kitchens. The rocket casings were cut from irrigation pipes, traffic light poles or similar objects made from steel tubing that were widely available in the Gaza Strip. The warhead was filled with military grade explosives salvaged from abandoned artillery shells and landmines or with improvised explosives made of fertilizers available in the open market.¹⁵ Most warheads were laced with metal shards or balls to increase their lethality. Tools for machining the rocket nozzles and forming the stabilizer fins from steel cans, for welding the various parts and for finishing the product were widely available in numerous machine shops and light industries in Gaza City and its suburbs.

Hamas' first rocket was launched against Sderot on October 26, 2001, roughly one year after the outbreak of the Second Intifada. It is likely that Hamas realized the need for standoff weapons shortly after the outbreak of the Intifada when its attempts to send armed skirmishers into Israel were largely foiled. If so, it means that the time it took from deciding to manufacture the rockets until they became operational was less than one year – evidence of the resourcefulness and determination of Ghoul and his team.

Technical Features of the Homemade Gaza Rockets

Hamas named the first version of its homemade rockets after its national hero, Izz ad-Din al-Qassam, or in short "Qassam." This name became a generic term for all types of homemade rockets manufactured in the Gaza Strip, whether by Hamas or by other Palestinian organizations.

The advantage of these rockets lay not only in the availability of raw materials, but in two additional features: First, their small dimensions and relatively light weight (the weight of the first Qassams did not much exceed five kilograms) facilitated their transportation from the

factory to the launch point. In fact, Qassams are essentially "man portable rockets" that can be transported manually. Second, the firing of a Qassam did not require complex launching devices – any suitable metal scaffold would do. This simplicity allowed for the quick manufacturing and production of Qassams in large quantities, rendering irrelevant the loss of any individual launcher to a preemptive strike, as they were essentially disposable.

Immediately after fielding and firing the first rockets against Israel, Hamas embarked upon an improvement program, aimed mainly at extending the range of the rockets and increasing the lethality of their warheads. The range was gradually extended from three kilometers to more than 10 km, and the weight of the warhead grew from half a kilogram to more than 10 kg. Improvements were also made to the impact fuse and to the explosive power of the warhead. The available literature describes several models of Hamas-manufactured rockets: The Qassam-1 has a range of 3 km and carries a warhead weighing 0.5 kg; the Qassam-2 has a range of 8 km and carries a warhead weighing over 5 kg. The Qassam-3 is also mentioned, with a range of 10 km and a warhead weighing more than 10 kg. However, this model's overall weight is estimated at 90 kg, which means its mobility is restricted and thus it is less useful for Hamas than the previous models.

Other Palestinian organizations in Gaza set up rocket industries of their own and developed a variety of indigenous rockets. After the Hamas takeover of the Gaza Strip in June 2007, it began smuggling in factory made rockets (122 mm BM 21 Grads) via tunnels dug under the closed Egyptian border. These rockets were increasingly used against Israeli population centers. Interested readers can find copious details on the rockets used by Islamic Jihad and (until the Hamas takeover) of organizations affiliated with the Palestinian Authority in the publications of the Israel Intelligence Heritage and Commemoration Center (IICC).

The Course of the Offensive

From the Outbreak of the Al-Aqsa Intifada to Operation Cast Lead

Hamas commemorates October 26, 2001 as the inaugural day of its rocket offensive. The following year (2002), 35 rocket impact sites were recorded, most of them in the Gaza envelope area and a few near Israeli military bases within the Gaza Strip. This number increased significantly in 2003 to 155 rockets, most of which were aimed at Israeli towns and communities in the vicinity of Gaza. Even in this initial period, it was possible to discern the influence of external events on the rate of fire. For instance, a ceasefire that followed the Aqaba Summit on June 4, 2003 brought about a month-long break in the rocket launching from Gaza.¹⁶ Likewise, after the death of Yasser Arafat (November 2004) there was a significant, albeit short, decrease in the rate of rocket fire from Gaza.

The volume of fire doubled the following year. Throughout 2004, 281 rocket impacts were recorded near Israeli communities. The lethality of the fire also increased significantly. In June of that year the rockets claimed their first Israeli victims¹⁷ – evidence of the rise in reliability and lethality of the Gaza-made warheads. The following month, a record of 63 rocket impacts near Israeli targets was recorded, indicating an accelerated production rate in the Gaza workshops. In 2005, the growth curve of the rocket campaign slackened, and only 179 impacts were recorded – a decrease of 40 percent in comparison to the previous year. This decrease could be attributed to two factors: first, the Cairo Agreement between the Palestinian organizations (March 2005), in which they declared a "lull" in the fighting,¹⁸ and second, the unilateral Israeli Disengagement from Gaza, which, although considered controversial by the Israeli public, was welcomed by the Palestinians. The Cairo Agreement "lull" collapsed in less than a month, and the renewed rocket attacks of April that year (albeit at a relatively moderate rate) intensified with the approach of the Disengagement.

During the month of the Disengagement (August 2005), however, the firing ceased almost completely. This could be ascribed to the Palestinian organizations' appreciation of Israeli internal politics and

their concern not to provide Israeli opponents of the Disengagement any reason for halting it. Once the withdrawal was completed and all Israeli troops and civilians had left the Gaza strip, the rocket campaign resumed, though at a relatively moderate rate due to a Palestinian mishap. (In September 2005, during a victory parade in downtown Gaza to celebrate the Disengagement, a truck carrying Qassam rockets exploded killing 19 civilians and wounding 80). This moderate rate of fire continued until the end of that year. The next year, 2006, saw a quantum leap in the number, types and ranges of the rockets fired from Gaza. During that year no less than 946 rockets were fired against Israel, of which 35 percent (331 rockets) were launched during a two-month period (June: 134, July: 197). This escalation was seemingly connected to a deliberate radicalization in Hamas' policy toward Israel, which was expressed in a series of commando raids into Israeli territory, in one of which the soldier Gilad Shalit was captured. This attack triggered a major counter-attack by the IDF. Moreover, during the same year, the Israeli city of Ashkelon was hit for the first time by rocket fire from Gaza. These rockets were of the factory made 122mm Grad type that were likely smuggled into Gaza from Egypt, via the abandoned Philadelphi Line (Israel's fortified line along the Egyptian border), which had been vacated by the IDF in the course of the Disengagement.

In November 2006, then Israeli Prime Minister Ehud Olmert and Palestinian Authority Chairman Mahmoud Abbas agreed on a ceasefire, yet the rocket fire continued unabated at a fairly constant rate of 20 to 40 rockets per month. During the period of internal Palestinian struggles leading to Hamas' takeover of Gaza, the increase in rate of fire reached hitherto unprecedented level when in a single month (May 2007) 257 rockets were fired at an average rate of eight to nine rockets daily. This outburst of intense rocket fire, which coincided with the short Palestinian civil war in Gaza, was attributed by Palestinian observers to a deliberate attempt to provoke a strong Israeli response that would unite the quarreling factions in Gaza and stop the internal war. Overall, in 2007, a total of 1,137 rockets were fired at Israel – an increase in 20 percent from the previous year.

In 2008, the intensity of the rocket fire kept growing, setting a new record in April (373 launches). The suffering caused by the rocket

offensive against the Gaza envelope communities and in Ashkelon compelled Israel's Prime Minister, Ehud Olmert, to enter into indirect negotiations with Hamas over a six-month ceasefire. Mediated by Egypt, a ceasefire agreement was reached and the rocket fire subsided almost completely for five months. In the last month of the agreement, however, rocket attacks were resumed in response to a targeted killing by the IDF within Gazan territory.¹⁹ With the expiry of the ceasefire in December 2008, Hamas presented a series of harsh political demands as preconditions for another short-term ceasefire. Upon rejection of its demands, in December of that year, Hamas launched a massive campaign of Qassam and Grad rockets. As a result, the Israeli government decided to launch a counteroffensive called Operation "Cast Lead." A description of the rocket attacks during Operation Cast Lead and Israel's efforts to subdue it is reviewed in the next chapter. Despite the five-month ceasefire, which Hamas generally adhered to, Israel was hit by a record number of 1,689 rockets that year – a 50 percent increase from the previous year.

From the rocket campaign's commencement in late 2001 to Operation Cast Lead at the end of 2008, 4,320 rockets of all types were fired against population centers in Israel. This offensive, which began as a minor nuisance, grew to previously unimaginable dimensions toward the end of the decade. More than 40 percent of the rockets launched at Israel's south during this eight-year period were fired during the year before Operation Cast Lead.

The growing rate of fire over these eight years can be seen in Figure I. The gradient of the curve in Figure I shows two "knee" points, each signifying a sharp increase in the rate of fire. The first is at the end of 2005, marking a transition from the relatively moderate firing rate of the first four years or so to a steeply increased rate. The second "knee" point, indicating another leap in the average rate of fire, occurs at the end of 2007, presumably showing the effect of the Hamas takeover of the Strip in the middle of that year and its newly gained "free hand" to intensify the rocket offensive.

The number of rockets fired over a 12-month period does not give a full picture of the Palestinians' growing firepower. The monthly number of rocket attacks fluctuated considerably over time, probably

reflecting non-military political and economic constraints. In some instances, internal Palestinian fighting sometimes restrained the rate of fire but other times prompted its increase. As well, deaths of Palestinians inside Gaza prompted "revenge" attacks against Israel. Perhaps, then, a better indication of the realistic capacity of the Palestinian organizations to generate rocket fire can be found by tracking the number of rockets fired during the "busiest" month of each year of the offensive. This gives a more accurate picture of the true capabilities of the Palestinian organizations in marshaling their production and operational resources and in managing the logistics and human resources necessary to generate concentrated rocket fire. It is only when they utilize maximum effort that we can see the true extent of their rocket capability – tracking these peak rates over the years shows the true growth curve of these capabilities.

Figure I: Cumulative Number of Launches over Time

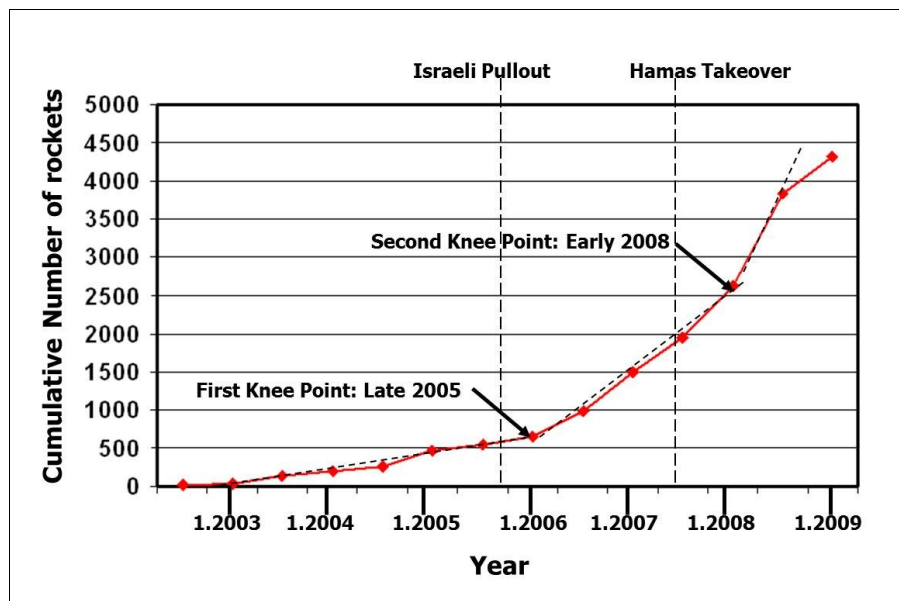
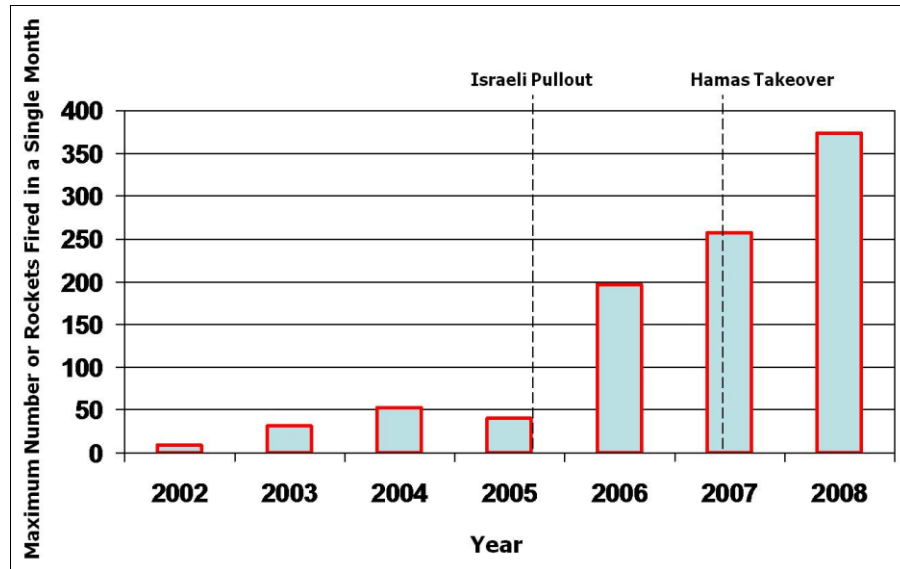


Figure II charts the peak monthly number of fired rockets for each year of the offensive. The graph shows that over the first four years (2002-2005) the maximum rate of fire in any single month was relatively constant, totaling 40 to 50 rockets. After 2005, however, this maximum monthly firing capability increased to 200, 250 and

finally to almost 400 rockets per month prior to Operation Cast Lead – a tenfold increase from the first years of the offensive.

Figure II: Timeline of Monthly Peak Launch Rates up to Operation Cast Lead



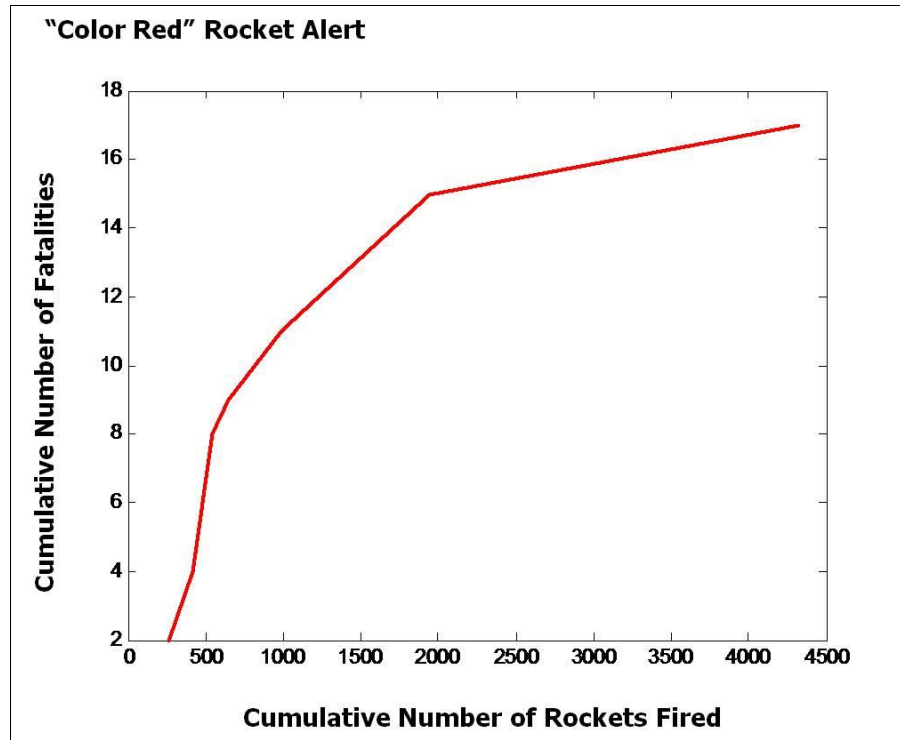
The above two graphs show that of the two decisive events that determined the course of the conflict between Israel and the Palestinian groups in Gaza – the Disengagement of 2005 and the Hamas takeover in 2007 – the former was more significant as far as the rocket campaign is concerned. From both graphs it is clear that at the time of the regime takeover by Hamas, the rocket offensive was already exhibiting a steep increase in both the average and peak rates of fire per month. This steep increase became noticeable in early 2006, just a few months after Israel's withdrawal from the Gaza Strip. Moreover, the graphs clearly show that until 2005 there was no tendency toward a significant increase in rate of fire, and consequently, no enhancement in firing capabilities. It appears, then, that the decisive event in the rocket campaign – the event that transformed the offensive from a nuisance to a potential strategic threat – was the August 2005 Disengagement from Gaza.

The description of the Palestinian rockets in the IICC reports indicates that the Qassam rockets that were overwhelmingly used until Operation Cast Lead were of two kinds: a 5 kg warhead model and a heavier 10 kg warhead model. Assuming that equal numbers of both types were fired during this period, then on average each rocket carried 7.5 kg of explosives. Multiplying this by the number of rockets that hit southern Israel during the seven years from the beginning of the campaign until Cast Lead, about 32,400 kg (32.4 tons) of explosives were shot at Israel's south during that period. This quantity greatly exceeds the total weight of explosives used by West Bank Palestinians during the suicide bombing campaign of the Second Intifada. In fact, the amount of explosives dropped on southern Israel from early 2002 to late 2008 is equivalent in weight to the bombing capacity of five or six F-16 fighter planes.

From the start of the Gaza rocket offensive until Operation Cast Lead, in Israel and Israeli controlled territories, rocket fire killed directly and indirectly a total of 17 people,²⁰ most of whom were Israeli citizens.²¹ Almost half of these fatalities occurred in the town of Sderot, a clear indication of the intensity of the attack on the town and its surroundings. Figure III charts the number of fatalities as a function of the accumulated number of rockets. The slope of the curve provides insight into the average lethality of the rockets, or in other words, how many rockets were required to kill one person.

Figure III shows that the rockets' average lethality decreased over time. In the initial phase of the campaign, about 100 rockets caused one fatality – yet the average for the entire offensive was 254 rockets per fatality. This finding seems to contradict the data of the IICC report concerning the increase in weight and quality of the warheads installed in the rockets, which should imply enhanced lethality of each individual rocket. This apparent contradiction can be explained by the difference between the specific lethality of each individual rocket and the effective lethality of all the fired rockets. Specific lethality is determined by the weight and composition of the warhead. Effective lethality, on the other hand, is a function of rocket accuracy (rockets hitting open areas don't cause casualties) and civil defense measures (people inside shelters are secure even from direct hits).

Figure III: Cumulative Number of Fatalities as a Function of the Number of Rockets Fired



The same phenomenon was observed in the Second Lebanon War. During the early stages of the Gaza rocket offensive, no alert system existed to warn the population to take cover, and there were insufficient shelters to protect the population. Once an early warning system was put in place and timely alerts were sounded, the public learned to rely on these alerts and take cover, reducing the effective lethality of the rockets and the number of casualties in spite of the ever increasing rate of fire and specific lethality of the rockets. Over time, public and private sheltering arrangements further reduced the number of casualties. While the Palestinians tried to justify the blatant war crime of deliberately attacking uninvolved civilian populations by claiming that the rockets were essentially non lethal "political statements," it was in fact Israel's costly but effective civil defense measures that reduced what could have been a massacre into a painful, but acceptable, low level of casualties.

The positive outcome of efficient public warning systems coupled with responsible citizen behavior and which saved many lives also had its downside: By minimizing casualties, it encouraged the continued complacency of the Israeli government and the public at large, as discussed below.

Operation Cast Lead

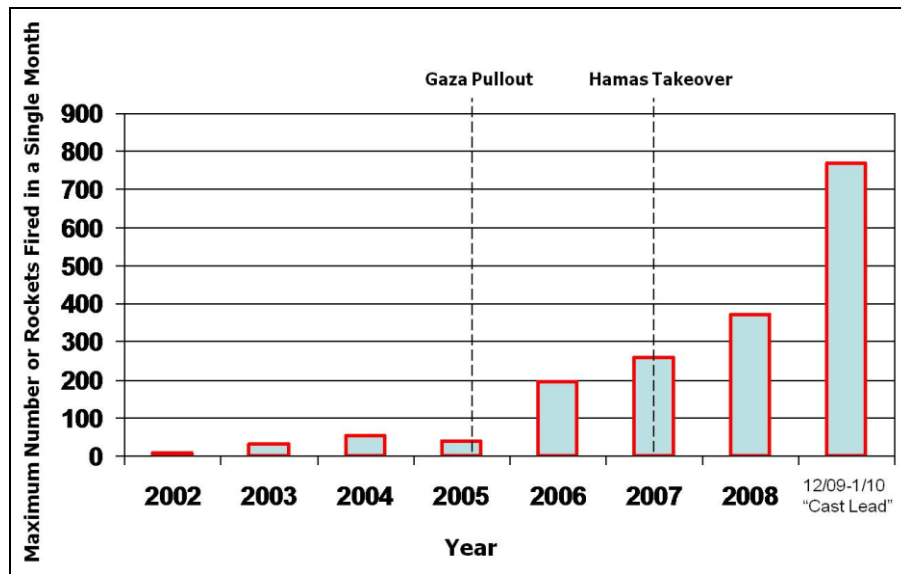
As already mentioned, Hamas' refusal to extend the June 2008 ceasefire led that December to the resumption of full scale rocket attacks more severe than those prior to the ceasefire. At the end of December 2008, the Israeli government ordered the IDF to launch a counteroffensive, dubbed Operation Cast Lead. Its declared goal was: "Dealing a blow to the Hamas government hard enough to bring about a new, improved and long-lasting security situation around the Gaza Strip, strengthening deterrence, and minimizing the rocket fire as much as possible."²² The Israeli military offensive commenced on December 27, 2008 with a massive bombardment by the Israel Air Force (IAF) of Hamas' infrastructure in Gaza. Following a week-long air offensive, IDF ground forces entered Gaza and seized areas from which rockets were being launched at Israel's southern communities. The operation ended with Israel's unilateral declaration of a ceasefire on January 19, 2009 and the rapid evacuation of the seized Palestinian areas. A detailed review of the operation's military progress is beyond the scope of this study, but Hamas' use of rockets during the campaign deserves closer scrutiny.

Approximately two hours after the first attacks by the IAF, Hamas and other Palestinian organizations launched an intense barrage of rockets at the Gaza envelope communities and other communities and towns deeper within Israel. The Palestinian rocket offensive did not come to a full stop upon the declaration of a unilateral ceasefire by Israel on January 19, 2009. Rather, its intensity tapered off gradually over time, reaching a "steady drizzle" after several weeks. This "drizzle" of rockets has continued ever since.

During the 22 days of Operation Cast Lead, a total of 660 rockets were fired into Israel,²³ resulting in three fatalities, dozens of severely wounded, hundreds of lightly wounded and thousands plagued by

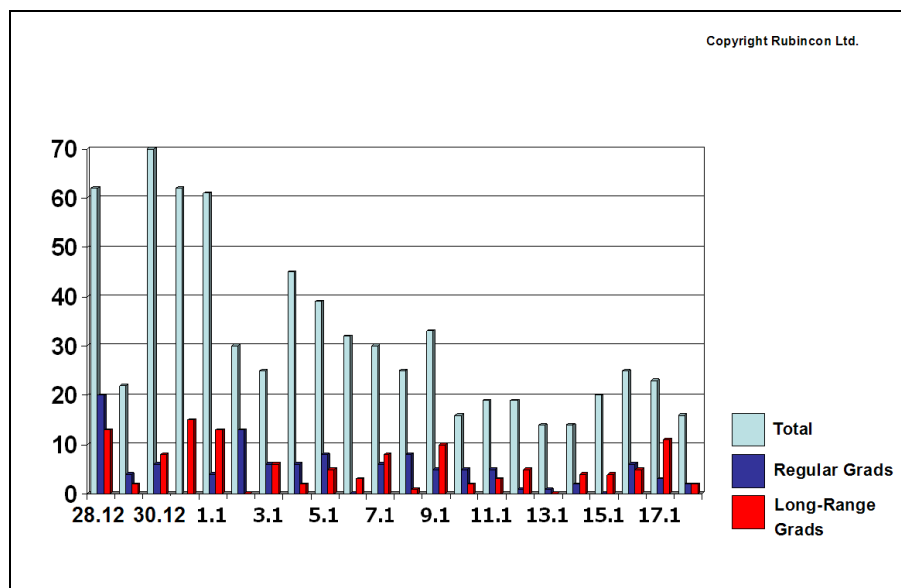
psychological shock.²⁴ The effective lethality of the rocket fire throughout Operation Cast Lead – around 220 rockets per fatality – was only slightly higher than the effective lethality in the preceding years, which attests more than anything to the efficiency of passive defense (early warning, sheltering and the cooperation of the general public with civil defense instructions) during the operation.

Figure IV: Monthly Peak Launch Rates Over Time, including Operation Cast Lead



The rocket campaign during Operation Cast Lead had two unique features. The first was a higher rate of fire than ever before – the Palestinian organizations managed to fire about 660 rockets in the span of three weeks, compared to a maximum of 380 rockets during the “busiest” month of their offensive prior to Cast Lead. Moreover, the Palestinians’ ability to double their rate of fire in a short period of time – within just a few hours – indicates, quite unsurprisingly, that the five-month ceasefire in summer 2008 was well utilized to expand the human and material resources dedicated to rocket warfare against Israel. This leap in capability stands out clearly when we add the equivalent monthly peak from December 27, 2008 to January 28, 2009 to the chart of peak monthly rates over time (see Figure IV).

Figure V: Number of Rockets that Fell Between 28.12.2008 and 19.1.2009 around Midnight



The second feature was the use Hamas made, for the first time, of improved Grad rockets, whose range was double that of the standard Grad rockets previous launched from Gaza. These improved rockets, first used by Hizballah in the Second Lebanon War, enabled Hamas to strike deeper into Israel and reach communities beyond the Gaza envelope, which had hitherto seemed safe from the Gaza rockets. The cities of Be'er Sheva and Ashdod were attacked almost daily, as were smaller communities such as Yavneh and Gedera, by rockets with an estimated range of 43 km. Hamas claims also to have attacked the air force base at Tel Nof,²⁵ although this report was never confirmed by any Israeli source. According to the information collected on the communities that suffered from rocket attacks during Operation Cast Lead and their distance from the Gaza borders, it can be concluded that during this three week-long operation, approximately 130 long-range Grad rockets were fired. Figure V offers a comparison of the daily rate of fire during Cast lead, distinguishing between long-range Grads and all other types of Hamas rockets. It can be seen from this figure that in contrast to the situation during the Second Lebanon War, when Hizballah's rocket firing rate gradually increased

throughout the campaign, in Operation Cast Lead the opposite was true – rocket fire peaked in the first few days and then gradually subsided. While most Israeli analysts attribute this decline in rate of fire to the effectiveness of IDF preemptive strikes and the overrunning of certain launch sites by the ground forces, other factors may have played a part here. For a brief discussion of alternative explanations, see a previous paper by the author.²⁶

Cast Lead Aftermath

The end of Operation Cast Lead and the retreat of IDF troops from the Gaza Strip did not lead to a complete cessation of rocket fire by Hamas and the other Palestinian organizations; rather, it led to a gradual decline.²⁷ At the same time, Hamas and other Gaza groups have been renewing, increasing and improving their rocket arsenal. According to media reports, Hamas currently stockpiles an arsenal of 5,000 rockets of various types.²⁸ Several sources reported in November 2009 that Hamas had conducted its first test launch of a long-range rocket, which impacted 60 km away. In all likelihood this rocket arrived from Iran via the tunnel smuggling system, hence, it can be assumed that it was a Fajr-5 with a potential range of 75 km. If this is the case, it means that Hamas possesses rockets capable of hitting targets north of Tel Aviv and as far east as Dimona.

Summary

The rocket threat from the Gaza Strip, which began as a sporadic offensive with several inaccurate and short-range homemade rockets improvised by Hamas engineers, has become, within less a decade, a significant threat to Israeli population centers, national infrastructure and central military installations. The rocket offensive has evolved into a war in its own right, exacting a significant cost in life, damage, and economic disruption. The threat, initially affecting about 50,000 Israeli citizens in the Gaza envelope communities, has increased more than twenty-fold and now threatens more than one million civilians in southern and central Israel. It is no longer mere harassment, but a strategic threat capable of inflicting severe civilian casualties and paralyzing Israel's economy.

ISRAEL'S RESPONSE MEASURES

Introduction

Artillery rockets of all kinds, including those fired by the Palestinian organizations, are in essence indirect fire weapons – for all intents and purposes indistinguishable from artillery shells or mortar bombs, except for their mode of propulsion. Direct fire projectiles have low flying, flat trajectories that can be blocked by erecting barriers across their path (such as protective walls around buildings). However indirect fire projectiles, like artillery rockets, follow high ballistic trajectories that overfly ground barriers; hence, they require more elaborate responses. Four categories of responses – both offensive and defensive – can be envisaged:

- a) Preemption – Denying the aggressor's capability to fire rockets into the defender's territory by seizing prospective launch areas, destroying deployed rockets and their launchers, and destroying rocket stockpiles in the aggressor's rear areas.
- b) Deterrence – Reducing the aggressor's willingness to risk launching rockets into the defender's territory using painful punitive measures. Deterrence works best after such punitive measures have already been applied in the past.
- c) Passive Defense – Hardening prospective targets to withstand rocket damage and providing shelters for the general population. A precondition for effective population sheltering is an effective public alert system that provides timely warnings to the population to take cover.
- d) Active Defense – Interception and destruction of rockets in flight. This option became viable technically and financially only recently

Preemption, deterrence and active defense were the responsibility of the IDF, who carried out vigorous offensive actions to preempt the rocket fire and deter its perpetrators. Overall, these actions were ineffective with the exception of Operation Cast Lead. The IDF was reluctant, however, to pursue active defense for reasons that are discussed below. Passive defense fell under the jurisdiction of Israel's government civilian agencies (mostly the Defense and Finance

Ministries), whose responses were on the whole slow, hesitant and lagging behind the growing threat. The reasons for such failures are discussed below.

In summary, the response measures that were vigorously applied were barely effective, while the response measures that might have been effective were barely applied.

Offensive Responses: Preemption and Deterrence

Israel's Offensive Measures

Although the Second Intifada, which started in October 2000, did not feature a significant number of incursions from Gaza into Israeli territory, it did bring about direct fighting and exchanges of fire within the Gaza Strip between the IDF and Palestinian militias. Initially, the IDF's military actions dealt exclusively with the threats to its forces and to the Israeli communities inside Gaza. It was only during the second half of 2004, when the rocket fire on the Gaza envelope communities intensified and the first Israeli civilians were killed, that the IDF switched tactics and commenced dedicated military operations aimed at suppressing the rocket attacks. These operations included ground incursions to seize launching sites, aerial attacks on raw material warehouses, production facilities and rocket launch teams, and targeted attacks on key operatives in the rocket industry.

While all offensive measures were characterized by the IDF as preemptive, they were also punitive with an aim to enhance deterrence, especially after the unilateral Disengagement when a policy of retaliatory artillery fire was practiced for a time. The most significant military offensive in this context was Operation Cast Lead in December 2008 and January 2009, the expressed objective of which was deterrence: "to deal the Hamas government a powerful blow in order to bring about an improved and long-lasting security situation around the Gaza Strip, strengthening deterrence and minimizing the rocket fire as much as possible."²⁹

Prior to Operation Cast Lead, the IDF launched at least five dedicated air and ground operations whose sole aim was to reduce rocket fire. The other military operations carried out during the same period had multiple objectives, one of which was the prevention of rocket fire. The first dedicated military operation, codenamed "Days of Atonement," started on September 29, 2004, and lasted 17 days. The operation was launched following the death of two civilians by a Qassam rocket in Sderot. During the operation, the Gaza Strip was divided into three zones. The IDF seized areas in the northern Strip and the IAF carried out intensive air-to-ground attacks on rocket launch teams. The operation ended on October 15, 2004, with the withdrawal of the IDF from the areas it had seized.³⁰ Despite the IDF's intensive activity, 15 rockets were fired from Gaza during the operation, killing one Israeli civilian. Moreover, two IDF soldiers lost their lives in the fighting.³¹ Then Palestinian Prime Minister Abu Ala announced that 140 Palestinians were killed during the operation. According to IDF estimates, 130 of these were armed combatants.³²

Following the Cairo Agreement of March 17, 2005, in which the Palestinian organizations agreed to a cessation of hostilities (*tahdiya*), and later on during the Disengagement, which began in August 2005, the Palestinian organizations showed some restraint and scaled down their rocket fire so as not to provide Israel with any reason to delay or halt its pullback. Once the unilateral Israeli withdrawal was completed (September 12, 2005) the rocket offensive was promptly resumed on a larger scale than before. This was partly due to a Hamas "industrial accident" – during its victory rally in Gaza City marking the Disengagement, a truckload of Qassam rockets exploded, killing 20 Palestinian civilians. Hamas held Israel accountable and launched a massive rocket offensive on Sderot (September 23-24, 2005). The episode aroused public fury in Israel, as this was contrary to the hopes and expectations that the Palestinians would refrain from firing on Israel after its evacuation from the Gaza Strip. In response, the IDF launched Operation "First Rain," which included extensive aerial attacks on Palestinian military targets and rocket production infrastructure as well as "targeted killings" of key Hamas rocket operatives. As well, the IDF's field artillery teams, for the first time, started shelling prospective rocket launch sites within the Gaza Strip to deny their use to rocket launch teams (September 27, 2005). It was

perhaps the targeted killing of a senior Hamas commander that spurred Mahmoud al-Zahar, one of the organization's senior leaders, to proclaim Hamas' commitment to a period of calm. The operation ended on October 1, 2005, when Israel's political leadership reached the conclusion that the operation had exhausted itself.³³ As shown in Figure I, the period of calm was brief, quickly replaced by renewed fighting and further escalation in the rocket offensive.

An escalation in hostilities was evidenced not only in the increased rate of fire but also in the increased range of the rockets. In the months following "First Rain," the rocket fire approached Ashkelon's industrial zone, raising Israel's concern over the safety of nearby "strategic installations," an oblique reference to the Zikim power station and the Eilat-Ashkelon oil pipeline terminal. In order to preempt this threat, the IDF launched Operation "Blue Skies" on December 28, 2005. Its aim was to create a buffer zone in the northern Gaza Strip by forcing back the rocket launchers and denying the use of these areas as launching sites by prohibiting Palestinian presence in them. The two month-long operation, which ended in early February 2006, included the use of field artillery and numerous ground attacks by the IAF to keep Palestinians away from the prohibited areas.³⁴ Immediately afterward, the Palestinian organizations proved their ability, nonetheless, to hit the "strategic installations" when, for the first time, rockets hit both installations and the nearby southern industrial zone in Ashkelon.³⁵

About two months after "Blue Skies," on February 3, 2006, a Qassam rocket hit a building in Kibbutz Carmia, south of Ashkelon, injuring four Israeli civilians, including a baby who sustained severe injuries. Following this incident, the IDF launched yet another military offensive – Operation "Lightning Storm" – which included air-to-ground attacks, artillery shelling and targeted killings of Hamas operatives. However, this operation too did not seem to make an impression as the rocket fire continued to intensify in the Gaza envelope communities, including in Kibbutz Carmia, where the cycle of violence had begun.

The continued Gaza rocket offensive and the IDF's vigorous counteroffensives led to one of the most damaging incidents (for

Israel) in the entire campaign. On June 9, 2006, there was an explosion on the beach of Beit Lahia, a northern Gaza Strip town, which killed an entire Palestinian family of eight. The tragedy happened amidst an Israeli artillery barrage on suspected rocket launch sites. The Palestinians, backed by various human rights organizations, were quick to blame the IDF artillery for the incident, which caused an uproar in the Arab world and spurred international condemnation of Israel. An IDF internal probe exonerated the artillery units, suspecting that the real culprit was an explosive charge placed by Hamas on the beach as part of its defense against Israeli seaborne incursions. Needless to say, Israel's version of the story hardly made a ripple in the world media.

The incentive for the next military operation was a Hamas raid inside Israel during which several Israeli soldiers were killed and one soldier, Gilad Shalit, was captured alive and taken into Gaza. Consequently, the IDF launched on June 28, 2007 Operation "Summer Rains," a protracted, five-month long military campaign. The official goal of the operation was predominantly to apply pressure on Hamas to release Shalit. However, the massive rocket fire unleashed by Hamas at the onset of the Israeli operation diverted part of the IDF efforts toward suppressing the rocket fire. The campaign consisted of nine distinct sub-operations, interspersed with continuous fighting, which included targeted killings of Hamas operatives, attacks on infrastructure, and artillery barrages on rocket launch sites. At least two of these sub-operations – "Oaks of Bashan," launched on July 6, 2006 and "Autumn Clouds," launched on November 1, 2006 – were aimed specifically at suppressing the rocket fire and included incursions into the Gaza Strip and the seizure of prospective launching zones.

Even when not directed specifically against the rocket threat, military operations during "Summer Rains" kept unceasing pressure on the Palestinian rocket firing capability, with frequent air to ground strikes on rocket launching teams and on the chain of supply of the rocket industry in Gaza. Yet the data shows no slackening of the rocket offensive in 2006³⁶. If anything, the opposite was true. In three of the five months of the operation, new records were reached in the intensity of rocket fire, surpassing for the first time 100 rockets per

month. In November of that year, during Operation "Autumn Clouds," the rocket fire on Sderot became so heavy and lethal that it prompted many residents to leave town – the first partial evacuation of a Gaza envelope community since the start of the offensive.³⁷ That same month, the IDF's use of artillery against the rocket launch teams resulted once again in a politically damaging event when an artillery shell accidentally hit a Palestinian residence, killing 19 people, among them women and children. This time, the IDF admitted its error and assumed responsibility for the tragedy. This incident led to a UN condemnation and the decision by the IDF to stop using artillery fire in its counteroffensive.

Operation "Summer Rains," in the course of which two Israeli soldiers were killed, officially ended on November 26, 2006 when an "understanding" (i.e. an unofficial agreement) was reached between then Israeli Prime Minister Ehud Olmert and Palestinian Authority Chairman Mahmoud Abbas, according to which Palestinian organizations agreed to halt their rocket fire in exchange for the retreat of IDF forces from the Gaza Strip.

Hamas and other Palestinians groups did not adhere to this "understanding" and the rocket campaign continued unabated. It further intensified during the Hamas takeover of Gaza in June 2007, a month in which a new peak rocket fire intensity was recorded. In parallel, the IDF launched a series of brief ground incursions into the Gaza Strip. In February 2008, the situation once again deteriorated in the wake of a targeted killing of Hamas operatives, which led to the firing of 42 rockets toward Sderot and Ashkelon, killing one Israeli at Sapir Community College just outside of Sderot. In response, the IDF launched on February 29, 2008 Operation "Warm Winter," which included a ground assault and the seizure of launching sites in northern Gaza. The operation ended on March 3, 2008 with the withdrawal of IDF forces from the Gaza Strip. As in previous operations, here too the data does not show any mitigation of the rocket offensive, the level of which was among the highest since the start of the campaign seven years earlier.

The rocket fire – and, in parallel, the IDF counteroffensives – gathered momentum in the subsequent months. However, in June

2008, a six-month ceasefire was reached, with Egyptian mediation, between Israel and the Hamas government in Gaza. At the end of the six months, on December 18, 2008, Hamas resumed its fire against southern Israel. In response, the Israeli government decided to launch Operation Cast Lead, a three-week massive incursion of Israel's ground forces into the Gaza Strip. Ten Israeli troops were killed during this operation, many from "blue on blue" incidents.³⁸ At its end, the rocket fire gradually petered out into a "drizzle" that still continued at the time of writing (September 2010), more than two and a half years after Cast Lead. (See the postscript at the end of this study).

The Effectiveness of the Offensive Actions

When the military operations first began, it was generally assumed by the IDF and the Israeli public that such action might suppress or even halt the rocket fire by hampering the capability of the Palestinian organizations to manufacture and launch rockets as well as by dissuading them from doing so through painful retribution. Erosion of the Palestinian capability to launch rockets was expected to be achieved as a cumulative effect of destroying the rocket production facilities and eliminating key personnel in the rocket manufacturing and launching network. Lt. Gen. (res.) Dan Halutz, who was IAF Commander, IDF Deputy Chief of General Staff, and then Chief of General Staff during the relevant period, stated that as IAF Commander, his approach was to attack every component in the rocket "food chain," from the destruction of raw material stockpiles to the destruction of the means of production (machinery, etc.), rocket storage depots, transportation and launching facilities, while emphasizing the human infrastructure of the rocket array.³⁹ After Operation "Days of Repentance," the media reported that "the IDF is content overall with the operation's outcome and has expressed satisfaction with the number of destroyed terrorist cells, including 'nine Qassam units.'" Unidentified senior IDF officers told the media, "The IDF reached impressive achievements," but cautioned, "We cannot allow this success to go to our heads."⁴⁰

Deterrence as a major motive for military action was emphasized by then Minister of Defense Shaul Mofaz after the deployment of

artillery units near Gaza: "We will hit them until they understand that as a sovereign state we will not allow shooting into the State of Israel."⁴¹ At the end of Operation "Lightning Storm" in 2006, Maj. Gen. Yoav Galant, IDF Southern Command Chief, warned that "the IDF will act more severely if there will be no calm on the Israeli side."⁴²

Countless articles in the press during this period reflected the expectation that military actions alone would wear down the Palestinian organizations' motivation to launch rockets against Israel. However, the dry statistics of the Gaza rocket campaign in the years leading up to Operation Cast Lead clearly indicate that Israel's military measures neither stopped nor slowed down the rocket fire. On the contrary, despite Israel's offensive actions and expectations, the rocket attacks increased steadily over time in rate, range and lethality. It can be deduced then that the military measures taken prior to Cast Lead were on the whole unsuccessful in seriously damaging the rocket manufacturing and launching network in Gaza. They were also ineffective in dissuading Hamas from continuing to attack Israel.

The disappointment from the results of Israel's offensive military actions could already be discerned during the fighting. In July 2007, a former commander of the IDF Gaza Brigade conceded that "there was no airtight military solution to the Qassam challenge."⁴³ Following a week of intense fighting toward the end of Operation "Autumn Clouds," Brig. Gen. Yuval Halamish, an intelligence officer, admitted at a Tel Aviv University conference that the IDF was experiencing some difficulties in countering the Qassam rockets and often luck was the most significant factor. In the same vein, an unnamed Southern Command officer was quoted as saying, "There is no magic solution. This [counter rocket] activity is an uphill climb, but it is showing results."⁴⁴ In other words, it was unrealistic to expect immediate results in suppressing the rocket fire, but let's be hopeful. Lt. Gen. (res.) Dan Haloutz said frankly, "We felt we were investing a lot of effort but with no satisfactory results."⁴⁵

The only offensive action that achieved tangible and relatively long-lasting results was Operation Cast Lead, which constituted a quantum leap in the application of Israeli firepower against the Gaza rocket

offensive. Unsurprisingly, it also resulted in an immense increase in damages and casualties to the Palestinian side, causing political damage to Israel. So why did all of the preceding, limited IDF offensives fail to achieve similar results? This might be attributed to two major factors: first, the inherent difficulty in preempting missile and rocket fire, and second, the limitation on the use of force in the particular circumstances of the Gaza fighting.

The first difficulty derives from the basic properties of missiles and rockets. Unlike aircraft or UAVs, which require a runway or complex catapulting facilities for takeoff, missiles and rockets can be fired from virtually anywhere without much preparation. Moreover, once fired, their launchers can vacate the launching sites and take cover within a remarkably short time. As far back as World War II, the Allies used powerful air raids to try to destroy the launching facilities of the V2 ballistic missiles fired at London by Nazi missile launchers situated in the Netherlands. This approach failed since the German Wehrmacht, anticipating such preemptive action, drilled its rocket teams to dismantle and conceal all launching apparatus within less than 60 seconds of the missile's takeoff. Earlier than that, the Allies bombed the Peenemünde Research Center on the Baltic coast to prevent Germany from completing the development of the V2 missile. However, this attack did not significantly delay the missile's development, as the industrial infrastructure and production lines of the V2 ballistic missile continued in the full scale production of thousands of missiles (in addition to their special fuels) under a veritable rain of Allied bombs. Attempts to prevent the firing of missiles by destroying their launchers were carried out repeatedly in both the Iran-Iraq War (1980s) and the First Gulf War (1991) – similarly to no avail.

In the case of the Gaza rocket campaign, the situation is even more complex. Here, the rocket production facilities employ the most elementary industrial infrastructure found in small, non-specialized machine shops that are abundant in Gaza, and on commercially available raw materials intended for civilian use. The rocket launchers are simple welded frames that can be manufactured cheaply, quickly and in large quantities, making them easily replaceable. The rockets themselves are simple to operate, and the training of new launch

operators is relatively quick, enabling the swift replacement of teams that have suffered casualties. Simply put, the suppression of what Haloutz called the "food chain" of rockets and missiles is always problematic, even more so in the case of the Gaza rocket network.

The second difficulty derives from the specific conditions of the Gaza theater, where the armed militias operate within a dense, supportive civilian population. This considerably restrains the type of weapons and level of force that are appropriate for the IDF to implement. Israel could theoretically have abandoned all restraint – for instance, by recapturing the entire Gaza Strip in a powerful ground operation – and subsequently could have "cleaned out" the rocket infrastructure, house by house. This would have completely halted the rocket offensive, but at an unacceptable cost to Israel's international relations and to its own social fabric, as such a move would be strongly protested by segments of the Israeli public. An additional restriction on the IDF's use of force was its desire to minimize casualties among its troops.⁴⁶

The use of artillery in the Gaza counteroffensive clearly illustrates the limitations on the use of force in this arena. Intended as a deterrent, artillery fire turned out to be a political boomerang. Rather than dissuading the Palestinians from firing rockets into Israel, it generated sympathy for them in global public opinion, damaging Israel's international standing and embarrassing it into abandoning this practice. Part of the Israeli public was also dissatisfied with the use of artillery, and some residents of the Gaza envelope region even complained about its disruptive effects on their daily lives. Similarly, an IDF attempt to use non-lethal sonic booms (by flying supersonically over Gaza) in order to dissuade the Palestinians from firing rockets into Israel was vigorously opposed by Israeli and international human rights groups, who complained that the noise deprived Gaza children of their sleep.

Operation Cast Lead itself, whose negative repercussions on Israel's international standing are still reverberating, highlights the heavy political price incurred in the extensive use of force against armed militias embedded within a supportive civilian population.

The limited offensive actions prior to Operation Cast Lead not only failed to achieve the desired results, but seem to have encouraged continued rocket attacks while exacting a heavy price from Israel. No offensive Israeli military measure, including Cast Lead, has succeeded in seriously degrading the rocket capabilities of the Palestinian organizations. On the contrary, according to reports attributed to intelligence units, these capabilities are ever growing. While Cast Lead brought about a significant decline (but not an absolute halt) in the intensity of the rocket campaign against Israel, it is still unclear what part the IDF's counteroffensive played in this decline. One cannot dismiss the possibility that the new political realities that arose after Cast Lead were just as instrumental in motivating Hamas to halt its fire as Israel's punitive military operation – predominantly the change of government in the US and the rising wave of sympathy for Gaza's civilians in Western public opinion, as expressed by "Free Gaza" demonstrations and flotillas by human rights groups to "lift the siege on Gaza." Perhaps Hamas found the role of victim more profitable than the role of aggressor.

In light of this negative balance sheet, three questions come to mind. First, what was the point of pursuing military rather than diplomatic measures? Second, why did the IDF persist for years in its limited offensive policy despite the unsatisfactory results? And third, once the unsatisfactory results became obvious, why didn't the IDF add defensive measures to its toolkit of responses?

The answer to the first question depends on the worldview of the readers. Those who believe that it was possible to stop the rocket campaign using political measures can point to two interludes in the fighting that were achieved by diplomacy: the first, in 2005, was a product of Israel's unilateral Disengagement, and the second, in the latter half of 2008, was a result of the six-month *tahadiya* (ceasefire) agreement with Hamas. Those who assume that the conflict could not be resolved by diplomacy can point out that both interludes were unstable and that the rocket fire was promptly renewed with even more vigor. Diverging opinions on this matter are likely to persist.

In regard to the logic of continuing the counteroffensive despite the unsatisfactory results, Haloutz stated, "We continued (with the

military measures) since it was the lesser evil. This is a war of attrition, and the question is which side will be worn down first." His opinion was that the fundamental purpose of these measures was to "exact a cost," or in the terminology of prior generations, these measures were "retaliation operations."⁴⁷

Almost certainly no government in Israel, whether right or left wing, would adhere to a policy of restraint in the face of rocket attacks against its sovereign territory and the killing of citizens in their own houses, without jeopardizing its political survival. Inaction would have been unacceptable to the majority of the Israeli public, even if Israel stood to gain from this the automatic sympathy of the international community, as occurred when Israel remained passive in the face of Saddam Hussein's 1991 missile offensive. The question, then, of whether there was justification for Israel's limited offensive measures despite the failure of this response, is irrelevant. The Israeli government could not have acted differently towards the incessant rocket offensive against its territory and citizens. It had to fight back just as it did against the suicide terror campaign that emerged from the West Bank.

The third question – why were no defensive measures added to the offensive ones when it became clear that the latter were not achieving their aim – warrants further examination. Israel's response to the suicide bombing campaign from the West Bank during the Second Intifada initially relied on offensive measures such as targeted killings and ground incursions, culminating in a major ground offensive (Operation Defensive Shield in 2002). At the same time, albeit after much deliberation, Israel's government undertook a major defensive measure by erecting an elaborate and costly security barrier along the West Bank borders. In contrast, the Gaza rocket campaign did not elicit comparable defensive measures. The developments and decisions leading up to this situation will be subsequently discussed.

Defensive Response Measures: Active and Passive Defense

Background

Aerial attacks on cities are a relatively new form of warfare that was first applied during the Spanish Civil War in the 1930s. It was subsequently implemented during WWII, when entire cities across Europe were destroyed. The emergence of strategic air power capable of sowing such widespread destruction compelled prospective victims to adapt various response strategies, both offensive and defensive:

1. Deterrence: Establishment of powerful strategic air power to dissuade aggressors from attacking the defender's homeland; further use of such air power as retaliation after an attack in order to dissuade the aggressor from additional attacks.
2. Preemption: Destruction of the aggressor's capability through attacks on air bases, specifically on the production, maintenance and operation infrastructure of its air power.
3. Active Defense: Interception and destruction of enemy airplanes in mid-air, whether by manned interception aircraft or by ground-based air defense systems (anti-aircraft guns and ground-to-air missiles).
4. Passive Defense: Evacuation of non essential residents from threatened population centers, provision of shelters to the remaining residents and establishment of early warning and alert systems to warn the population to take cover in time.

From the perspective of the civilian population under attack, there is no real difference between aerial bombardment, missiles or rockets – all are "threats from above." Thus, defensive response options against missiles and rockets are similar to those used against aerial threats – deterrence, preemption, active defense and passive defense – the main difference lying in the technical and operational challenges. First, preemption of rockets and missiles is far more difficult than that of air power, as argued in the preceding section. Second, the requirements for shooting down manned aircraft are very different from destroying missiles and rockets in flight since the latter are generally smaller and much faster targets than most modern combat aircraft and therefore infinitely more difficult to detect and destroy. Also, while the

technology for intercepting bombers by fighter aircraft matured in WWII, the know-how for intercepting and destroying missiles by other missiles has evolved only in the last two decades. And, the technological ability to intercept and destroy shorter range rockets in flight has matured only in the last few years.

When it comes to passive defense measures, sheltering against air raids takes advantage of the relatively long period between threat detection and threat arrival. Usually, there is enough time for people to move in an orderly fashion to communal shelters. In contrast, the warning time for impending missile and rocket attacks is too short for civilians to reach such shelters. Instead, a large number of shelters in close proximity to smaller groups of people – preferably within individual residences – are required as it is only a matter of seconds before the rocket impacts. The short grace period is also problematic for foot and vehicle traffic, requiring the provision of numerous roadside shelters for pedestrian and drivers.

While the previous section dealt with Israel's efforts to stop or at least slow down the Palestinian rocket fire into Israel using offensive tactics, the related issue of minimizing damage and casualties by defensive tactics and measures, both active and passive, is detailed below.

Active Defense in Israel

The term "active defense" refers to the interception and destruction of missiles and rockets in flight. The technologies required to intercept Scud-like ballistic missiles reached maturity during the latter part of the 1980s. Israel was one of the few countries who took advantage of this new technological capability for the development of a full scale active defense system. The "Arrow" program that began in the late 1980s originated from a growing threat awareness that coincided with a political opportunity. The threat at the time came from Syrian Scud missiles, many equipped with chemical warheads. The opportunity came when Israel joined US President Ronald Reagan's Strategic Defense Initiative (SDI).

The Arrow program was conceived and supported by the Defense Ministers at the time, Moshe Arens and Yitzhak Rabin, despite strong and obstinate objections from the IDF High Command and against a chorus of criticism from the Israeli media. There was a general disbelief that intercepting missiles in flight was feasible ("You cannot hit a bullet with a bullet") and doubts about the affordability of active defense ("an expensive Arrow against a cheap Scud"). However, the IDF's objections stemmed from the concern that resources allocated to such defensive response measures would consume resources allocated to offensive weapons, which the IDF had always viewed as the backbone of Israel's military doctrine.⁴⁸ Despite these objections, the Arrow system was developed and reached initial operational capability (IOC) in December 2000, three months after the outbreak of the Second Intifada.

The Arrow system was designed against theater ballistic missiles such as the Iraqi Al Hussein that hit Tel Aviv and Haifa in 1991 – sizable missiles with a flight time of many minutes. These were fired individually from complex transporter erector launchers (TEL) and required a large crew for fuelling and launch preparation. In contrast, artillery rockets are physically small, with a short flight time (measured in tens of seconds) and rapid firing rate of up to 30 rounds per minute. Neither Arrow nor its US equivalents were designed to provide a solution for such threats.

Rockets were first fired against Israel in 1968 when the Palestine Liberation Organization (PLO) launched Grad rockets ("Katyushas") from its bases in Jordan toward the valley of Beit She'an. After its 1970 expulsion from Jordan to Lebanon, the PLO resumed its rocket campaign against northern Israel, firing Katyushas at the cities of Kiryat Shmona and Nahariya – which suffered significant casualties and material damage – from its bases in south Lebanon. In the early 1980s, the PLO rocket offensive intensified to an intolerable level, prompting Israel to launch a high intensity counteroffensive – the first Lebanon War – the official goal of which was to seize PLO rocket launching sites as far as 40 km north of the border in order to block the PLO's capability to hit Israel with rockets. The expulsion of the PLO from Lebanese territory left a vacuum soon filled by the newly founded Hizballah organization. In 1985, shortly after Israel withdrew

from central Lebanon to its declared "security zone" in south Lebanon, Hizballah commenced its own rocket offensive against northern Israel. This led on two occasions to deliberate escalations by Israel. In both cases the IDF used standoff fire power (mainly artillery fire and air-to-ground attacks) to destroy Hizballah rocket depots and launchers north of the border as well as to pressure the Lebanese government to curtail the rocket fire. These two bouts of escalation – Operation "Accountability" (July 1993) and Operation "Grapes of Wrath" (April 1996) – were unsuccessful in bringing about the hoped for result.

During Operation Accountability rocket fire reached hitherto unimaginable ferocity. All IDF endeavors to suppress it by attacking launchers and supply routes were futile, and the rocket fire stopped only when Israel terminated the operation following an "understanding" between Israel, Lebanon, Syria and Hizballah. The unsatisfactory results of Operation Accountability first put the option of active defense on the Ministry of Defense's agenda. This occurred at the same time that Israel began its cooperation in active defense R&D programs with the US government, and Israel's Ministry of Defense believed that the road was clear to acquire more advanced active defense technologies from the US. Among the US ventures in missile defense was the development of high powered chemical lasers for intercepting missiles in flight. A proof of concept system was demonstrated by the Pentagon to Brig. Gen. (res.) Uzi Eilam, then Director of the Defense Ministry's R&D Directorate (MAFAT), with an emphasis on its ability to destroy rockets in mid air. According to Eilam, "It was already clear to us at that time that we must find an additional response, preferably one of active defense, to the threat of rocket fire from Lebanon – and this is how the idea of using a high energy laser beam to hit rockets in flight came up."⁴⁹

Operation "Grapes of Wrath" in 1996, during which over 770 rockets were fired against Israel's northern communities, further solidified the need for active defense and led to a joint venture with the US Army to develop a defense system based on a high powered laser called the "Nautilus," also known by the Americans as THEL (Theater High Energy Laser). By the outbreak of the Al-Aqsa Intifada in October 2000, a few successful interception tests had already been conducted

in the White Sands test range in New Mexico, pitching a prototype THEL against Israeli supplied Grad rockets. Since the prototype itself was a fairly cumbersome device, a more compact, mobile system was conceived, coined MTHEL (Mobile THEL).

Thus, when the first rocket from Gaza landed in Israeli territory in October 2001, the Israeli government and the defense industry had already gained valuable experience and accumulated some solid achievements in the art of active defense: One kinetic missile defense system (based on an interceptor missile, the Arrow) was already developed and approaching initial operational capability, and a second program – for the development of a directed energy system (based on a high energy laser) – was providing invaluable experience and know-how to the Israeli teams. It might have been expected that the IDF and the Ministry of Defense would rush to put such assets and experiences to good use by promptly employing them as an added active defense layer in the array of responses to the Gaza rocket offensive. This, however, did not happen.

Active Defense and the Gaza Rocket Campaign

The Gaza rocket campaign commenced at the same time that a high power laser anti-rocket system was in the course of development. When the first Israeli civilians were killed by rocket fire in June 2004, the Nautilus program was underway with some impressive successes at the US test range. Yet, during the first major IDF offensive aimed at suppressing the rocket fire (October 2004), when Maj. Gen. (res.) Amos Yaron, then Director General of the Ministry of Defense, was interviewed on the prospects of employing defensive means against the rocket threat, he stated unequivocally: "The Israeli defense establishment has no breakthrough that could destroy Qassam rockets in flight, nor do we have any intention of investing astronomical sums that would anyway fail to bring about any breakthrough in this area."⁵⁰ Later on in the same interview, in reference to the Nautilus system, Yaron made it clear that the defense establishment would continue to support the Nautilus program on a minimal scale (around \$7 million annually) in the following years, but emphasized that "the project had no completion date" and doubted whether such a system, even if operational, could actually destroy Qassam rockets in flight.

Years later, Yaron explained that since no active defense system could guarantee a "hermetic sealing" of the sky, the damages and casualties incurred by the few rockets that might leak through the defensive screen would defuse any public sense of security gained from successfully destroying rockets. This, in his opinion, would render as wasted the enormous investment made to build such systems.⁵¹ It is likely that Yaron's objections to allocating a significant budget to active defense, as well as his reservations about the technical feasibility of intercepting Qassam rockets in flight, reflected the IDF's prevailing skepticism about the technology as well as its doctrinal adherence to offensive weapons and tactics. Indeed, the following year (in 2005), Nautilus budgets were cut completely and the program shelved. The IDF, ready to risk its troops in offensive operations, was reluctant to invest in defensive technologies that could spare the lives of its soldiers as well as those of threatened civilians.

The termination of the Nautilus program in 2005 did not put the lid on all active defense related activities. That same year, MAFAT issued an RFI (request for information) to Israel's defense industries for a kinetic defense system (interceptor based rather than laser based) against rockets of the Qassam and Grad classes. No less than 14 proposals were submitted, three of which – based on innovative, low-cost interceptor missiles – came from the major defense companies in Israel: Rafael Advanced Defense Systems, Israel Aerospace Industries and Israel Military Industries.⁵² In August 2005, MAFAT chose the Rafael proposal as the lead one,⁵³ yet no development program was initiated, probably due to the IDF and Ministry of Defense's objections as expressed by Maj. Gen. (res.) Yaron. While the Defense Ministry embarked in early 2006 on a new active defense program ("Magic Wand"), it was designed against heavy rockets of types acquired by Hizballah at that time and had no capability against the Qassam and Grad rockets terrorizing southern Israel. An unnamed senior official in the defense establishment was quick to dispel any hope that this system, or any other system, would ever be capable of improving the situation: "Sderot will be hit by many more Qassams, and similar rockets are bound to be fired in the future from the West Bank. We must learn to live with this situation."⁵⁴

This "situation," so complacently advocated by that unnamed official, continued until the shock of the Second Lebanon War in July-August 2006 jolted decision makers out of their apathy. The intense rocket bombardment of Israel's northern districts, the high number of fatalities from rocket fire (53 civilians and soldiers), the colossal material damage, and the mass evacuation of the civilian population clearly demonstrated that tactical rockets have strategic implications far beyond their sheer nuisance value. The failure to stop the Hizballah rocket fire by offensive operations – either with reprisal air raids on Beirut's Dahia district or a furious campaign of destruction against the rocket launchers in southern Lebanon – added to the feeling of distress in Israel and to the growing awareness that something new must be done.⁵⁵

Consequently, then Minister of Defense Amir Peretz, who as a resident of Sderot had experienced first-hand the effect of Qassam rocket attacks on southern Israel, instructed the director of MAFAT to reexamine the available technologies for active defense against rockets and recommend a full scale development program. MAFAT Deputy Head Yaakov Nagel was appointed chairman of the committee to examine proposals from Israel and abroad. These included a rapid firing gun system,⁵⁶ a high energy chemical laser system (actually an improved, compact version of the Nautilus), and several kinetic (interceptor based) systems. The committee rejected the rapid gun and directed energy options and instead selected Rafael's proposal from 2005 for a kinetic system, giving it the somewhat bombastic name "Iron Dome." Due to the urgent need for a speedy response to the rocket threat, the head of MAFAT's R&D division, Brig. Gen. Danny Gold, initiated the project on his own authority in November 2006, almost two months before Defense Minister Peretz formally approved the recommendation of the Nagel Committee⁵⁷ in February 2007. Ehud Barak, who replaced Amir Peretz as Defense Minister on June 18, 2007, endorsed his predecessor's decision and the project won the support of the Israeli cabinet in December 2007.⁵⁸ The program's cost was estimated at \$300 million for development and initial production. It was expected to reach its initial operating capacity (IOC) in the second half of 2010.

Iron Dome is one of the most ambitious projects ever pursued in Israel's weapon development history. The system is designed to engage rockets fired from as close as 4 km away to as far as 40 km away, ranging from the tiny Qassam rockets to the heftier Grad 122 mm factory-made rockets. Later on, the system's operational capacity was expanded to include rockets of up to 70 km in range – addressing the threat of the Iranian Fajr-5 mid-size rockets that Hizballah had already deployed from Lebanon.

Due to the urgency of the situation, the project received priority akin to a wartime emergency project. The first interception tests were successfully completed in March 2009 and a series of interception tests using the full weapon system (including radar and a command and control center) were successfully conducted in January 2010. Subsequently, it was announced that the first Iron Dome system would be delivered to the IDF by May 2010 – several months ahead of schedule. Following another round of highly successful tests in July 2010, the IDF started training to operate the system and the Air Force's Air Defense Command planned to achieve IOC in November 2010. Such a technological achievement – the full scale development of a cutting edge program in less than 30 months – is impressive by any standard.

Comments by senior officials in the defense establishment indicated that once the development was complete, Iron Dome batteries would be promptly deployed in southern Israel to protect the Gaza envelope communities, in particular the long suffering town of Sderot. In late 2007 Defense Minister Barak estimated that in two and a half years time it would be possible to deploy the first operational system in Sderot.⁵⁹ "Iron Dome will bring back security to the south," stated the byline of an article on the successful tests of January 2010.⁶⁰ In practice, however, the IDF had no intention of deploying Iron Dome batteries on a permanent basis for the defense of Sderot and decided that the delivered batteries would be stored in Air Force bases and be deployed in the field only in cases of "significant escalation." Furthermore, the size of the acquisition program remained vague. According to a senior official in the General Staff, "First we need to see what the system is capable of and what it cannot do, and only then we will decide the size of the purchase"⁶¹ – a statement which reflects

the IDF's ambivalence in regard to active defense. If it had been a new aircraft acquisition program instead, it is hard to imagine any officer of the General Staff suggesting that the IDF purchase only one aircraft "to see what its capabilities are" and only then decide on the size of the buy. Eventually, as a result of the IDF's refusal to finance the Iron Dome acquisition from the defense budget, Barak turned to the US President who consented to allocate \$205 million (an insignificant sum in the terms of Israel's overall defense budget) for the procurement of several more Iron Dome batteries. Once produced, these would cover about one third to one half of the total number of batteries required to protect the entire country. The humiliation of begging for the monies needed for this sorely needed self defense weapon indicates that, even today, the IDF still has not accepted homeland defense against missiles as part of its overall mission – despite this being formally enshrined as "the fourth pillar" of its doctrine.

The Nagel Committee, whose task was to choose between contending rocket defense technologies, also examined rapid fire gun systems. This was rejected on account of the miniscule size of the area that a single gun system could defend, as several guns would be required just to protect a modest sized town like Sderot. At the same time, there was no doubt about the ability of a gun system to protect smaller communities (such as a single *kibbutz*) or national infrastructure installations like the "strategic target" (i.e. the Zikim power station) near Ashkelon. As early as 2004, a joint team of representatives from the IAF and MAFAT declared that "the Vulcan-Phalanx system (a rapid fire cannon used by the US army) could provide a response for the protection of strategic installations." In 2008, the Israeli Ministry of Defense submitted an RFI to the Pentagon as a preliminary step toward the possible procurement of such a system. In early 2009, the Israeli State Comptroller recommended that the IDF accelerate this process "in view of the threat of rockets and mortar bombs to vital and even strategic locations."⁶² Despite all of this, no such purchase of rapid fire cannon systems is known to have been made by Israel so far (October 2011).

From this chain of events, one can see that the IDF was consistent throughout the Gaza rocket offensive in rejecting active defense

measures. This rejection was rooted in its inherent preference for offensive weapons and tactics regardless of their indifferent results. While the shock of the Second Lebanon War created an awareness of the need to diversify the response options, including introducing active defense, going so far as to enshrine it as the fourth pillar of Israel's defense doctrine,⁶³ it was nevertheless not really internalized by the IDF. Maj. Gen. (res.) Yaron, speaking many years later, best expressed this sentiment when he said, "[The Gaza rocket campaign] will be resolved either politically or militarily by reoccupying the [entire Gaza] territory. Whoever believes that investing billions of dollars [in defense systems] will solve the problem is plainly wrong."⁶⁴ Lt. Gen. (res.) Haloutz, with his characteristic candidness, spoke about the two contrasting philosophies in Israel's defense establishment concerning active defense: The Ministry of Defense (i.e. the civilian staff of the Minister of Defense) maintained that active defense was an acceptable solution while the IDF (i.e. the IDF High Command) rejected it. Haloutz attributed this difference to the "psychology of decision making and the reluctance to change one's priorities, which is difficult to do, since it is easier to deal with something already on your desk than to pick up an issue from the floor and put it squarely on your desk." In addition, Haloutz attributed the IDF's approach to the low lethality of the rockets from Gaza.⁶⁵

As of September 2010 (time of writing), no active defense system, Israeli or foreign purchased, had been employed against the rocket offensive on southern Israel. Remarkably it was not the rockets from Gaza that finally compelled Israel's defense authorities to embark on the development and acquisition of an active rocket defense system – rather, it was the shock of the Second Lebanon War that did so. One can conclude, therefore, that the Gaza rocket campaign was not perceived by Israel's defense establishment as a security risk significant enough to justify a change in paradigm and priorities. The residents of the afflicted communities, whose lives were at risk and whose property and livelihood were jeopardized, thought otherwise, as will be seen below. The gap in threat perception between the civilians in harm's way and the complacent officials in the IDF and Ministry of Defense, ostensibly responsible for their safety, was even more pronounced on the issue of passive defense, as described in the next section.

Passive Defense

Passive Defense in Israel

Sheltering the general population against air raids has always been part of Israel's defense doctrine. During World War II, Tel Aviv and Haifa were bombed several times by the Italian Air Force, killing hundreds of residents.⁶⁶ The British administration of Palestine encouraged the Jewish Yishuv (community) to establish a civil defense system, consisting of residential shelters and an urban public warning system to provide alarm sirens as well as "all clear" signals. The experience gained during the Second World War and the equipment that remained – namely the centralized public warning system – were again put to good use during the 1948 War of Independence, during which Tel Aviv and its suburbs were once again subjected to aerial bombardment, this time by the Egyptian Air Force, leaving dozens dead and causing heavy material damage. For the next 43 years aerial bombing was regarded as the main threat to the home front. Accordingly, underground public bomb shelters were built and new legislation dictated that every place of residence, including private homes, must have an underground shelter. Similarly, all apartment buildings had to include a reinforced cellar for sheltering the building's residents.

After the Six Day War, the PLO launched rockets and mortar shells toward Beit She'an and the Jordan Valley communities. One of Israel's responses was the extensive "shelterization"⁶⁷ of the targeted communities, including the structural reinforcement of public institutions and the construction of roadside shelters for drivers and passersby. After the expulsion of the PLO from Jordan and its entrenchment in Lebanon, Israel's northern communities (including the large towns of Nahariya and Kiryat Shmona) were in turn subjected to ever increasing Grad rocket fire ("katyushas"). Here, too, Israel's government responded by extensively constructing public and private shelters and by structurally reinforcing schools and other public buildings.

The missile attacks on Tel Aviv and Haifa during the First Gulf War (1991) prompted a reevaluation of the concept of air raid sheltering.

With the threat now coming from chemical agents, underground shelters were deemed too risky since the heavier than air chemicals could flow to low-lying places, which would essentially turn these shelters into death traps. Consequently, shelterization requirements were altered, replacing underground shelters with above ground "protected spaces" – namely a designated room in each dwelling, with blast resistant walls and ceilings as well as steel doors and shutters. The "protected space" would be strong enough to withstand blasts and shrapnel and the infiltration of chemical agents. The building code in Israel was amended accordingly, new legislation was passed, and local governments were given the power to enforce this new regulation. Today, the protected space (MAMAD) is familiar to any Israeli citizen purchasing a new apartment or house.

Of all Western states, Israel is probably the country with the greatest awareness of the need for population sheltering, the most extensive system of passive defense, and the greatest and most up-to-date knowledge and experience about building public and private shelters against every type of threat. It could have been expected that this awareness and capability would be utilized promptly to protect the population of southern Israel as soon as the Gaza rocket offensive started. But, as with active defense, this was not the case.

The planning and implementation of passive defense is based on close cooperation between numerous government agencies, including the Defense Ministry, IDF, Finance Ministry and the municipalities and regional councils – each with its own agenda, budgeting priorities and coterie of quarrelsome officials. This is a source of continuous tension and endless wrangling. The issue of passive defense during the Gaza rocket campaign is therefore a complex story with as many versions as the number of entities involved. A detailed account of the convoluted story of passive defense during the Gaza rocket campaign is beyond the scope of this study, which offers instead the brief overview below.

Passive Defense and the Gaza Rocket Campaign

The first passive defense initiative was implemented after the first mortar bomb struck Kibbutz Nahal Oz on April 4, 2001. This attack

did not cause property damage or injuries, but was perceived by the kibbutz members as a forewarning of things to come. The kibbutz used its political connections to appeal to then Minister of Defense Binyamin (Fuad) Ben Eliezer, who allocated NIS 7 million to the kibbutz for the structural reinforcement of its residences – this sum was matched by the kibbutz from its own resources.⁶⁸ According to the State Comptroller's report, this money enabled the construction of 120 secure spaces (MAMADs) in the kibbutz, enough for all of its members.⁶⁹ Yet, the steps taken by Kibbutz Nahal Oz were not emulated by neighboring communities, and the issue of shelterization remained stagnant for the next three years.

It took the first deadly rocket attack on Sderot in June 2004, in which two Israelis lost their lives – one of them a small child – to compel the Gaza envelope communities to start extensive sheltering programs. The shock of these deaths also led the IDF to launch a military offensive (Operation "Days of Repentance") as well as to take the first hesitant step toward the effective sheltering of the general population in the southern region. To this end, the need for a public warning system was recognized and pursued. Rafael's "Ma'amin" system, a device originally designed for sniper detection, was hastily converted into a rocket detection system capable of detecting Qassam rockets in flight. This provided a 15 to 20 second warning for the residents of Sderot – a barely sufficient yet vital time for people to reach a MAMAD or simply seek shelter behind a wall. The system was deployed near Sderot in September 2004, but at first operated erratically and caused grave disappointment.⁷⁰ In the following years the system was improved and became fairly reliable. The same system provided residents of northern Israel with effective early warning during the Second Lebanon War and offered even more timely and accurate early warnings in southern Israel during Operation Cast Lead. For such achievements, the Ma'amin development team was awarded the 2009 Israel Defense Prize.⁷¹ Later on, the US-made "Nurit" artillery-spotting radar was integrated into the system,⁷² and more recently, the new and sophisticated "Raz" radar, developed and produced by Elta Systems, was added to the early warning system.⁷³

The vigorous steps taken in the area of early warning eventually produced satisfactory results. However, general population sheltering was neglected. As early as May 2004, seemingly as part of the IDF High Command's detailed planning for the Gaza Disengagement, the IDF Home Front Command put together a plan to shelterize all Gaza envelope communities located within 9 km of the Gaza border – a total of 83 communities. The cost of this program was estimated at NIS 4.2 billion, a prohibitive sum for the Israeli defense budget.⁷⁴ Thus, the plan was shelved.

The government's decision in June 2004 to unilaterally withdraw from the Gaza Strip did not explicitly account for the need to build shelters for the Gaza envelope communities. Nevertheless, three weeks later, the Minister of Defense allocated NIS 130 million for the erection of shelters in the seven communities closest to the Gaza border. In March 2005, the Ministry of Defense approved a plan to build shelters in all 46 communities located within 7 km of the Gaza border, a program whose completion was scheduled to coincide with the completion of the Disengagement process in the second half of 2005. The plan immediately hit a budgeting snag, since it had naively been assumed that the necessary funds would come from the treasury plus-up. But, the Finance Ministry refused to increase the defense budget beyond the already approved annual defense allocation and demanded that the sheltering plan be financed instead by internal Ministry of Defense sources. The end result was that only a small part of this program was ever implemented, and even this occurred months after the completion of the Disengagement.

In the town of Sderot, which was the main target for Qassam rockets from Gaza, initial arrangements for upgrading the existing public shelters began in 2003, almost two years after the onset of the rocket offensive. Yet, only after the June 2004 attack on a kindergarten that resulted in the first two deaths from Qassam rockets did the IDF Home Front Command prepare a comprehensive program for shelterizing kindergartens and schools in Sderot. The implementation of this program moved along at a snail's pace due to the basic controversy between Defense and Treasury over the budget allocation. Thus, 18 months into the program, with rockets continuing

to fall on Sderot, only one-third of the town's kindergartens, and none of its schools, had received structural reinforcement against rocket fire.

The completion of the Disengagement in August 2005 did not bring about the hoped for respite from the Gaza rocket offensive. Instead, the rocket fire actually intensified. In 2006, the evacuation of Sderot by some of its residents first became noticeable, a trend that kept increasing in subsequent years. According to Eli Moyal, then mayor of Sderot, school registrations dropped by almost 12 percent in 2008 compared to the previous year,⁷⁵ indicating that in 2007 over a tenth of the population had fled the town. This underscored the urgent need to shelterize public buildings and residences that had not yet been fortified against rocket impacts, both in Sderot and in the neighboring communities. Moreover, on March 17, 2006, the day of the Knesset elections, the city of Ashkelon was hit for the first time by rockets from Gaza, thus vastly increasing the number of communities under threat and that required specialized anti-rocket shelters.

Notwithstanding the exponential growth in the number of threatened residents, the increasing disruption to daily life and the gradual emptying of the town of Sderot, the Israeli government reacted in a slow and indecisive manner. Israel was recovering at the time from the perceived debacle of the Second Lebanon War. This was a period of national grieving and soul searching, which forced a considerable shift in priorities and budgets toward the rebuilding of the IDF, restoration of economic losses, and repairing of material damages in northern Israel. Against this backdrop, the government's unwillingness to address the needs of the Gaza envelope communities or devote resources to shelterization in the south was apparent.

By the end of 2006, a year during which almost 1,000 rockets were fired against the Gaza envelope communities, the Israeli government refused to discuss the shelterizing of private residences.⁷⁶ The decision to develop Iron Dome in February 2007 only lent further support to those who opposed investing in passive defense as they claimed that the new active defense system would make any further passive defense measures redundant.⁷⁷ However, Knesset members who resided in the Gaza envelope communities launched a vigorous campaign for the continued shelterization of private and public

buildings in their communities. Eventually a compromise was reached. Since Iron Dome's minimum range was officially 4 km, the government accepted the need to fortify all communities that sat within 4.5 km of the Gaza border.⁷⁸ The 2007 budget included a three-phase program for constructing 10,000 secure spaces within the "4.5 km line" – 6,000 in Sderot and the remainder in smaller communities. Phase I of this program called for the structural reinforcement of 3,000 rooms in the apartments of the older parts of Sderot (those built before 1991 and hence lacking the mandated "secure space" or MAMAD). This phase received a budget of NIS 330 million. Still, phases II and III, involving the reinforcement of another 3,000 rooms in Sderot and 4,000 rooms in the surrounding rural areas, remained unbudgeted.

The prolonged debate over the budget allocations for phases II and III of the plan prompted the Gaza envelope residents to file a lawsuit against the Israeli government on the grounds of discrimination between those residents that had benefited from phase I and those who remained unprotected. This was at the time of the short-lived *hudna* (ceasefire) with Hamas during the summer of 2008, when the Israeli government decided to scrap the additional phases of the project, arguing that there had been no deterioration in the security situation to warrant such measures. Only when it became clear that the residents of the south had a good chance of winning their lawsuit did the government approve the budgets for the second and third phases of the program, at a total cost of about NIS one billion.⁷⁹ On a more positive note, once the acrimony ended, all of the government agencies involved in the project joined together to advance the creation of secure spaces in the Gaza envelope, which proceeded smoothly and effectively.

The result of all this infighting and indecision in the upper echelons was that it took six years from the beginning of the offensive for Israel's government to do its duty and undertake a vital albeit costly program of shelterizing all residents' homes in the zone of danger. Up to that point, shelter-building was limited in extent and often had to rely on local political initiatives. As argued below, this inaction by the government was perceived by residents of the afflicted area as a debacle, evoking public outcry and even legal action.

What were the reasons for such procrastination by the central authorities in Jerusalem as its citizens faced mortal danger? Several explanations come to mind, some generic – stemming from the general inefficiency of Israel's public service – and some more specific, related to the unfolding of events elsewhere in the country.

One generic explanation for this governmental dawdling can be attributed to the traditional difficulty of Israel's administration at all levels to initiate and implement major civic construction programs, a difficulty whose origins could be the topic of a fascinating study by itself but which is beyond the scope of this paper. Sheltering entire communities was by all measures a major and costly civic construction enterprise. As such, it was destined to share the fate of all other large scale enterprises, which had been tossed into the bureaucratic maze and bounced around between various government agencies for many years until a consensus was reached – if ever – and the enterprise received a go-ahead. The torturous histories of other large civic construction initiatives in Israel, such as the Ayalon Freeway, the Tel Aviv light rail (still decades away) and the seawater desalination system (still in its infancy), are typical of the elephantine pace of Israel's other national infrastructure initiatives

Another generic factor seemingly at play was the eternal battle over the defense budget. The responsibility of identifying and implementing civil protection initiatives lies with the Defense Ministry, which is in charge of specifying the technical requirements (via the Home Front Command) and presenting cost estimates for the project. As seen by the treasury, civil protection against enemy action is a matter of national defense; hence, its financing should come from the general defense budget, and the Ministry of Defense should come up with the money by shifting priorities within its own annual budgets. The Ministry of Defense, however, sees its approved budget as inflexible, committed in its entirety to its annual manpower, maintenance and acquisition requirements, and thereby lacking any leeway to accommodate new and unforeseen expenses. This quarrel between the two ministries has existed since the establishment of Israel. It is prevalent as well in other countries, reflecting the constant struggle over national priorities between "guns" and "butter".

Apart from these two generic factors, there may have been several more immediate and specific causes for the slowness and hesitancy in implementing passive defense in the Gaza envelope communities. One such cause could be the gradual progression of the Gaza rocket offensive. Having commenced as a low level, hardly noticeable threat, it was only several years into the offensive that its lethality, range and rate of fire increased to a point of insufferableness.

After the first Qassam landed on the town of Sderot in 2001, it would have been obvious to any sensible observer that the situation could only worsen, yet nothing was done regarding civil protection in Sderot or in the surrounding communities (with the exception of Kibbutz Nahal Oz) until the June 2004 deaths. Undoubtedly, the low lethality of the rockets in the first years of the campaign "lulled" the residents, the local authorities and the government into inactivity. A 2005 poll by the Sha'ar Hanegev Regional Council showed that only a small percentage of the population was concerned with the security situation. Most indicated as their main concerns demographic growth, community spirit, economic development and quality of education. Moreover, some of the local leaders made a deliberate effort to play down the significance of the rocket attacks during the first few years of the offensive, preferring to adopt a "business as usual" attitude as a sign of fortitude and determination, and also to avoid frightening away new residents and potential investors in the region.⁸⁰ Haloutz characterized the government's decision making process as follows: "The [governing] system provides solutions only when the situation becomes intolerable and the [executioner's] axe is already cutting into the nape of its neck."⁸¹ During the first three years of the rocket campaign, there was still no sense of urgency and even if there was such a feeling, some of the local decision makers had an interest in concealing it.

Another specific cause of delays in civil protection measures in the south was the intense public debate surrounding the Disengagement. A clear indication of this can be found in the State Comptroller's report on the civil protection of the Gaza envelope communities: "In June 2004...the Minister of Defense held a meeting to review the IDF's plans for the Disengagement [in the course of which he approved] the implementation of the first phase of civil defense [i.e.

building shelters against rockets and mortars] for seven border communities but warned against actions and statements [on this or any other matter] that may create the impression that the Disengagement would cause a deterioration in the security situation".⁸² Launching a widespread civil defense program at that time would have been tantamount to publicly admitting that the Disengagement could create new security risks, playing into the hands of the Disengagement's opponents. Indeed, it was only a year and a half later, in 2007, when it became glaringly apparent that the rocket offensive had intensified to an unbearable level, that the government finally agreed, albeit reluctantly, to deal with the issue of sheltering the population of the Gaza envelope communities.

A third specific factor that may have played a role in the postponement of civil protection was the disagreement between the various players over the strategy Israel should pursue in response to the Gaza rocket offensive. Eli Moyal, the Mayor of Sderot during most of the period covered in this study, believes to this day that implementing civil protection is a tacit admission that Israel is ready to accede to aggression. From his perspective, "To accept civil protection is to accept terror as part of your life." His preference for offensive rather than defensive measures is also evident in his statement that "the war should have been pursued aggressively."⁸³ Moyal was not alone in this view.

Finally, a pragmatic objection to population protection had to do with its potential scope. Decision makers were concerned that every increment in range that put more communities at risk would in turn create more demand for costly population protection. This could instigate an impossible race between the growing range of the rockets and ever growing requirements for expensive public and private sheltering. Moreover, it seems that there was a real concern among some government officials that acceding to the demands of Sderot and Gaza envelope residents for civil protection would create a precedent for residents in more distant communities. If and when the rocket range increased to include them, this would bring the treasury to the brink of bankruptcy.⁸⁴ Prime Minister Olmert's controversial statement that "we will not shelter ourselves to death," clearly expressed such concerns.⁸⁵

Whatever the reasons, the fact is that the residents of the Gaza envelope communities were exposed for years to ever intensifying, increasingly lethal rocket attacks, putting their lives, property and livelihoods at stake, before Israel's government bestirred itself to support their need for rocket proof sheltering. In his 2005 report on the status of the school and kindergarten sheltering program in Sderot, the State Comptroller condemned the government's mishandling of the situation, calling it "a continuous debacle." This harsh term could well describe the government's handling of the entire sheltering program in southern Israel.

THE HOME FRONT: PUBLIC OPINION AND GOVERNMENTAL ATTITUDES

While an in depth study of the behavior and mood of the population and local officials in the targeted areas as well as the general Israeli public and leaders is beyond the scope of the study, a short review is offered here.

The public attitude among residents of the Gaza envelope towards the rocket campaign can be divided into two stages: a stage of equanimity followed by a stage of apprehension. The first stage was characterized by a low level of attention to what was considered a mere nuisance, due to the relatively low rate of rocket fire, little amount of damage and few casualties incurred at the time. Throughout this period, Gaza envelope residents were more focused on the problems of day-to-day living than on survival. The 2005 public opinion poll mentioned above confirms this, as the overwhelming majority of the local public assigned a lower priority to security issues than to children's education and livelihood. During this period of equanimity, the local authorities strove to continue developing the region; hence, they tended to play down the rocket threat and suppress its significance. One example of this is the case of a local college that tried to squelch the news of rocket impacts inside its campus.⁸⁶ It is likely that other local institutions and communities, anxious to retain their income and residents, did the same.

The Israeli government, too, seemed to play down the significance of the rocket campaign during that time. Preliminary discussions over an Israeli unilateral withdrawal from the Gaza Strip (and from part of the West Bank) were broached discreetly among confidants of then Prime Minister Ariel Sharon in the summer of 2003,⁸⁷ two years prior to its actual implementation. During those two critical years, Sharon fought energetically to gain public approval for his decision as well as endorsement from his own political party, the Knesset and the majority of his own government ministers. Clearly, attention to the rocket fire on the Gaza envelope communities would have played into the hands of the Disengagement's opponents. This probably explains the motives of Dov Weisglass, Sharon's close adviser at the time, in

dismissing the Qassam rockets as "flying objects" – an insignificant factor in national risk management.

It is hard to pinpoint the exact time when equanimity turned into apprehension. This shift in public attitudes probably began with the first rocket fatalities in June 2004 and was completed in late 2005 with the disillusionment over the outcome of the Disengagement. The state of apprehension increased demands for the construction of shelters and led to the abandonment of Sderot. The residents' sense of insecurity began to surpass their concerns over income and education. This apprehension was accompanied by a growing estrangement from the government, which was perceived as being indifferent to their suffering and too stingy to invest in protecting them. The intensification of the rocket fire after the Hamas takeover of Gaza led to angry protests and the blocking of roads in Jerusalem and Tel Aviv by Sderot residents, who demanded prompt government action to stop the rocket fire. Through the private initiative of Israeli-Russian tycoon Arcadi Gaydamak, Sderot residents were offered "vacations" in Eilat that became popular among part of the population.⁸⁸ The evacuation of residential districts was not limited to the low socioeconomic strata of Sderot. In May 2008, after a member of Kibbutz Kfar Aza was killed by a mortar bomb in front of his fellow kibbutz members,⁸⁹ the kibbutz practically disintegrated⁹⁰ as its hitherto highly resilient community began to abandon the area.

Along with public demoralization in the Gaza envelope communities, there were also instances where groups and individuals took advantage of the security situation. In some cases, rumor has it, funds allocated for building shelters in residences were diverted to the enlargement of private homes.⁹¹ Also, while the number of pupils registered in Sderot's schools declined, the overall municipal registry was growing. This paradox can be explained by the benefits and tax exemptions granted by the government to Sderot residents – it seems that individuals from outlying districts were registering as Sderot residents (by renting evacuees apartments for cheap) in order to enjoy the tax benefits.

Generally, public opinion in the center of Israel was indifferent to the suffering of the Gaza envelope residents, despite considerable efforts

by various individuals and organizations to generate empathy. Perhaps the clearest illustration of this indifference was the attempt in the summer of 2007 to expose Tel Avivians to Sderot's trials and tribulations by displaying a Qassam exhibit on the trendy Rothschild Boulevard in Tel Aviv, which featured 50 exploded Qassam rockets placed along the boulevard. The media response to this exhibit indicates that the public in Tel Aviv perceived the display as a modern sculptural art venture rather than a distress call. This indifference, seen since the beginning of the Gaza offensive in 2001, had foreshadowed the "bubble mentality" of the Second Lebanon War in summer 2006. A coffee shop customer in Tel Aviv, interviewed during Operation Cast Lead explained the "bubble mentality" as such: "You can call it escapism, you can call it indifference, but the bottom line is that you cannot expect people to identify with a suffering they simply do not experience."⁹² Nonetheless, the media also offered many expressions of guilt by individuals and groups from central Israel over the abandonment of their fellow Israelis in the south. One blogger wrote of his weekend bicycle ride in the south: "When I passed near Sderot I thought of it being hit by Qassams and for a moment I identified with the suffering of the residents. Then the thought passed and I resumed my concentration on cycling." Many other examples of guilt feelings can be found in the print and electronic media at the time.

Overall, the media did not ignore the rocket campaign and its consequences and reported in depth on the population's suffering. Even so, it curiously refrained from using the term "attrition war" in its coverage of the events in the south, despite growing similarities to the previous attrition campaigns along the Jordan Valley and the Lebanese border. Apparently the government's tendency to play down the situation permeated the general media.

As for the attitudes of government representatives, even if some senior officials were empathetic toward the suffering of the Gaza envelope population, they managed to conceal it quite effectively. Expressions such as "flying objects," "mere psychological threat," and "we will not shelter ourselves to death" gave an impression (presumably unintentionally) of disconnect between the civilians under attack and the officials elected, among other things, to

safeguard their security. The foot-dragging on the issue of civil protection was interpreted to some extent as the government's alienation of its citizens, and even as an indication that the population's demands were exaggerated, derived from weakness and outright cowardice. In June 2006, Shimon Peres, then Deputy Prime Minister, complained, "Everyone is stoking the hysteria. What is the big deal? Kiryat Shmona was bombed for years."⁹³ Deputy Minister of Defense, Maj. Gen. (res.) Matan Vilnai, in a speech at the Knesset in response to a no-confidence proposal, made an unflattering comparison between the complaints of the Gaza envelope residents and the resilience of Jerusalem's residents during the period of suicide attacks: "We in Jerusalem...suffered hundreds of dead...did we complain that we could not sleep at night?...Did we claim to have been forsaken?..."⁹⁴ On their part, the targeted population vented their anger, frustration and feelings of alienation through graffiti art, stickers and YouTube clips, demanding "a Western Negev state" or "a new defense cabinet."

CONCLUSION

The Gaza rocket offensive has continued for more than nine years. In its early stages, in the latter part of 2001, it was no more than a footnote to the Al-Aqsa Intifada raging across Israel at the time, but after the Hamas takeover of the Gaza Strip in June 2007 it turned into a full-blown conflict between the State of Israel and the Hamas government in Gaza. By September 2010 (time of writing) the campaign had been relatively quiet for over 18 months, with the rocket fire dwindling to a "trickle" and with no major Israeli military action against Hamas or other Gaza organizations except an occasional minor air strike. This de facto ceasefire was not based on any formal agreement and therefore its stability and duration are questionable. It is likely to end sooner or later, and the rocket fire is bound to resume. Already during Operation Cast Lead, Hamas showed its ability to attack deep into Israel. According to media reports, Hamas has been making good use of this lull in hostilities to build up a larger and longer range arsenal of rockets.

In November 2009, Hamas first tested a rocket with a range that could reach Tel Aviv. It is probable that Hamas rockets could soon attack civilian and military targets in central Israel, including Tel Aviv, Ben-Gurion airport and air force bases in the south. What began as a mere nuisance at the beginning of the previous decade has now turned into a major strategic threat. How this situation came about and whether it could have been avoided will be debated heatedly in the future. This study focuses on the pragmatic aspects of the story, namely Israel's response measures and their efficacy.

From the description of Israel's response measures detailed in this study, it is clear that Israel preferred offensive responses to defensive ones. Within the spectrum of offensive responses, preference was given to limited, offensive operations both on the ground and from the air. At least five limited ground operations were launched against the rocket network in Gaza. In April 2002 Israel launched a major ground offensive ("Defensive Shield") in the West Bank as part of its efforts to quash the suicide bombing offensive against central Israel, but it shrunk back from doing the same in Gaza against the growing menace of the rocket offensive. Operation Cast Lead, the only major

counteroffensive against the rocket terror was carried out eight years later.

In light of the ineffective results of the limited ground assaults, the question is why were they carried out at all? The answer does not lie in concrete military notions like preemption and deterrence but relates to perception and self-image. The inevitable reaction of individuals and societies to aggression is to fight back, even if this does not bring immediate or concrete results. Thus, when criticizing the effectiveness of Israel's offensive measures, the question must be asked: what would the outcome have been had no offensive measures been taken at all? It is reasonable to assume that unlimited, self-imposed restraint in the face of constant rocket attacks – killing Israeli citizens and driving them out of their homes – would have been perceived by the Israeli public as well as by Israel's enemies as a sign of extreme helplessness. Presumably, any Israeli government that would have pursued a policy of utter restraint would not have survived long in office.

The fairly extensive application of offensive measures sharply contrasts with the hesitation and reluctance of the civil and military authorities to engage in significant defensive measures, active or passive. While the use of early warning as a passive defensive measure was prompt and effective, it was not a particularly expensive component of the defense toolkit and was infinitely less expensive than building thousands of secure spaces (MAMADs) or developing and producing active defense systems. Vigorous political maneuvers and the intervention of Israel's Supreme Court were needed in order to force the government to allocate resources for extensive civil protection. The development of an active defense system that could intercept short-range rockets from the Gaza Strip was delayed until after the shock of the Second Lebanon War. It is yet unclear if and when sufficient interceptor missiles and associated systems will be available to protect against the rockets from Gaza. (See postscript for updated information on Israel's use of active defense systems).

Ultimately, the common denominator of the two phenomena – the energetic implementation of offensive measures versus the lethargic handling of defensive measures – is budgetary. Offensive action

usually makes use of manpower and equipment already budgeted and paid for in the annual defense budgets. In contrast, extensive civil protection and major active defense programs require considerable budgetary allocations, which must be diverted from existing budgets or financed from increased taxes – in other words, it requires a change in priorities. Haloutz's observation on the difficulty of changing priorities in the Israeli decision making process is appropriate in this case.

At the same time, it must be noted that the Israeli government has agreed in the past, albeit reluctantly, to change its budgetary priorities when a vital need arose either in national security considerations or domestic political needs. The multi-billion shekel security fence erected during the Second Intifada for defense against the suicide campaign is an example of such an emergency budgetary reallocation. It therefore must be concluded that in the eyes of the Israeli governments in power since the start of the Gaza rocket offensive, this campaign did not justify a priority change. Israeli governments have tended to refer to the rocket campaign against Israel's south as a nuisance rather than a major threat to national security (or to their continued tenure). This attitude was quietly endorsed by the majority of Israel's public, who, on the whole, did not criticize its government or launch an extensive protest (apart from the protest of the residents of the attacked areas). Overall, both the government and the public refused to place the rocket threat high on their list of national priorities.

How can this be explained? One explanation derives from “precedent rationale.” Israel experienced attrition wars along its borders in the past, first in the Jordan Valley and then along the Lebanese border. In these cases the main response was that of small-scale offensives actions (with one exception: the First Lebanon War). In previous cases, too, no significant changes were made to national priorities, and the public in the center of the country showed acceptance, to a certain extent, of the situation. This type of behavior seems like a natural and even healthy response of a society under siege, which strives to lead a normal daily life while its enemies try to disrupt this routine.

Yet this hypothesis fails to explain some profound difference between preceding attrition wars and the current one. In the case of the rocket offensives against northern Israel, civil protection of the residents in the afflicted areas was not accompanied by scathing debates between the local population and the authorities as in the present case.⁹⁵ The authorities at that time simply did their duty and flooded the afflicted areas with shelters, both communal and residential, with hardly any debate. Furthermore, in the attrition wars in the north, Israel's defense establishment eagerly sought active defense measures and invested in a futuristic high power laser system ("Nautilus"), in striking contrast to its reluctance to invest in active defense in the Gaza case. This indicates that the "precedent explanation" is not entirely adequate.

A supplementary explanation derives from "specific rationale." The rocket campaign from Gaza commenced during the Second Intifada and escalated after the latter was suppressed. The Israeli public had to stretch its resilience to the limit in enduring and overcoming the Second Intifada, which brought in its wake a severe economic crisis. The significant escalation in the rocket campaign – from 2004 onwards – was characterized by the decline of the Second Intifada and an easing of the security situation in Israel's large cities, which brought a sense of relief and an impressive economic recovery.⁹⁶ Some of the recovery was due to the economic reforms of then Minister of Finance Binyamin Netanyahu. Conceivably the desire to sustain the economic recovery by maintaining tight budgetary discipline was the main motive for the tendency to refrain from allocating significant resources for defense in general and for defensive responses to the rocket campaign in the south in particular. While this approach is understandable, its downside became evident not only in the hesitant management of the battle along the Gaza border, but also in the IDF's lack of proficiency that was unfortunately demonstrated in the Second Lebanon War. The suppression of the Second Intifada and the return of Israel's economy to an accelerated growth track were impressive national achievements, but the preference of "butter" over "guns" took its toll both in the Second Lebanon War and in the suffering of the Gaza envelope residents.

To sum up, Israel's response measures in the face of the southern rocket campaign did not differ in principle from the responses to previous attrition wars, which also gave preference to the maintenance of normal, daily routines in non-targeted areas. Yet in the Gaza case, Israel's responses were colored by the circumstances of the time, which brought out a lower level of decisiveness in the defensive realm in comparison to past cases. In order to "justify" the hesitancy of the defensive response, some government officials opted to trivialize the threat – for example, calling it a "mere psychological threat." The price paid by Israeli society for this hesitancy and indecisiveness was damage to the social fabric and a sense of alienation among the afflicted residents. The government's behavior can perhaps be explained, but can in no way be excused. A national leadership is elected to lead the nation in times of peace and war rather than to merely act as its bookkeeper.

And what of the future? It is unclear whether past models of contained attrition wars near the country's borders are still relevant. The massive armament of Syria, Hizballah and Hamas with rockets and missiles that can hit the entire country from end to end might ratchet any minor border incident into a war of attrition against Israel's heartland. Maintaining normal life in the heartland of Israel while a war rages along the borders may no longer be tenable. From now on, any war in the periphery has the potential to quickly blow up into a war of attrition against the entire territory of Israel. In this new reality it will be impossible to ignore the issue of defensive measures, and Israeli society, if it wants to live, will have to change its priorities and bear the burden of withstanding the new mode of warfare inflicted upon it. Not only will social cohesion rely on defensive measures, but the very ability of Israel's society to function and to support the IDF's offensive measures will depend on it.

POSTSCRIPT

In the 10 months that have passed since the publication of the Hebrew version of this study, the intensity and general pattern of the Gaza rocket offensive has evolved in a predictable manner. On the whole, the "drizzle" of rocket fire has persisted over this period, interrupted by brief cycles of escalation that subsequently petered down again to a "drizzle".

Two escalation cycles have been recorded to date: one in early April 2011 and the second in late August 2011. In both cases, the rocket fire intensified after Israel attacked targets in the Gaza Strip, killing Palestinian combatants or civilians. The escalation pattern was, however, significantly different from that of the pre-Cast Lead offensive. Here, the tendency of the Palestinian groups was to fire rockets at the more distant, larger cities in Israel's south and not at the small Israeli communities adjacent to the Gaza border, like Sderot. Ashkelon, Ashdod and Be'er Sheva were repeatedly targeted, as well as some smaller towns deep within Israel.

As predicted, the rocket offensive has increasingly targeted larger populations within Israel's heartland, making it impossible to confine the confrontation to the border areas. While the rocket offensive up until Cast Lead at the end of 2008 affected about 200,000 Israeli civilians, the two rounds of escalation in 2011 affected close to one million people. Sderot, in fact, was hardly targeted – according to available sources, there were no more than three hits within the city limits out of an approximate 280 rockets of all types fired at Israel during the two cycles of escalation. The Palestinians, it seems, have lost interest in harassing small communities; with longer range rockets now at their disposal, they are finding it more profitable to harass larger cities.

The second major departure from the previous pattern was the implementation of Israel's active defense system. After completing another round of successful tests in February 2011, the two available Iron Dome batteries, which had been stored in an Israel Air Force base, were used in late March and early April 2011 for the defense of Be'er Sheva and Ashkelon respectively. Their rate of success in the

field is unclear (no official information on this has been released to date), but the media has reported success rates ranging from 78-93 percent. Although both cities were subjected to repeated attacks, very few of the Palestinian rockets penetrated the active defense, minimizing loss of life and property damage. The combined Israeli toll in both flare ups was one dead and less than 10 severely injured. This lethality ratio of one fatality for every 280 rockets is much lower than the lethality ratio in the opening phase of Cast Lead (one fatality per 100 rockets) and that of the 2006 Lebanon War (one fatality per 72 rockets). It seems then that the use of active defense reduced the lethality of the Palestinian rockets by at least two-thirds. The relatively minimal casualties and property damage enabled the Israeli government to manage the crisis without escalating the violence.

The success of Iron Dome has dispelled any misgivings within Israel's political leadership over the need for active defense. The treasury's fears that a growing need for passive defense deeper inside Israel would require huge budgets were coming true, and active defense now seemed the cheaper choice. The success of the initial active defense system to intercept the majority of rockets has created a strong demand from local governments in southern Israel for the deployment of Iron Dome in their communities. In the wake of the August 2011 flare up, Israeli Minister of Defense Ehud Barak announced the imminent activation of a third Iron Dome battery in September 2011 and a fourth one by the end of the year.

The Israel Air Force, whose troops operate Iron Dome, seems to have been finally cured of its ambivalence, and its troops have embraced the system enthusiastically. Furthermore, the Air Defense Command has been expanded from one to three wings in preparation for the absorption of more Iron Dome batteries and the next missile defense system, "David's Sling," expected to mature in about two years.

The Palestinians' reaction to the introduction of active defense was mixed. Some reports spoke about frustration among Gaza's residents, many of whom could watch the Palestinian rockets being destroyed in mid-air over neighboring Ashkelon. At the same time, the Palestinian armed factions made intense efforts to break through the defense by launching larger salvos of rockets at the two batteries defending

Ashkelon and Be'er Sheva, while forgoing the temptation to seriously hit the yet undefended city of Ashdod. In fact, the single fatality during the two escalation cycles came as a result of a particularly heavy salvo of Grad rockets fired at Be'er Sheva on the night of August 20, 2011. The fact that this barrage of rockets was aimed at Be'er Sheva, with its Iron Dome battery, and not at the equidistant but larger and undefended city of Ashdod, may indicate that the Palestinians' main priority was to probe the defense system for weaknesses. Such use of saturated fire as a countermeasure to missile defense was predictable based on numerous statements made by Iranian and Hizballah officers.

The future security environment in the Middle East and along Israel's borders, both in the north and south, hinges on the outcome of the ongoing upheavals in the region – the so called "Arab spring" that has been ongoing since February 2011, toppling three of the region's regimes. The end of Mubarak's rule in Egypt and the still raging violence in Syria will no doubt influence the future of Israel's confrontation with the Palestinians in Gaza and with Hizballah, as well as the course of future rocket offensives.

Notes

¹ Cross-referencing public sources reveals that from the start of the campaign until Operation Cast Lead, 4,320 rockets were fired, killing 17 people, in addition to 2,543 mortar shells, which killed another ten.

² For example: "When a discussion was held about Gaza, opinions here were that bombs and Katyushas would be fired from Gaza to Ashkelon. Well, were they?"

Shimon Peres, 28 June 1995. Available at:

<http://forum.sportenter.co.il/showthread.php?t=107&page=217>.

"The nightmare scenarios of the Likud are well known. They also promised us Katyushas from Gaza. For a year now Gaza is predominantly under PA rule. There hasn't been a single Katyusha and there won't be," Yitzhak Rabin on Israeli radio, 24 July 1995. An audio recording can be found at: <http://media.a7.org/a7radio/hebrew/rabin-no-shells.wma>.

Some of the media expressed a similar position, for example: "Who remembers, for instance, the Katyushas which were meant to land on Ashkelon if 'God forbid' the Gaza Strip were evacuated?" Carmit Guy, Radio Channel 2, 6 April 2000. Available at: http://www.faz.co.il/story_5764.

³ Dov Weisglass at a conference on science, technology and security, Tel Aviv University, 2 June 2005. See also, "Weisglass: The Qassams – Flying Objects," *Yediot Aharonot*, 3 June 2005.

⁴ "Ministry of Defense: Trade Renewed with China", *Ynet News*, 3 January 2006.

⁵ "We will not fortify ourselves to death, though there may be extreme situations in which we will have a limited response capability," *Globes*, 3 December 2007.

⁶ See:

<http://www.mevaker.gov.il/serve/showHtml.asp?bookid=449&id=157&frompage=70&contentid=8296&parentid=8294&bctype=1&startpage=0&direction=1&sw=1600&hw=1130&cn=%D7%AA%D7%A7%D7%A6%D7%99%D7%A8>.

⁷ The terms "artillery rocket" and "rocket artillery" are used interchangeably to refer to the use of rockets for bombing purposes.

⁸ "And the rocket red glare, bomb bursting in air gave proof through the night that our flag was still there." These lyrics were inspired by the courage of the defenders of Fort McHenry, Baltimore, against the artillery bombardment of the British Royal Navy in the War of 1812, a bombardment which made much use of Congreve rockets as steep trajectory weapons.

⁹ The system in IDF use is the US-made MLRS - Multiple Launch Rocket System - with a 300mm diameter and range of 40 km.

¹⁰ Wikipedia (Hebrew), under "Katyusha."

¹¹ For a detailed survey of the Hizballah rocket campaign during the Second Lebanon War and the IDF efforts to suppress it, see U. Rubin, "The Rocket Campaign Against Israel During the 2006 Lebanon War", Middle East Security and Policy Studies, No. 71, BESA Center, June 2007. Available at: <http://www.biu.ac.il/Besa/MSPS71.pdf>.

¹² "\$20M in Tiger Weapon Seized," *National Post*, 4 May 2009. Available at: www.nationalpost.com.

¹³ In 2003, after the Iraq War, artillery rockets were used extensively against urban targets by the rebels in that country. The current war in Afghanistan has been

characterized in the last few years by the extensive use of rockets against population centers, including the capital, Kabul. Lately, rockets were reported to have been used also by the pro-Pakistani organizations in Kashmir against Indian targets and by the Kurdish PKK organization in Turkey against Turkish army posts in eastern Turkey.

¹⁴ El Kassam English forum, see Adnan el Ghouli at www.almoltaka.ps/english.

¹⁵ The technical description of the rockets and the overview of the evolution of the rocket campaign in the present and following chapters is taken mostly from the report of the Intelligence Heritage & Commemoration Center (IICC), "The Rocket Threat from Gaza 2000-2007." Available at http://www.terrorism-info.org.il/malam_multimedia/Hebrew/heb_n/html/rocket_threat.htm.

¹⁶ The Aqaba Summit was held during the visit of US President George Bush, with participation as well by Israeli Prime Minister Ariel Sharon, Jordanian King Abdullah and the Prime Minister of the Palestinian Authority, Abu Mazen, who made a commitment at the Summit to stop the armed Intifada and the anti-Israel incitement.

¹⁷ The first two fatalities from a Qassam rocket attack launched from Gaza were Afik Zehavi and his grandfather, Mordechai Yosefov, both killed by a rocket that landed near a kindergarten in Sderot on 28 June 2004. See S. Hadad & A. Halfon, "Sderot: Adult and Boy Killed in Qassam Rocket Attack," *Ynet News*, 28 June 2004. Available at: <http://www.ynet.co.il/articles/0,7340,L-2938751,00.html>.

¹⁸ On 17 March 2005 Hamas, Fatah and ten other Palestinian organizations reached an agreement for Hamas to be integrated into the Palestinian Authority. This agreement paved the way for a Hamas victory in the elections to the Palestinian Parliament in January 2006.

¹⁹ For more information on the bombing of a booby-trapped house and tunnel within the Hamas-controlled area and the attack on a Qassam launching team on 5 November 2008, see <http://www.nrg.co.il/online/1/ART1/807/308.html>.

²⁰ One of the fatalities, Be Suda, was a Thai foreign worker who worked in the flower hothouses of the Ganei Tal settlement in Gush Katif.

²¹ Salah and Halid Zaddin (father and son) were killed by a Qassam rocket adjacent to Kibbutz Nahal Oz.

²² *Bamachane* (army periodical - Hebrew), 2 January 2009.

²³ This data was logged by the author in a comprehensive logbook maintained by him during the operation, based on media reports, mostly from websites, such as Ynet, NRG, Haaretz, *Sikur Memukad*, and *Heder Hadashot*. Nevertheless, Israeli official announcements gave different numbers. The disparity probably is the result of a combination of factors, such as uncertainty about the rockets that landed in open areas, different definitions and counting methods, partial reporting by the population on rocket landings, the lack of differentiation between rockets and mortar shells by communities exposed to both weapons, etc.

²⁴ One of the difficulties in counting the lightly wounded is the lack of differentiation between physical and psychological injuries when reporting the numbers. As part of the effort to strengthen public morale in the afflicted areas, teams of psychologists encouraged people to apply for help in cases of

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psychological stress. Each person who did so was counted in the statistics as a "stress casualty."

²⁵ Y. Melman, " Hamas: We Hit the Tel Nof Air Force Base", *Haaretz*, 10 January 2009.

²⁶ U. Rubin, "An Active Defense against Rockets and Missiles: The Lessons of Operation Cast Lead and the 2006 Lebanon War," Middle East Security and Policy Studies, No. 69, BESA Center, February 2009. Available at: <http://www.biu.ac.il/SOC/besa/perspectives69He.html>.

²⁷ According to the IICC, in the year following Operation Cast Lead, a total of 141 rockets were fired - just less than the number of rockets fired in 2003. See: [http://www.terrorism-](http://www.terrorism-info.org.il/malam_multimedia/Hebrew/heb_n/html/ipc_070.htm)

[info.org.il/malam_multimedia/Hebrew/heb_n/html/ipc_070.htm](http://www.terrorism-info.org.il/malam_multimedia/Hebrew/heb_n/html/ipc_070.htm).

²⁸ D. Richardson, " Hamas Rocket Teams Adapted to Israeli Tactics Amid Conflict," *Jane's Missiles and Rockets*, December 2009, p. 11.

²⁹ *Bamachane*, 2 January 2009.

³⁰ For a survey on Operation "Days of Repentance," including start and end dates, see NEWS 1 website, [http://www.news1.co.il/Home/L02-S-00121-00.html?tag=16-](http://www.news1.co.il/Home/L02-S-00121-00.html?tag=16-15-47)

[15-47](http://www.news1.co.il/Home/L02-S-00121-00.html?tag=16-15-47).

³¹ The infant Dorit Benisian. See: <http://www.zionism-israel.com/vic/Benisian.htm>.

³² A. Buchbut & M. Osmana, "Days of Repentance: 130 Terrorists Killed," *NRG*

News, 16 October 2004.

³³ IDF Spokesperson, "Operation First Rain to Eradicate Qassam Fire North of The Gaza Strip," 26 September 2005. See:

<http://dover.idf.il/IDF/About/history/2000s/2005/092601.htm>.

³⁴ "Chief of General Staff: The Aim of Operation Blue Skies is to roll back the Qassam threat from strategic installations in the Ashkelon area." See: <http://www.inn.co.il/News/Flash.aspx/135020>.

³⁵ "Qassam Landed on Strategic installation in Ashkelon," *Ynet News*, 14 February 2006.

³⁶ See diagram on "Extent of Fire in 2006" and "Rocket Threat from Gaza Strip 2000-2006," IICC Report, p. 40; See "Kassam Rockets Statistic to January 2008." Available at:

http://zionismisrael.com/vic/Sderot_Qassam_Statistics_Summary_2007.htm.

³⁷ Due to "vacations" in Eilat funded by tycoon Arcadi Gaydamak. See:

<http://www.ynet.co.il/articles/0,7340,L-3329216,00.html>.

³⁸ See: [http://www.mako.co.il/news-military/security/Article-](http://www.mako.co.il/news-military/security/Article-1ec4d0ea599ee11004.htm)

[1ec4d0ea599ee11004.htm](http://www.mako.co.il/news-military/security/Article-1ec4d0ea599ee11004.htm).

³⁹ Author's interview of Lieutenant-General (res) Dan Haloutz, 30 July 2009.

⁴⁰ Buchbut & Osmana, "Days of Repentance: 130 Terrorists Killed."

⁴¹ "Mofaz: A Qassam Fired? We will send A-Zahar to Yassin," *Ynet News*, 27 September 2005. Note: Sheikh Yassin was the leader of Hamas until his elimination by the IDF in a focused operation on March 2004. Mahnood A-Zahar is currently the most senior Hamas leader in Gaza.

⁴² "Qassam Landed on Strategic installation in Ashkelon."

⁴³ Colonel (res.) Shaul Arieli, former IDF Brigade Commander of Gaza, commented that "there is no perfect military solution to the Qassam attacks." Interview, "From Today to Tomorrow" program, Channel 1 TV, 5 July 2006.

⁴⁴ C. Greenberg, "IDF: Eventually We Will See the Results in Gaza," *Ynet News*, 21 December 2007.

⁴⁵ Author's interview with Dan Haloutz, 30 July 2009.

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ On the IDF's objection to developing the Arrow, see U. Eilam, *Eilam's Arch* (Tel Aviv: Yediot Aharonot and Sifrei Hemed, 2009, Hebrew), p. 411. For a more detailed analysis of the IDF position against the project, see, B. Z. Naveh and A. Lorber, *Theater Ballistic Missile Defense*, American institute for Aeronautics and Astronautics publications, Lexington Massachusetts, pp. 23-26.

⁴⁹ Eilam, *Eilam's Arch*, p. 421.

⁵⁰ A. Barzilai, "Director General of Ministry of Defense: In The Next Few Years There Will Be No System to Intercept Qassams," *Haaretz*, 19 October 2004.

⁵¹ Author's interview with Maj. Gen. (res) Amos Yaron, 12 March 2009.

⁵² F. Frisch, "What's on Fire?" *Maariv*, 21 November 2007. Solicited proposals submitted for the development of an interceptor system against heavier rockets of the Fajr type later crystallized into the "Sling of David" program. This program, launched on March 2006, had no requirement to defend against Qassam rockets.

⁵³ A. Lorber, "The High Energy Laser – Is Israel Attempting its Next Techno-Political Flop?" Ariel Center for Policy Research (ACPR), December 2009. Available at: <http://www.acpr.org.il/new.htm>.

⁵⁴ A. Egozi, "Sources Claim That The Qassam Interceptor System Will Be Operational in 6 to 8 Years," *Yediot Aharonot*, 16 November 2006.

⁵⁵ For a detailed survey on Hizballah's rocket campaign on the north during the Second Lebanon war, see: Rubin, "The Rocket Campaign Against Israel During the 2006 Lebanon War."

⁵⁶ In response to the firing of mortar shells and short-range rockets on US forces in Iraq, the US ground forces developed a ground-based model of the ship-mounted PHALANX naval rapid-fire gun. Its high rate of fire enabled it to hit mortar shells and rockets in flight. The US and British ground forces purchased, deployed and operated these gun systems to protect their forces in Iraq. According to media reports, these gun systems proved successful.

⁵⁷ The chief of the R&D division of MAFAT, Brigadier General Dani Gold, was criticized harshly for this by the State Comptroller. In others' opinion, including this author, Gold's actions were timely and praiseworthy.

⁵⁸ *Israel's 12th Prime Minister Ehud Olmert: "Israel's 31st Government: Policy Decisions and Implementation"* (In Hebrew, p. 15), Prime Minister's Office Communication Department.

⁵⁹ A. Harel, "Minister of Defense: Interceptor System will Protect Sderot within Two and a Half Years," *Haaretz*, 24 December 2007.

⁶⁰ A. Egozi & Y. Yehoshua, "The Price of Defense," *Yediot Aharonot*, 10 January 2010.

⁶¹ A. Harel, "Iron Dome, Missile Interceptor System, Not to be Deployed in Sderot," *Haaretz*, 3 February 2010.

⁶² Y. Melman, "State Comptroller Report: Foot-Dragging in Deploying Vulcan Phalanx Guns for Intercepting Rockets," *Haaretz*, 2 March 2009.

⁶³ The other three pillars are deterrence, preemption and attack. See speech by Minister of Defense Amir Peretz at the Herzliya Conference, 22 January 2007: http://www.herzliyaconference.org/_Articles/Article.asp?ArticleID=2328&CategoryID=285.

⁶⁴ Interview with Amos Yaron, 12 March 2009.

⁶⁵ Interview with Dan Haloutz, 30 July 2009.

⁶⁶ In one of the bombings raids on Tel Aviv, 107 people were killed in the Nordia neighborhood, today's Dizengoff Center shopping mall. See <http://www.isracast.com/article.aspx?id=470>.

⁶⁷ This term was introduced into the paper to convey as best as possible in English the Hebrew term "*migun*", for which the words reinforcement or hardening are not quite an accurate translation.

⁶⁸ Author's interview with Knesset Member Shai Chermesh, 19 March 2009.

⁶⁹ "The Disengagement, Shelterization of the Gaza Envelope communities, Decisions and Implementation," State Comptroller Report, 22 January 2006.

⁷⁰ I. Saban & A. Egozi, "The Failed Deterrence," *Yediot Aharonot*, 21 September 2004.

⁷¹ Y. Knispel, "Israel Defense Award for Early Warning System Developed by GOC Army Headquarters," GOC Army Headquarters website, 25 June 2009. Available at: <http://mazi.idf.il/113-8052-he/IGF.aspx>.

⁷² Artillery-spotting radar is used to track hostile mortars bombs, pinpoint their launch coordinates, and compute their anticipated impact points.

⁷³ S. Helving, GOC Army Headquarters website, 15 January 2009. Available at: <http://mazi.idf.il/3834-7267-he/IGF.aspx>.

⁷⁴ This data and most of the information on decision-making processes and budgets until after the Disengagement comes from: "The Disengagement, Shelterization of the Gaza Envelope communities, Decisions and Implementation," State Comptroller's Report, 22 January 2006, unless stated otherwise.

⁷⁵ Author's interview with Eli Moyal, 5 May 2009.

⁷⁶ "Alon Schuster: The Decision of the Prime Minister's General Director is Impertinent and Irresponsible," 4 December 2006, www.nihukmekomi.co.il.

⁷⁷ Interview with Shai Chermesh, 19 March 2009.

⁷⁸ The opponents of Iron Dome were quick to conclude that this system would not be able to protect Sderot, whose western urban limit lies about 1.4 km from the Gaza border, but this is not necessarily correct. Firing rockets from the Gaza borderline itself is too risky to the launch team, compelling the Palestinian organizations to launch their rockets from deep within their territory from sites embedded in densely populated areas. It can be safely assumed that the currently-used Qassam rockets are launched from a distance of at least 6 km from their targets – a range well within the specification of Iron Dome.

⁷⁹ Author's interview with Shai Chermesh, 15 April 2010.

⁸⁰ Information on residents' attitudes as well as on the intentional suppression of the rocket attacks' implications come from the author's interview with Alon Schuster, Head of Sha'ar Hanegev Regional Council, 19 April 2009.

⁸¹ Interview with Dan Haloutz, 30 July 2009.

⁸² State Comptroller Report from 22 January 2006.

⁸³ Interview with Eli Moyal, 5 May 2009.

⁸⁴ In his response to the lawsuit filed in the Israeli High Court of Justice by residents of the Gaza envelope communities demanding the provision of rocket sheltering of their homes, Israel's Attorney General stated that the shelterization of residential homes in the Gaza envelope have "significant budgetary consequences, such as tying up the huge budgets from being spent on other, more publicly-beneficial purposes." See: "The State to the Israeli High Court of Justice: Stay Away from the Fortification Issue," *NRG News*, 10 December 2007. Available at: <http://www.nrg.co.il/online/1/ART1/669/695.html>.

⁸⁵ Statement by Prime Minister Ehud Olmert during a debate in the State Comptrolling Committee at the Knesset, 3 December 2007. See: "Olmert: Israel will not shelter itself to death," *NRG News*, 3 December 2007. Available at: <http://www.nrg.co.il/online/1/ART1/666/627.html>.

⁸⁶ Interview with Alon Schuster, 19.4.2009.

⁸⁷ Lieutenant-General (res) Moshe Yaalon, "What caused the Disengagement?" Jewish Leadership website, 8 March 2006, <http://he.manhigut.org/security/2396>.

⁸⁸ "Peretz vs. Gaydamak: We will not allow a takeover by donors," *Ynet News*, 16 November 2006.

⁸⁹ Kibbutz member Jimmy Kadosh.

⁹⁰ Interview with Shai Chermesh, 19 March 2009.

⁹¹ Prime Minister Ehud Olmert hinted at this in his remarks during a debate in the State Comptrolling Committee on 3 December 2007: "If someone thinks we should invest billions in underground shelters so that we could rest in them, this will not happen." (see 85 above).

⁹² Israeli Channel 2 News, 5 January 2009.

⁹³ S. Hadad & A. Somfalvi, "Sderot under Curfew," *Ynet News*, 20 June 2008. Available at: <http://www.ynet.co.il/articles/0,7340,L-3264961,00.html>.

⁹⁴ A. Maranda, "Vilnai to residents of the Gaza Envelope: Hundreds were killed in the terror attacks," *Ynet News*, 16 June 2008. Available at: <http://www.ynet.co.il/articles/0,7340,L-3556420,00.html>. Deputy Minister Vilnai, realizing the strong negative impression of his remarks on the residents of the Gaza envelope, made a second visit the following day (17 June 2008), to try to rectify the situation.

⁹⁵ Ehud Barak, speaking about the difference in approach of the administration then and now, said during his 2008 meeting with heads of councils in the south: "Just as we built, for years, shelters for every house in the north, so it should be done now in the south." Concurrently, his deputy, Maj. Gen. (res) Matan Vilnai, alluded to the source of this difference in a somewhat roundabout way: "We will get to the second stage (of the shelterization program) and as it happened in the first one, this will also be carried out against the wish of the Prime Minister." See: "Barak to Gaza

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Envelope: Standing by You on Fortification," Western Negev website, 14 August 2008. Available at: <http://www.short.co.il/article.php?s=300>.

⁹⁶ During the peak of the Second Intifada, in 2001-2003, there was a negative annual growth rate of 2% in Israel's GNP. In the years 2004-2007 (inclusive), the GNP grew annually at a rate of 3-4%. See "60 Years in Statistics," General Bureau of Statistics, www.cbs.gov.il.