# Terrorist Attacks On Public Bus Transportation: A Preliminary Empirical Analysis


MTI Report WP 09-01


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# TERRORIST ATTACKS ON PUBLIC BUS TRANSPORTATION: A PRELIMINARY EMPIRICAL ANALYSIS

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This report provides data on terrorist attacks against public bus transportation targets and serious crimes committed against such targets throughout the world. The data are drawn from the MTI database of attacks on public surface transportation, which is expanded and updated as information becomes available. This analysis is based on the database as of December 17, 2009. Data include the frequency and lethality with which buses, bus stations, and bus stops are attacked; the relationship between fatalities and attacks against bus targets and the relationship between injuries and attacks against those targets; how often, relative to other surface transportation targets, buses are attacked, first with all weapons and then with only explosive and incendiary devices; the relative lethality of attacks; and the distribution of attacks. It then presents some preliminary observations drawn from those data that can help stakeholders—governments, transit managers, and employees—to focus on the ways the most frequent and/or most lethal attacks are carried out as they consider measures to prevent or mitigate attacks that may be considered likely to happen in the United States.

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# INTRODUCTION

This interim report, produced by the Mineta Transportation Institute's National Transportation Security Center (MTI/NTSC), a National Transportation Security Center of Excellence (NTSCOE) for the Science and Technology Directorate (S&T) of the Department of Homeland Security (DHS), provides data on terrorist attacks against public bus transportation targets and serious crimes committed against such targets throughout the world. It then presents some preliminary observations drawn from those data.

The report is part of MTI/NTSC's contribution to a project collaboratively funded by the Transportation Security Administration–Transportation Sector Network Management (TSA-TSNM) and S&T-DHS to develop a Mass Transit Bus Operator Behavioral Awareness Program. Three other NTSCOEs are participating in the project: Rutgers University, Tougaloo College, and Texas Southern University. MTI/NTSC has provided statistical analyses of bus attacks, case studies, and subject matter expertise throughout the project, which began in September 2009 and will end in December 2010.

The data presented here are drawn from the MTI database of attacks on public surface transportation, to which additional incidents are added either as they occur or as they are painstakingly culled from existing collections that do not focus specifically on transportation security. This analysis is based on the database as of December 17, 2009; the most recent attack included in the analysis took place at an Israeli bus stop on December 13, 2009.

Most of the charts used in this report were used in presentations to the DHS Counter-IED working group on November 12, 2009, and to a bus-operator focus group on December 3, 2009. The charts from both presentations are reproduced in Appendices A and B.

This report will be revised and peer-reviewed and will be published as a formal MTI report in spring 2010. The final report will include MTI's most current data, so some of the statistics and preliminary conclusions will probably differ from those presented here. The final report will also include a more detailed look at a smaller set of data that will include approximately 50 recorded attacks against bus targets in North America, Western and Eastern Europe, and modern industrialized countries of Asia, whenever they occurred. It will also include the most recent attacks for which information is available from campaigns in Israel, Russia, Turkey, Pakistan, India, Sri Lanka, and the Philippines. This more detailed analysis will attempt to identify sets of attacks in which

- Particularly lethal tactics and weapons have been employed, including the use of suicide attackers.
- Actions by on-scene security personnel, operators, or passengers would likely not have stopped or mitigated the attack without significant advance warning.
- Enhanced awareness and actions by security personnel, operators, or passengers did in fact prevent or mitigate attacks.
- Particularly lethal bombs or incendiary devices were used.
- Bombs or incendiary devices malfunctioned or were ineffective.
- Multiple bombs were involved, timed to detonate to increase casualties, especially among emergency responders.

# THE MTI DATABASE

## OVERVIEW

MTI/NTSC started publishing chronologies of attacks on public surface transportation in 1997. These chronologies, which included some, but not all, such attacks between 1920 and 2000, were published in two MTI reports, the first in 1997[1] and the second in 2001.[2] These seminal publications on public surface transportation security helped to inform Congress; federal, state and local government agencies; and transit operators. Serious criminal attacks were included because terrorist groups observe and learn from criminal tactics and also sometimes conduct criminal actions to finance their operations.

In 2009, MTI/NTSC began creating a database that includes both its own chronologies and all attacks captured in the second release of the Global Terrorism Database (GTD) created by the National Consortium for the Study of Terrorism and Responses to Terrorism (START), based at the University of Maryland, a DHS Center of Excellence. The entries in this database, which we refer to as UMSTART, contain narratives of the details of surface transportation attacks between January 1, 1998, and December 31, 2007. MTI/NTSC also regularly updates its database to include attacks found in lists created by U.S. and other government and industry entities. All of the lists either are not specifically designed for transportation threat and security analysis or lack details and require painstaking analysis and interpretation to sort aspects of each attack into sets that will facilitate trend analysis. The MTI database also includes attacks identified through open source searches, as well as attacks that are not captured in other lists. It seeks to include all attacks starting in 1970; its record of attempted train derailments goes back to 1920.

Figures 1 and 2 show the evolving nature of the database as attacks are added. Between September 1, 2009, and November 12, 2009, 178 attacks were added, 80 percent of which (144) were against bus targets. Most of these attacks took place after 1974; 11 of the attacks took place between 1970 and mid-1974. Most of the additional incidents were identified through concentrated searches of campaigns against transportation targets in Israel, Russia, Turkey, India, Pakistan, Colombia, the Philippines, Indonesia, and Thailand.

On July 14, 2009, when MTI first described the database at the FTA/TSA Safety and Security Roundtable, the database included 1,049 attacks. As of December 13, 2009, it contained 1,497 attacks. About 90 attacks are added each month, and MTI estimates that by mid-2010, it could include as many as 2,000 attacks.

To make the database more robust, MTI is working with explosives experts within and outside the government to share information that will enable it to better analyze the effects of improvised explosive devices (IEDs) and improvised incendiary devices (IIDs). It is also using a smaller set of data—including those that will be used in the final MTI report—to test the feasibility of adding new fields that require access to original data. Finally, MTI is also moving the database from its current Excel© platform to a platform that enables median calculations as well as mean (average) calculations to be conducted to provide a truer picture of both the past likelihood (distribution) and the lethality of different kinds of attacks.

Figures 3 and 4 list some of the current fields in the system. There are 37 categories of targets and 26 categories of attacks and weapons, eight of which are considered “bombs or incendiaries.” The database also has 16 categories of methods of delivering and concealing devices and six categories of outcome, e.g., whether the devices detonated on target and on time, malfunctioned, or were rendered safe.

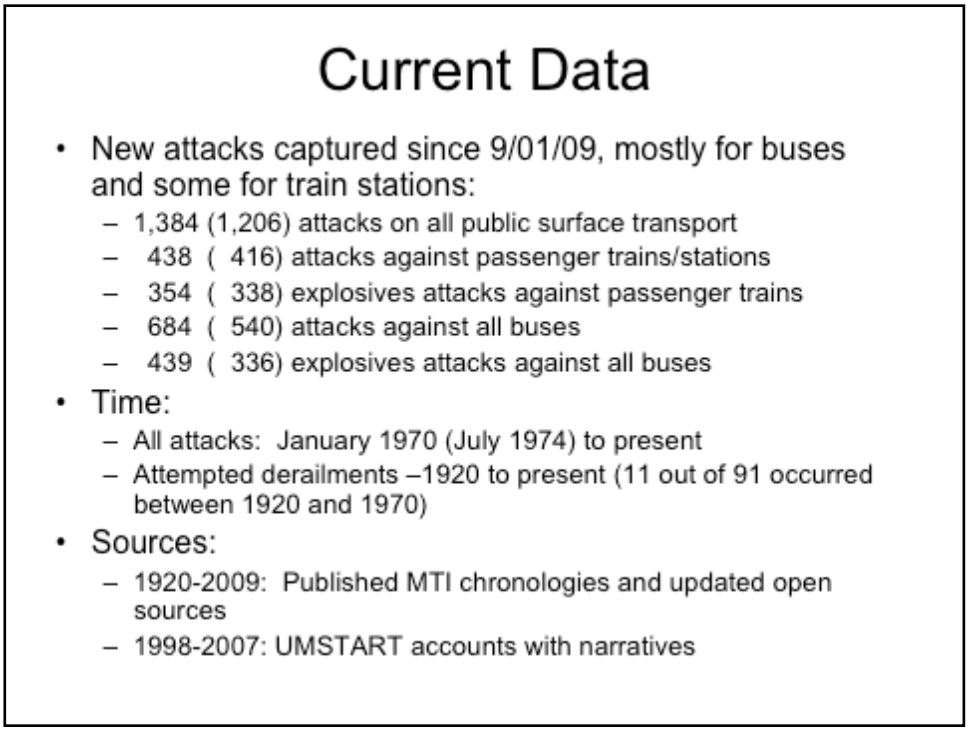
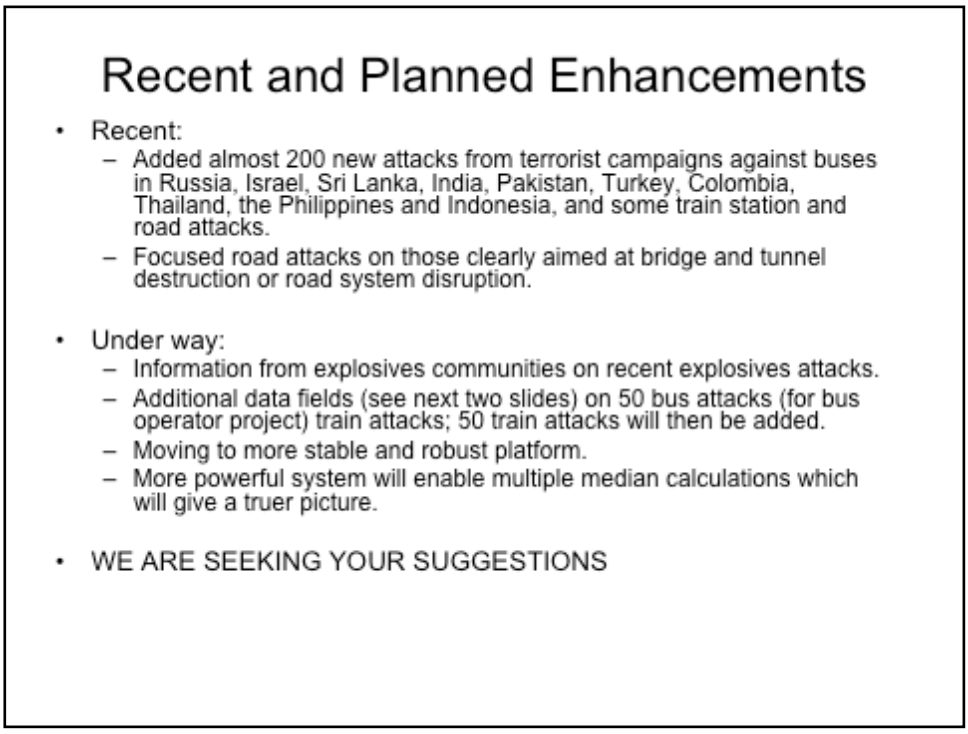



**Figure 1**

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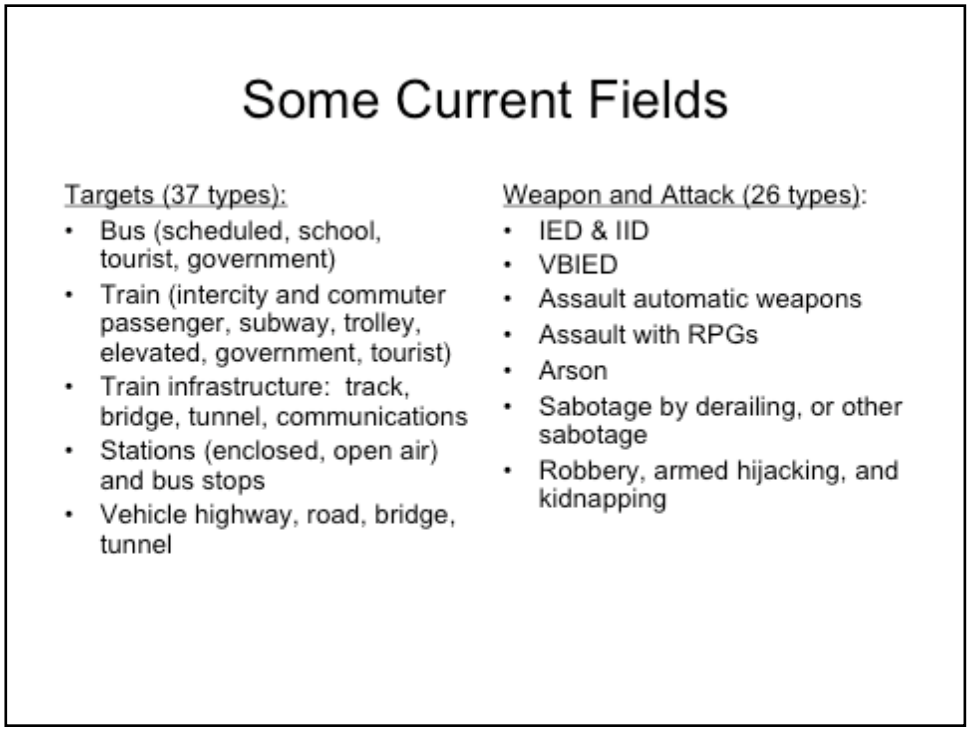



**Figure 3**

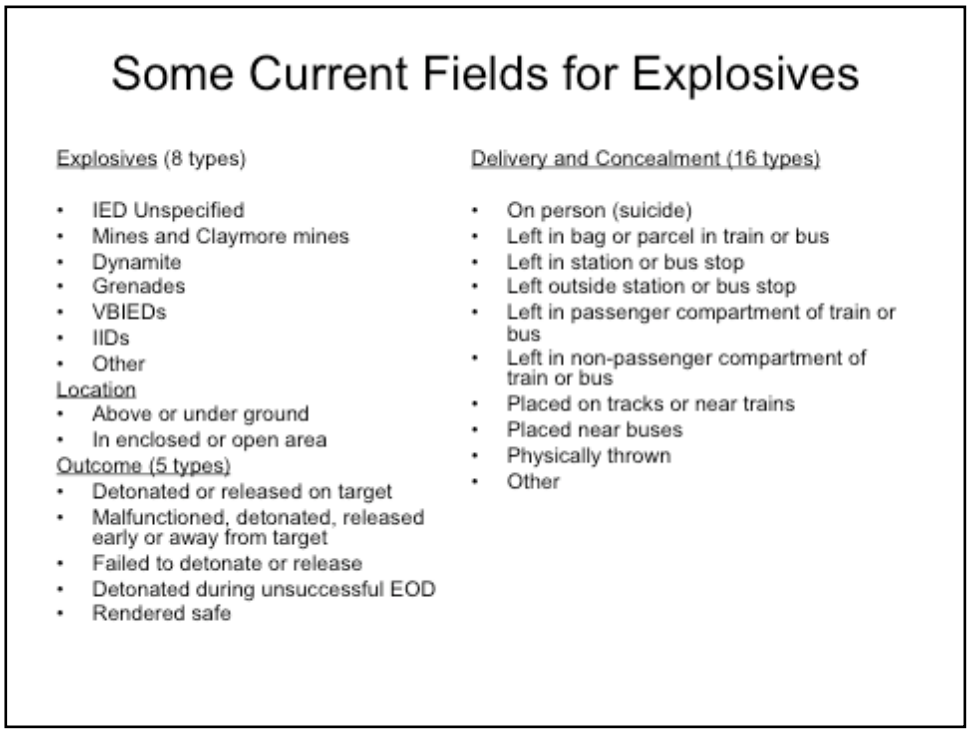



**Figure 4**

New fields being tested for inclusion on entries of recent attacks, for which more detailed information is available, are listed in Figure 5.

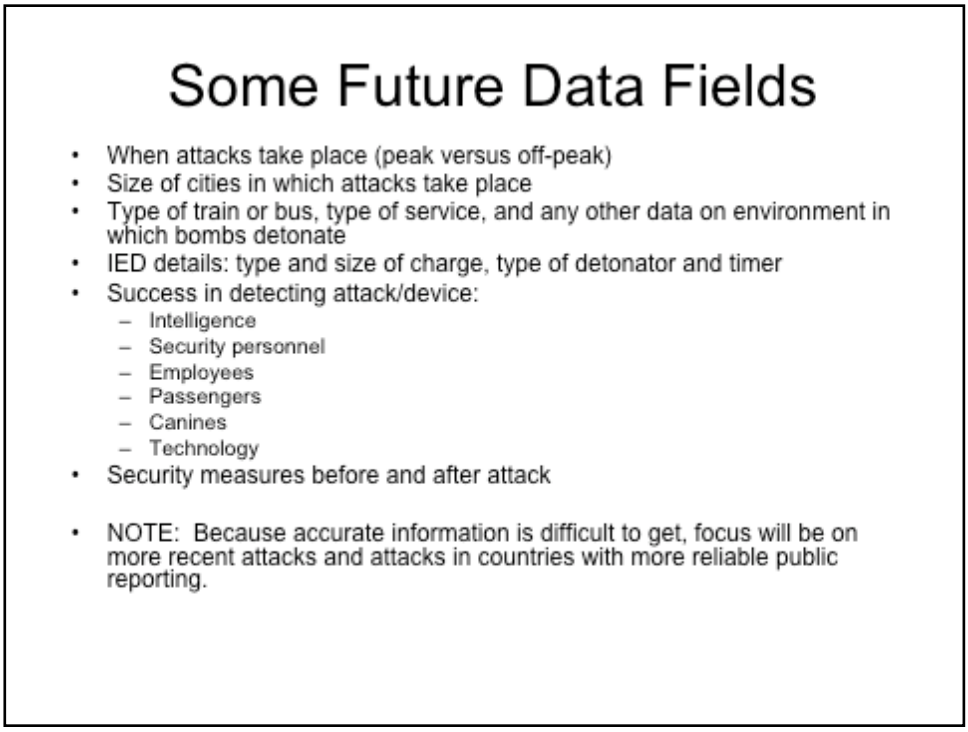



**Figure 5**

## COMPARISON OF THE MTI DATABASE AND UMSTART

The MTI database does not compete with UMSTART; rather, it complements UMSTART. MTI's database is designed to allow for updated trend analysis of attacks on public surface transportation. UMSTART allows more general analyses to be performed. The MTI database therefore serves a purpose that UMSTART does not provide because of its broad mandate and design.

Roughly 40 percent of the 1,497 attacks currently in the MTI database were obtained from UMSTART (which is credited as the source of the data). The remaining 60 percent come from MTI's own published chronologies and recent scans of news reports (this percentage will inevitably increase). MTI also uses UMSTART's list of countries and regions, and for incidents for which it is the *sole* source, its information on fatalities, injuries, and perpetrators. Both UMSTART and the MTI database indicate whether attacks involve suicide and also provide other useful information.

But there are important differences.

First, MTI's database contains more early attacks against surface transportation and is continually being updated, whereas UMSTART's published data currently extend only to December 31, 2007.

Second, there are significant differences in the level of aggregation. UMSTART aggregates transportation attacks into two categories: transportation and aviation (airports and airlines). At the data analysis level, it does *not* distinguish between attacks against public buses, public trains, subway trains, and their stations and stops, or between highways, bridges, and tunnels. It also does not distinguish between attacks against public transportation and attacks against private citizens, or it does so inconsistently. Searching UMSTART for attacks against transportation will not capture all of those aimed at public surface transportation, nor will it allow the user to differentiate between train, bus, and road attacks. By contrast, MTI's database includes only attacks against public surface transport, and it differentiates between different types of public

surface transportation targets. It therefore enables reliable data analysis on all terrorist attacks against public surface transport and against subsectors within it.

Third, UMSTART's data structure for targets and attacks is much less detailed than that in the MTI database**.** While UMSTART's data elements for targets relevant to public surface transportation are limited to "transportation," MTI divides its targets into 37 categories. UMSTART codes attacks into nine categories, whereas MTI codes them into 26 categories, including eight categories for further analysis of attacks using explosives or incendiaries. Again, this allows for detailed analysis of the frequency and lethality of attacks against various subtargets.

Fourth, UMSTART provides only generic descriptions of the bombs used in attacks, placing them in a single category, "explosives/bombs/dynamite." In contrast, MTI lists the number of devices used in an attack and indicates whether the detonation took place above or below ground; more important, it provides subcategories for number of devices, type of explosive or incendiary (eight subcategories), how it was delivered or concealed (16 subcategories), and outcome of each device (seven subcategories). This allows MTI to provide critical analyses of the frequency and lethality of different combinations of bombs and incendiaries, delivered and concealed in different ways, against different targets. It also enables analysis of the frequency of use of single versus multiple devices, and how frequently they detonated on target, malfunctioned, or were rendered safe through Explosive Ordnance Disposal (EOD).

Finally**,** the MTI database allows for separate analysis of train derailment attacks, coding them into instances in which it is known or suspected that bombs were placed on the tracks, or known or suspected that bolts or tracks were removed, or other methods were used. As of December 17, 2009, MTI's database included more than 95 derailment events dating back to 1920.

# LIMITATIONS AND RELEVANCE OF THE DATA TO U.S. PUBLIC BUS TRANSPORTATION

This section presents data on the frequency and lethality with which buses, bus stations, and bus stops are attacked. It is important to understand the preliminary nature of these data and also to place the attacks in context for U.S. stakeholders (see Figure 6).

## DATA LIMITATIONS AND PRELIMINARY CONCLUSIONS

Information on some of the attacks in the database is limited, and much of it is unreliable. This is true for attacks that took place decades ago or as recently as 10 years ago. It is also true for some attacks that take place in developing countries or in countries without a tradition of open reporting by government agencies. Also, regardless of where attacks or attempted attacks take place, if they occur during a news cycle dominated by other events, the amount of information available from open sources can be surprisingly limited. Finally, some reporting by local press may be speculative, unverified, or editorial, and the cooperative exchange of information on surface transportation attacks between governmental authorities—relative to that in the world of commercial aviation—appears to be only in its beginning stages.

For all these reasons, the MTI database entries assume certain default characteristics until more data are collected and verified. These "default entries" are recorded as rules in the database. For example:

- The default entry for a bomb that explodes inside a bus is "concealed or placed in the passenger compartment." This is a reasonable assumption, but in many cases there is insufficient data to verify that this was actually the case. Similar default entries are made for bombs that explode in bus stations and at bus stops: "concealed/left in stations (trash bins, under benches, near trains or buses)" and "concealed/left at bus stop."

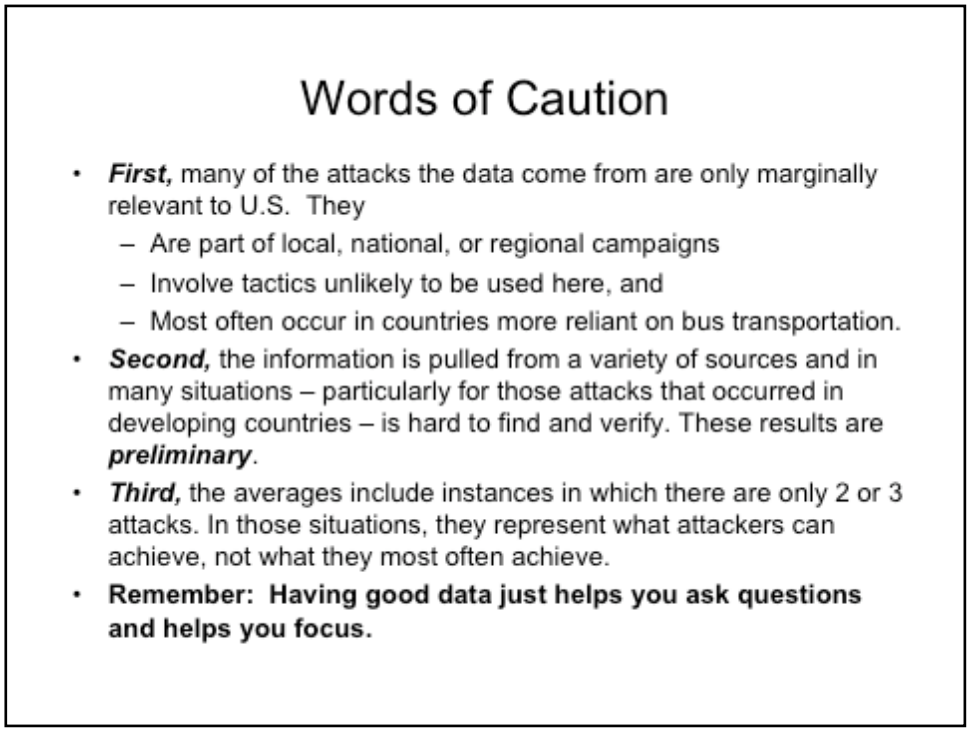



**Figure 6**

- The default entry for bombs or incendiary devices that detonate is "detonated or released on target." This probably overstates, to some degree, the success of the attacks, particularly when casualties appear to be low, and it assumes precise knowledge of what the target was.

- Armed assault is considered to be "assault with automatic weapons," since in the absence of information to the contrary, the prevalence of these weapons makes it likely that they were used.

- "IED–unspecified" describes any bomb for which there is no information detailing how it was constructed; and until more information is available on whether the targeted station was enclosed or open, it too is similarly categorized as "bus (or train) station, unspecified."

Some default entries are fairly reliable. The method of delivery and concealment of weapons used in suicide attacks is coded as "carried on person" (although some vehicle-borne IEDs (VBIEDs) are driven by suicide bombers as well), and a grenade is assumed (with good reason, given the 4 seconds between the pulling of a pin and detonation) to be "physically thrown," unless there is information indicating that it was combined with other mechanisms as an IED.

Another important limitation of the database derives from the inability of the current data system to perform routine median calculations. Some of the averages (means) are actually based on only two or three attacks, and in a few cases, only one attack. To put these figures into context, we have included the actual numbers of attacks on nearly all charts that provide average lethality, and some basic information is provided to explain these events. In cases where there are few attacks and the lethality or the success of the attacks is particularly high, the average should therefore be seen as what terrorists *were able to accomplish in a particular incident, not what they usually accomplish.*

MTI researchers will continue to capture attacks individually, and existing lists of data will be discovered and searched. MTI is, for example, now examining the extensive chronology maintained by the RAND Corporation and will incorporate new attacks gleaned from it into the database; questions about certain attacks will be answered, corrections will be made, and MTI's new data platform will allow more powerful analyses. The results of our analyses of these attacks—unique as they are (no institution to MTI's knowledge has attempted to generate such statistics)—must be seen as *preliminary.* They answer some long-standing questions, but they raise many others.

Nevertheless, they serve an important purpose. They can help stakeholders—governments, transit managers, and employees—particularly in the United States, to focus on the ways the most frequent and/or most lethal attacks are carried out as they consider measures to prevent or mitigate attacks that may be considered likely to happen in the United States.

## RELEVANCE TO THE UNITED STATES OF ATTACKS ON TRANSPORTATION IN OTHER COUNTRIES

Only three of the attacks in the MTI database were conducted in North America: two robberies in Mexico and a 1989 Greyhound bus hijacking in Canada, which was resolved peacefully. The overwhelming majority of the attacks have taken place elsewhere. It is important to understand the context of many of the attacks against public bus targets outside of the United States, because while these attacks are important, some have limited relevance to the domestic U.S. environment.

First, most of the attacks have been part of essentially local guerrilla or terrorist campaigns designed to bring down a government or achieve independence, autonomy, separation, and/or

some kind of state governing the territory for which this independence, autonomy, or separation is sought. Public buses, bus stops, and bus stations have been routinely targeted by Hamas, Hizballah, Islamic Jihad, and the robust collection of groups seeking a Palestinian state or the destruction of Israel; Sikh and Islamic separatists in India; the Liberation Tigers of Tamil Eelam (LTTE) in Sri Lanka, also known as the Tamil Tigers; the Revolutionary Armed Forces of Colombia (FARC) and the New People's Army in Colombia; and the Moro National Liberation Front (MLF) in the Philippines. Yet the ideologies of these groups range from Islamism to Marxism, and the groups themselves can be religious (e.g., Hizballah and Hamas) or secular (e.g., LTTE and FARC).

Second, most of the attacks take place in countries in which public bus transportation is either the primary means of public transportation (e.g., in Israel) or, along with trains, a large part of it, and in rural areas, the only public transportation. This is far from the situation in the United States, where aviation is the primary method of long-haul transportation, and with the exception of high-density urban centers such as New York, Boston, and San Francisco, the automobile is the primary method of local transportation. Where public bus transportation is extremely important, it becomes an obvious terrorist target. Conversely, where it is not so important, it may be a less likely target.

Finally, many of the tactics used in these attacks—some particularly lethal—are unlikely to be used in the United States. For example, Claymore mines were used exclusively in Sri Lanka and with particular effectiveness, and land mines have been used in rural areas of Latin America, Southeast Asia, and Southwest Asia. These weapons most likely become available to terrorist groups that are linked with active insurgencies, obtain military training, and have access to military equipment. In the United States, where military equipment is controlled but automatic weapons, including assault rifles, are widely available, it seems unlikely that military weapons would be used.

Finally, in the United States, actual terrorist acts are dominated not by Islamic or Middle Eastern groups, but by groups or individuals energized by specific domestic issues. The terrorist attacks in the United States for the 10 years in which narrative descriptions are provided in UMSTART (January 1, 1997, to December 31, 2007) illustrate this point (Figure 7).

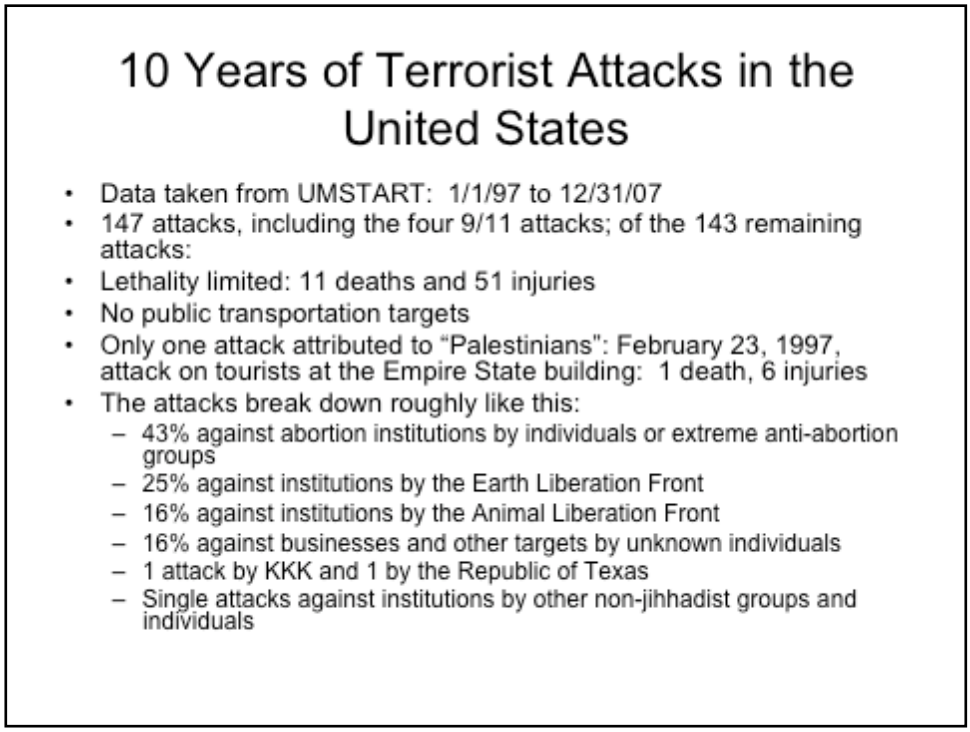



**Figure 7**

With the exception of the horrific attacks of September 11, 2001—which were conceived and orchestrated from outside the United States—U.S. "domestic terrorism" during this period has not been particularly successful. Although jihadist plots certainly have been aimed at producing high body counts, the 143 remaining attacks resulted in only 11 deaths and 51 injuries. Also, although those plots included public transportation targets—specifically, the heavy rail urban mass transportation systems of major U.S. cities—no attack against public transportation targets was recorded.[3] Further, only one of the attacks could be considered "Middle Eastern." It was conducted by a 70-year-old Palestinian male whose writings reveal a set of grievances that included not only Israel, but individuals who had cheated him out of funds and tourists in the Empire State Building.

The greatest percentage of attacks (43 percent) involved extremist anti-abortion groups and individuals; 25 percent were conducted by the Earth Liberation Front and similar groups; and 16 percent were conducted by the Animal Liberation Front. One attack was conducted by the Ku Klux Klan and a similar group, the Republic of Texas, and a smattering of single attacks were conducted by individuals or groups, most of them against government or corporate institutions for one cause or another. Finally, a large percentage of the attacks (16 percent) were conducted by unknown persons.

Indeed, non-jihadist U.S. domestic terrorist groups have shown little inclination to cause civilian casualties, and most, in fact, have attempted to avoid them. This point is illustrated by Figures 8 and 9, taken from a recent MTI report.[4] Even the devastating 1995 Oklahoma City attack by Timothy McVeigh was aimed primarily at the U.S. government; McVeigh considered innocent civilians to be acceptable collateral damage.

Nevertheless, attacks that take place in other countries are relevant to the United States and to public bus transportation for several reasons.

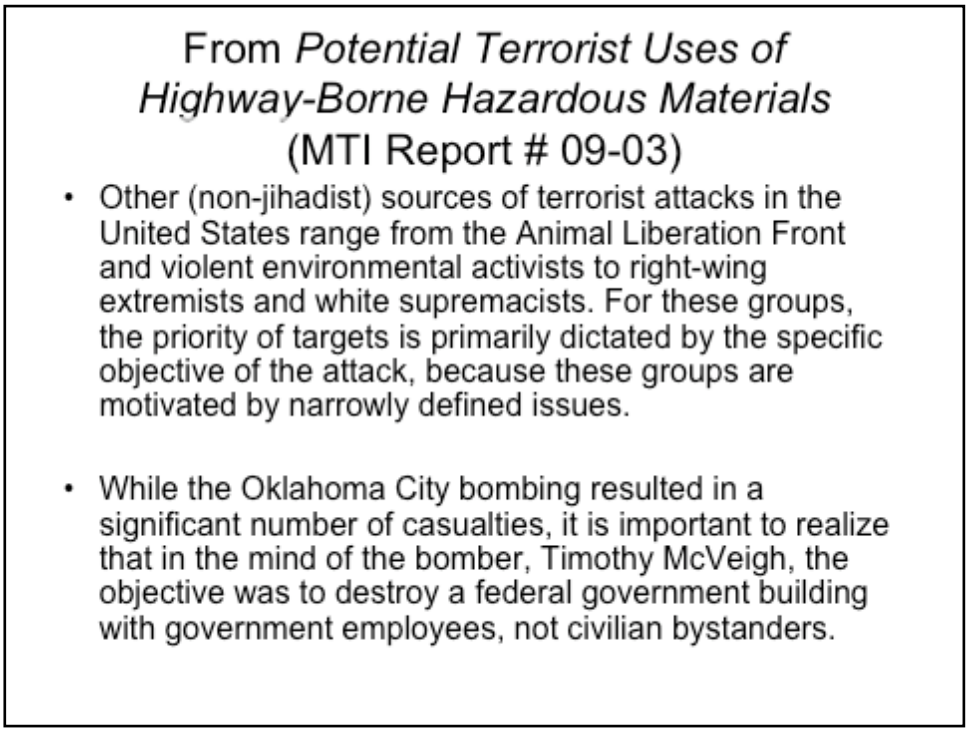



**Figure 8**

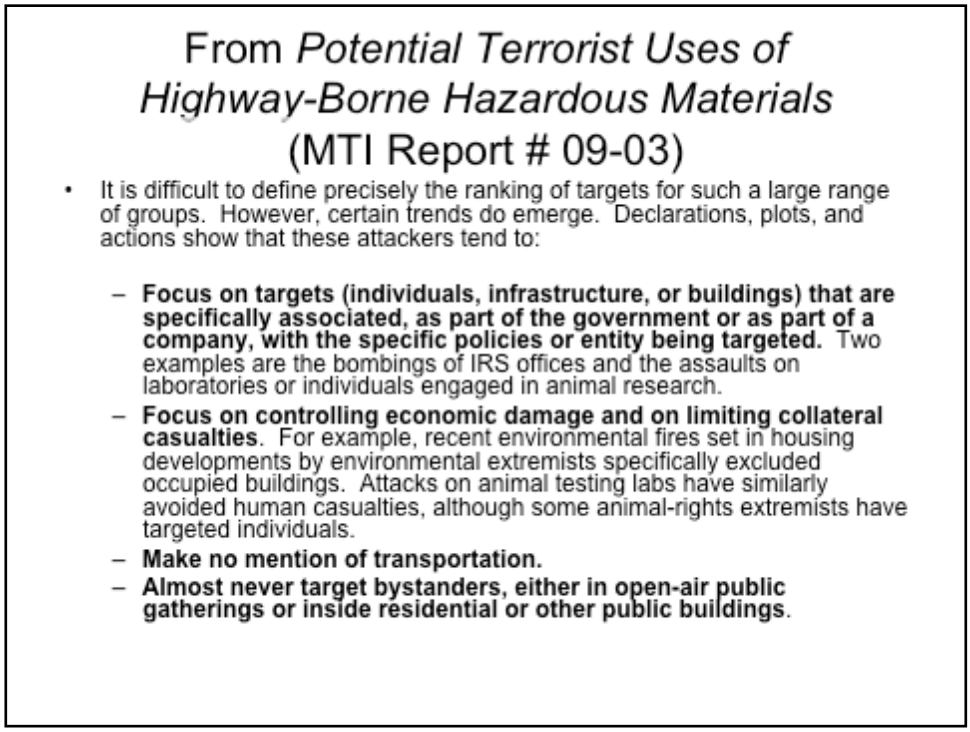



**Figure 9**

First, successful attacks against any target can be imitated. Terrorists seeking to attack public buses have an extensive playbook of attacks against public surface transportation. The description of successful results, particularly against very soft targets, simplifies the task for any terrorist seeking to make a similar attack and shortens the planning cycle. Attacks in London, Madrid, and Mumbai were considered major terrorist successes. Past success makes future attempts more likely.

Second, public bus transportation fits the profile of a desirable terrorist target. As described in the following excepts from a recent MTI report,[5] terrorists are opportunists and are far more likely to attempt attacks that will, with high confidence, achieve a death toll of 25 to 50 than a risky, complicated operation that could kill 1,000 or more.

> *Forced to choose between undertaking a complex and demanding operation to cause massive death and destruction and executing a smaller-scale attack with certainty of success, terrorists seem generally to choose the latter.* ***Terrorists may be willing to sacrifice their lives; they are far less willing to risk operational failure****.*
>
> * * * *
>
> ***Operational success tends to be defined in terms of casualties.*** *Terrorists seek targets that have emotional or symbolic value—widely recognizable icons, targets whose destruction would significantly damage or disrupt the economy, and high body counts. In recent attacks, terrorists have been willing to forgo iconic value in favor of high body counts, for example, by bombing subways or commuter trains. The economic impact of such attacks is indirect.*
>
> * * * *

The following assessment from the same report indicates the likelihood of al Qaeda or other jihadist groups targeting public transportation:

> *The threat posed by al Qaeda and groups associated with it is somewhat easier to analyze than that of other groups because al Qaeda's declarations, plots, and attacks are fairly consistent and suggest a distinct prioritization of targets.*
>
> *Al Qaeda urges its followers to carry out attacks that will produce high body counts and will have symbolic value—in jihadist language, attacks on targets that have "emotional" value (iconic targets)—and attacks that will cause serious economic damage. The iconic component can refer either to the destruction of an internationally recognized icon or to an iconic venue. In the latter case, the destruction of the target would not necessarily be the goal. The venue would merely be a dramatic backdrop that would increase the psychological impact of the attack.*
>
> *In fact, however, few of the jihadist attacks and plots since 9/11 have included iconic targets or venues, although diplomatic facilities and even nightclubs the jihadists consider sinful do have symbolic content. And despite the continued drumbeat about economic warfare in al Qaeda communications, the economic impact of the terrorist attacks since 9/11 has been incidental—for example, attacks on hotels do adversely impact tourism.*
>
> *Almost all of the jihadist attacks since 9/11 have* ***been directed against soft targets****—that is, unprotected or lightly protected targets such as hotels (Indonesia, Kenya, Jordan, Egypt, Pakistan), restaurants and nightclubs (Indonesia, Morocco, United Kingdom), public surface transportation (Spain, United Kingdom, Philippines, India), residential compounds (Saudi Arabia), and high-profile individuals. Terrorist attacks on embassies, consulates, and commercial buildings (Indonesia, Pakistan, and Turkey) have used vehicle bombs on the street; in other words, they have not attempted to penetrate security. Only in a couple of instances have terrorists attacked government buildings or, in one case, a refinery (Saudi Arabia), which are likely to have higher levels of security.* ***This again suggests a low tolerance for risk of failure****. The detonation of the terrorist devices, even beyond any security perimeter, still resulted in casualties and destruction. The avoidance of security does not mean that the terrorists were averse to personal risk, since many of these were suicide attacks. We are talking about operational risks.*
>
> *A review of the terrorist plots that were uncovered during the same period reveals greater operational ambition (use of exotic substances, multipart operations) to attack more-diverse but still similar targets.* ***Most of the plots involved attacks on public surface transportation—the killing fields of terrorists bent upon slaughter.*** *Embassies figured in several plots, along with other government buildings and military headquarters. Several plots involved attacks on naval or civilian vessels, like the attacks on the U.S.S.* Cole *or the French supertanker* Limburg*. However, soft targets predominate* (emphasis added).

Third, until very recently, radical jihadist plots involving attacks inside the United States have been fairly amateurish, but four of them have in fact focused on public transportation. All four targeted heavy rail mass transit systems of major U.S. cities, however; none considered bus targets.

- **The 1997 Flatbush plot.** In this plot, a suicide vest was prepared for use against the New York subway system. One conspirator hesitated, however, and approached the transit police. Authorities in turn conducted a raid and foiled the plot before it could be implemented.

- **The 2003 New York poison gas plot.** In February 2003, a cell of terrorists were arrested on their way to Bahrain from Saudi Arabia. They had designed devices to be placed near air intakes in ventilation systems or in closed areas and had undertaken surveillance of the New York subway system in fall 2002. They requested permission from al Qaeda's central leadership, but the decision was made to cancel the operation because the leadership had "something better in mind." It is unclear what was meant by that comment.

- **The 2004 Herald Square plot.** In August 2004, two individuals, one born in the United States and the other a naturalized U.S. citizen, conspired to place a bomb in the Garden City subway station in New York City. Other targets in New York, particularly surface transportation targets, were discussed as well. A tip to the New York Police Department (NYPD) from an anonymous caller led the NYPD to pay an informant to work his way into the Islamic community (including mosques and book stores) to secure information about the plans of the conspirators. The informant taped conversations and provided key evidence. The NYPD also used an undercover officer and ended the plot before it could be put into operation. While the intelligence and emotional stability of the conspirators are questionable, the plot definitely included surveillance and operational planning.

- **The 2006 PATH Tunnels plot.** In July 2006, FBI online surveillance uncovered a plot involving eight suspects, one of them (Assem Hammoud) an al Qaeda loyalist living in Lebanon, to blow up New York City PATH tunnels. Hammoud was released on bail after serving 26 months in solitary confinement in Lebanon. Two other individuals were also arrested, one in Canada and the other in the United Kingdom. According to the FBI, the plan was to carry bombs on backpacks onto commuter trains and detonate them while moving through tunnels. Dates and the amounts of explosives were discussed, and financing was apparently secured. The plot was uncovered before an overseas operative could go to the United States to undertake serious operational planning. The conspirators also spoke of bombing New York subways, among other targets.

In addition, Bryant Neal Vinas, a U.S. citizen raised on Long Island who was captured by Pakistani authorities for taking part in al Qaeda operations in Pakistan, passed information to al Qaeda about the Long Island Rail Road system.

Fourth, the level of determination and sophistication of the plots, although still low in comparison with those originating and/or conducted outside the United States, seems to be increasing, as illustrated by the recent Zazi plot, in which Najibullah Zazi pleaded guilty to planning to detonate bombs in the New York City subways; co-conspirators have also been charged.

Finally, while the pace of jihadist radicalization has been slower in the United States than in other countries such as the United Kingdom and France, domestic radicalization and recruitment and the plots that are sometimes involved appear to be increasing. Between September 12, 2001, and the end of 2009, 44 cases of domestic radicalization and recruitment to jihadist terrorism were reported in the United States; 32 cases were reported between 2002 and 2008, an average of four a year. However, in 2009 there were 12 cases, a considerable increase.[6]

As Secretary of DHS Janet Napolitano recently told Congress, “Home-based terrorism is here…. And like violent extremism abroad, it is now part of the threat picture that we must confront.” Since public transportation is in the terrorist playbook and has yielded many successes, attacks against the public transportation system in the United States must be considered.

Is public bus transportation a potential target for jihadist plots inside the United States? Is it, relative to other targets, a likely one? Should we be concerned about public bus transportation and eager to protect it? It is hard to provide firm answers to these questions, but it is safe to say that a public bus, bus station, or bus stop in the United States is

- A target containing a sufficient number of people to provide an adequate body count for a potential terrorist.
- A target that has been attacked repeatedly elsewhere with a high degree of success, creating a kind of menu of successful and relatively simple attack methods.
- A target that, although it has not yet appeared in jihadist plots to attack targets inside the United States, can be an important part of an urban mass transit system that has been targeted and might reasonably appear on the radar screens of radical jihadist groups seeking an operational success, particularly if heavy rail mass transit targets become hardened in anticipation of attacks or in response to them.

Therefore, while it is important that governmental officials, public transit managers, and public transit employees consider the data in this report in context, it is also important that they not take false comfort in the lack of attacks in the United States. It would be prudent to learn from the attacks elsewhere and to develop a program of bus operator security-awareness training and corresponding procedures and equipment that mitigate the risk of terrorist attacks and also assist bus operators in dealing with the much more likely dangers they face from common crime and deranged individuals.

# TRENDS IN ATTACKS ON PUBLIC BUS TRANSPORTATION

## OVERVIEW

Figures 10, 11, and 12 illustrate several fundamental points. Figure 10 demonstrates that while public surface transportation has been around for about 150 years, terrorist attacks against it have been a relatively recent phenomenon. MTI has recorded 15 attacks against surface transportation that occurred between 1920 and 1970, almost all of which were train bombings or attempted train derailments. Terrorist attacks started in earnest in about 1970 and then accelerated in the 1990s and the current decade. The drop in attacks in the past several years, as shown in Figure 10 and in Figures 11 and 12, is not an indication that the tempo of attacks has dropped, but rather reflects a lag in official reporting.

Figures 11 and 12 illustrate the relationship between *fatalities* and attacks against bus targets and the relationship between *injuries* and attacks against bus targets, respectively. The spikes in attacks correspond relatively well to the spikes in fatalities and injuries. More attention should be paid to fatalities than to injuries, however, for several reasons. Reporting on fatalities is generally more accurate than reporting on injuries; open source reports often provide a firm number of fatalities, and "at least" a certain number of persons injured. The minimum number is recorded in the MTI database. Also, some injuries later become deaths. Finally, different countries may use different definitions of serious injuries and may record only those or all injuries. The bottom line is that death is easier to define.

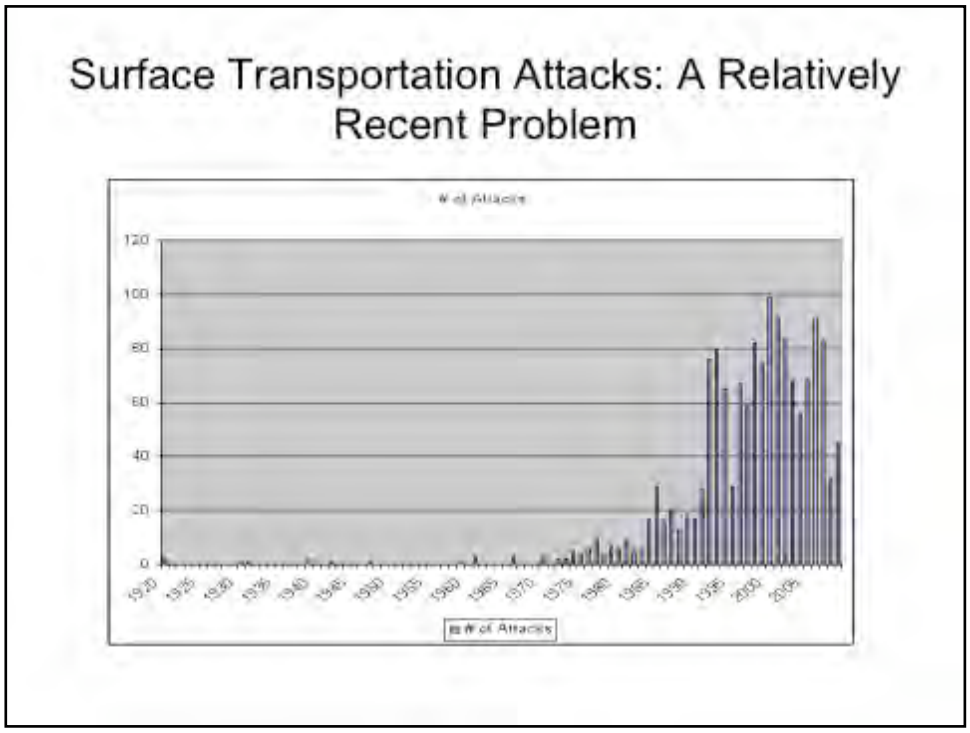



**Figure 10**

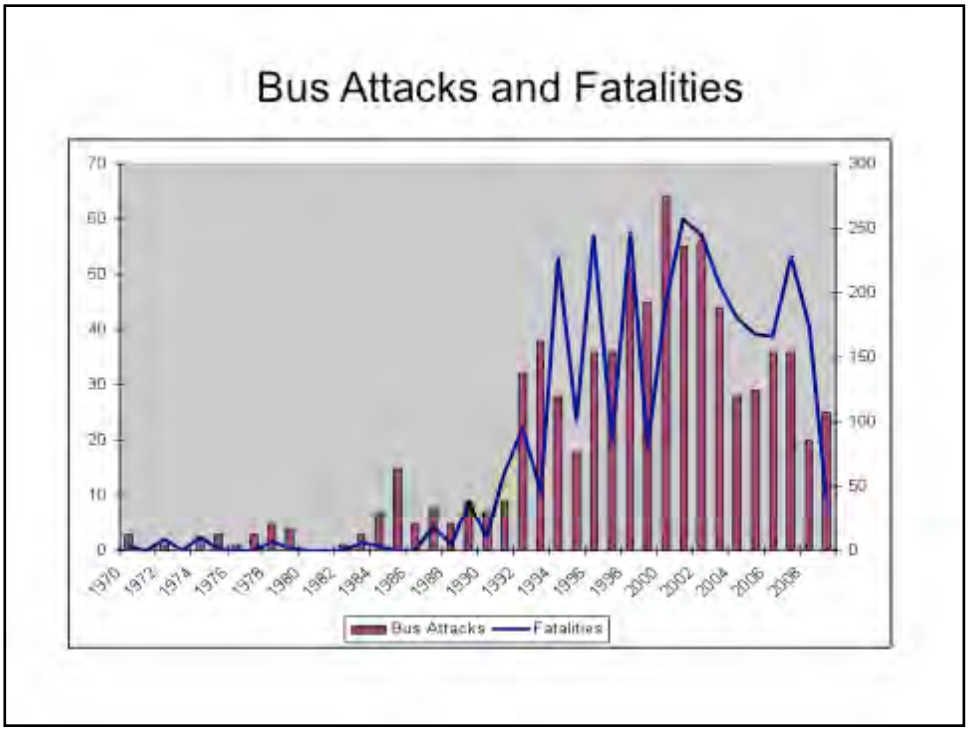



**Figure 11**

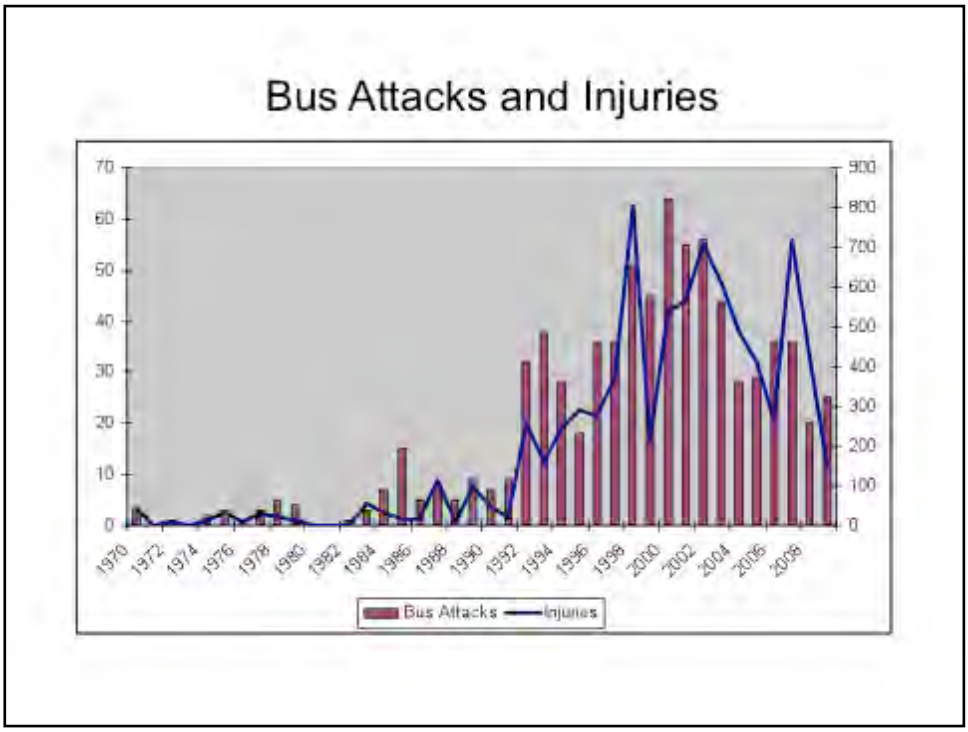



**Figure 12**

## FREQUENCY AND LETHALITY OF ATTACKS ON BUSES AND TRAINS

We next examine how often, relative to other surface transportation targets, buses are attacked, first with all weapons and then with only explosive and incendiary devices. We then consider the relative lethality of the attacks.

Figures 13 through 16 place the passenger train target subcategories into three groups: passenger trains, train stations, and train tracks. Passenger trains include, for example, trolleys, subway trains, and intercity trains. Attacks on tracks are most often attempted derailments, and many, but not all, of these are aimed at passenger trains. The same general approach holds for buses. The eight bus target subcategories are grouped into buses (including passenger buses, minivans, school buses, and tour buses), bus stations, and bus stops.

Two methods of looking at attacks are shown in the figures. “All attacks” include all 26 categories of attacks, ranging from IEDs to sabotage by derailment to assault with automatic weapons to kidnapping. “All bomb attacks” include only the eight categories of explosive and incendiary devices.

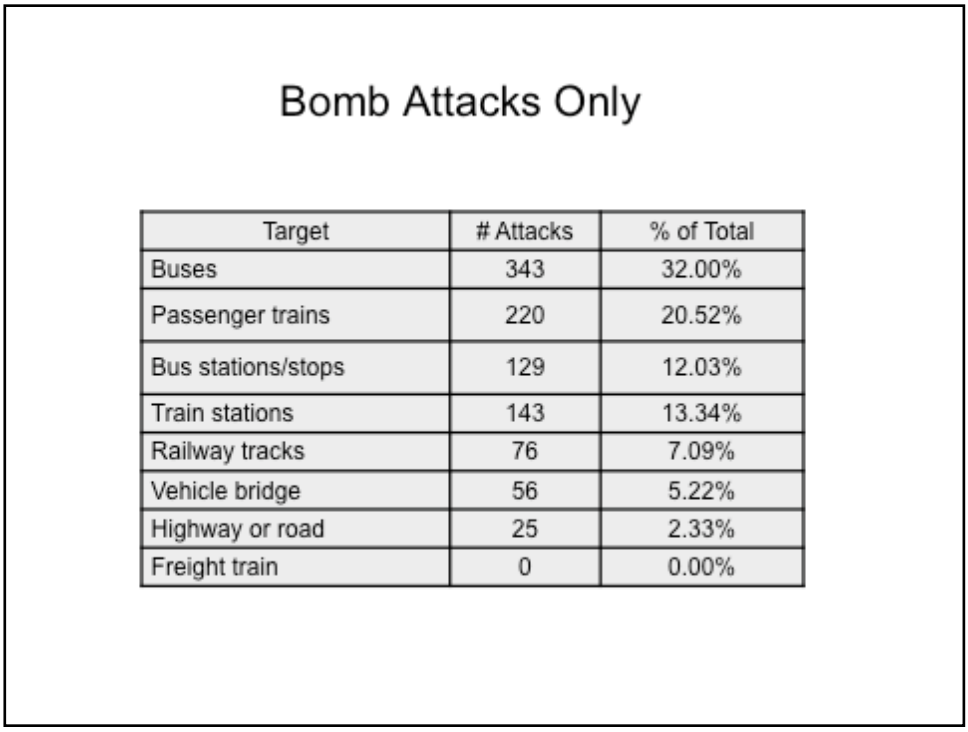
Figure 13 shows that 51.1 percent of the attacks in the database are against bus targets; 35.7 percent are against trains; and 6.2 percent are against road targets—combining vehicle bridges, one tunnel, and highway and road targets.

When only bomb attacks are considered (Figure 14), the percentages shift somewhat, in two ways. First, the percentage of attacks against bus targets *decreases f*rom nearly 51.1 percent to 44 percent, and the percentage of attacks against train targets *increases* from 36 percent to 41 percent. Second, the percentage of attacks against bus stops and stations increases, indicating another way in which bomb attacks tend to equalize the frequency with which target groups are hit. Buses are hit by explosive and incendiary devices about 32 percent of the time instead of 41 percent, and bus stations and stops are hit roughly 12 percent of the time instead of 10 percent.

How Often Do Buses, Bus Stations, and Bus Stops Get Attacked Compared to Trains and Other Targets?

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 615 | 41.55% |
| Passenger trains | 289 | 19.53% |
| Bus stations/stops | 142 | 9.59% |
| Train stations | 153 | 10.34% |
| Railway tracks | 87 | 5.88% |
| Vehicle bridge | 58 | 3.92% |
| Highway or road | 34 | 2.30% |
| Freight train | 21 | 1.42% |

**Figure 13**



Bomb Attacks Only

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 343 | 32.00% |
| Passenger trains | 220 | 20.52% |
| Bus stations/stops | 129 | 12.03% |
| Train stations | 143 | 13.34% |
| Railway tracks | 76 | 7.09% |
| Vehicle bridge | 56 | 5.22% |
| Highway or road | 25 | 2.33% |
| Freight train | 0 | 0.00% |

**Figure 14**

The reasons for these shifts have yet to be studied in detail, and they are counter to what most would expect, perhaps because of the large number of publicized bombings of Israeli buses.

A word of caution is needed regarding these data. MTI may well find a set of passenger train attacks that are not yet entered. Two lists provided by DHS/TSA have been examined, and extensive RAND data will be examined, to identify any attacks on trains that MTI (along with the UMSTART system) may have missed. Previously published MTI chronologies generally found the ratio of bus to train attacks to be 1:1. Regardless of the final ratio, public bus service is clearly a *major* surface transportation target.

Figures 15 and 16 show the lethality of attacks against these same target groups.

When all attacks are considered, bus targets are attacked more often, but train targets are attacked with greater lethality. The average death toll of surface transportation attacks is four, which is also the average for buses, bus stations, and bus stops. The average number of deaths from attacks against passenger train targets, when only trains and train stations are considered (not all track attacks are designed to derail passenger trains—some are designed to create general disruption), is five.

Considering only attacks in which bombs are used does not change the overall fatality rates of attacks against train and bus targets, nor does it change their relative differences (Figure 16). But bombs do increase the lethality of attacks against road targets—typically bridges and highways—and they decrease the lethality of track attacks, showing the relatively higher lethality of attempts to derail trains mechanically (by removing bolts, tracks, etc.). Thus, bomb attacks have lower overall lethality, but only marginally. (MTI has just completed a detailed study of terrorist derailments, based on an analysis of 181 attempted derailments since 1920.[7]) The overall lethality of attacks not only does not increase, it decreases from four to three deaths per attack, on average, when only bomb attacks are considered.

## All Attacks: Lethality by Target Group

**More attacks against bus targets, but train attacks more lethal**

| Target Group | Average Fatalities | Average Injuries |
|---|---|---|
| Trains and train stations | 5 | 21 |
| Bus, bus stops, and bus stations | 4 | 10 |
| Track | 1 | 1 |
| Road targets | 0 | 0 |
| Overall average | 4 | 12 |

**Figure 15**

## Bomb Attacks: Lethality by Target Group

1. **Bombs have little impact on differences between train and bus targets**
2. **Road attacks increase in lethality (developing-country campaigns)**
3. **Track attacks: Lack of mechanical derailments decrease lethality**

| Target Group | Average Fatalities per Attack | Average Injuries per Attack |
|---|---|---|
| Trains and train stations | 5 | 24 |
| Buses, bus stops, and stations | 4 | 13 |
| Road targets | 1 | 1 |
| Track | 0 | 1 |
| Overall average | 3 | 13 |

**Figure 16**

## DISTRIBUTION OF ATTACKS BY REGION AND COUNTRY

The regions in which all attacks against buses occur most often are shown in Figure 17, along with the distribution among the various regions. The data generally reflect the focused and deadly terrorist campaigns that include bus targets in certain countries of these regions (which will become apparent in figures below).

Nearly all (94 percent) of attacks against bus transportation have occurred outside of Western Europe, Eastern Europe, Australasia, and North America, and all but three attacks took place outside of North America. In addition, with the important exceptions of Israel and the Russian Federation, most of these attacks have taken place in developing countries.

When only attacks involving explosives and incendiaries are concerned, the regions in which the most attacks have occurred remain South Asia and the Middle East and North Africa, with Southeast Asia having the next highest number. But then there are some interesting shifts, as shown in Figure 18.

Western Europe—which ranks seventh for all attacks—ranks fifth for bomb attacks, which reflects the extent to which explosives and incendiary devices dominate the relatively few attacks in the region, most of them from the Provisional, Real, and Continuity IRA, along with two 2005 al Qaeda attacks in London; the Madrid subway attacks; the ETA fire bombings of tour buses in France; and bus bombings and fire bombings in Greece. South America decreased from fourth to sixth, most likely reflecting the use of assault weapons and arson in Colombia. Finally, North America is in last place, with *no* cases of bus bombings.

We turn now to the 10 developed and developing countries[8] that lead in all bus attacks and all bus bomb attacks (Figures 19 and 20).

Where Do Most Bus Attacks Occur?

| Rank | Region | # | % of Total |
|---|---|---|---|
| 1 | South Asia | 230 | 29.95% |
| 2 | Middle East and North Africa | 218 | 28.39% |
| 3 | Southeast Asia | 91 | 11.85% |
| 4 | South America | 50 | 6.51% |
| 5 | Sub-Saharan Africa | 50 | 6.51% |
| 6 | Russia and the NIS | 47 | 6.12% |
| 7 | Western Europe | 26 | 3.39% |
| 8 | East Asia | 21 | 2.73% |
| 9 | Eastern Europe | 17 | 2.21% |
| 10 | Central America & Caribbean | 13 | 1.69% |
| 11 | North America | 3 | 0.39% |
| 12 | Central Asia | 1 | 0.13% |
| 13 | Australasia & Oceania | 1 | 0.13% |
| | Total | 768 | 100.00% |

**Figure 17**

## Bus Bomb Attacks

| Bomb Rank | All Attack Rank | Region | # | % of Total |
|---|---|---|---|---|
| 1 | 2 | South Asia | 185 | 37.99% |
| 2 | 1 | Middle East and North Africa | 147 | 30.18% |
| 3 | 3 | Southeast Asia | 60 | 12.32% |
| 4 | 5 | Russia and the NIS | 31 | 6.37% |
| 5 | 7 | Western Europe | 17 | 3.49% |
| 6 | 4 | South America | 17 | 3.49% |
| 7 | 8 | East Asia | 16 | 3.29% |
| 8 | 6 | Sub-Saharan Africa | 6 | 1.23% |
| 8 | 9 | Eastern Europe | 4 | 0.82% |
| 10 | 10 | Central America & Caribbean | 2 | 0.41% |
| 11 | 12 | Central Asia | 1 | 0.21% |
| 12 | 13 | Australasia & Oceania | 1 | 0.21% |
| 13 | 11 | North America | 0 | 0.00% |
| | | Total | 487 | 100.00% |

**Figure 18**

## All Bus Attacks – Leading Countries

| Rank | Developing | # | % of Total | Rank | Developed | # | % of Total |
|---|---|---|---|---|---|---|---|
| 1 | Pakistan | 70 | 9.21% | 1 | Israel | 142 | 18.68% |
| 2 | India | 88 | 11.58% | 2 | Russian Federation | 37 | 4.87% |
| 3 | Philippines | 72 | 9.47% | 3 | Greece | 7 | 0.92% |
| 4 | Colombia | 38 | 5.00% | 4 | United Kingdom | 9 | 1.18% |
| 5 | Sri Lanka | 36 | 4.74% | 5 | France | 4 | 0.53% |
| 6 | Egypt | 20 | 2.63% | 6 | Spain | 3 | 0.39% |
| 7 | Turkey | 24 | 3.16% | 7 | Japan | 2 | 0.26% |
| 8 | Algeria | 22 | 2.89% | 8 | Poland | 2 | 0.26% |
| 9 | China | 17 | 2.24% | 9 | Bosnia/Herzegovina | 1 | 0.13% |
| 10 | Indonesia | 13 | 1.71% | 10 | Canada | 1 | 0.13% |

**Figure 19**

## Bus Bomb Attacks – Leading Countries

**Some changes in developing countries; no significant changes in developed countries**

| Rank | Developing Country | # | % of Total | Rank | Developed Country | # | % of Total |
|---|---|---|---|---|---|---|---|
| 1 | Pakistan | 61 | 12.66% | 1 | Israel | 107 | 22.20% |
| 2 | India | 66 | 13.69% | 2 | Russian Federation | 26 | 5.39% |
| 3 | Philippines | 53 | 11.00% | 3 | United Kingdom | 6 | 1.24% |
| 4 | Sri Lanka | 33 | 6.85% | 4 | Greece | 5 | 1.04% |
| 5 | China | 15 | 3.11% | 5 | France | 3 | 0.62% |
| 6 | Turkey | 15 | 3.12% | 6 | Estonia | 1 | 0.21% |
| 7 | Colombia | 14 | 2.90% | 7 | Italy | 1 | 0.21% |
| 8 | Egypt | 8 | 1.66% | 8 | Sweden | 1 | 0.21% |
| 9 | Algeria | 10 | 2.07% | 9 | | | |
| 10 | Indonesia | 8 | 1.66% | 10 | | | |

**Figure 20**

For developing countries, the only significant shift in ranking (more than two positions) occurred as a result of the increase in bomb attacks in China and the decrease in Colombia and Egypt. For developed countries, the rankings shifted very little when there were more than three attacks.

The lists of countries with the most attacks reflect the presence of terrorist campaigns that have included public bus transportation targets. While the largest single terrorist group listed in the MTI database is “unknown,” because of the lack of claims or suspicions confirmed by authorities, specific organizations and generic groups seem to be primarily responsible for attacks against bus targets in these countries. In developing countries, campaigns appear to be dominated by the following organizations and groups:

- **India.** Kashmiri and Sikh separatists, Naga and other tribal separatists, Islamic extremists and Lashkar-e-Taiba (LeT), United Liberation Front of Asom (ULFA), and Maoists.
- **Pakistan**. Baloch Liberation Army, Islamic extremists and separatists, and, in earlier decades, Afghan government agents.
- **The Philippines**. MLF and the New People’s Army, particularly in Mindanao.
- **Colombia**. FARC and the National Liberation Army.
- **Sri Lanka**. LTTE.
- **Turkey**. PKK (Kurdish separatists).
- **Algeria.** The Armed Islamic Group (GIA) and Islamic extremists.
- **Egypt**. Al-Gamya and other Islamic extremists.
- **China**. Muslim separatists.
- **Indonesia**. The Free Aceh Movement (GAM).

In the developed countries, the following organizations and groups—in addition to deranged individuals—are primarily responsible for attacks on public transportation:

- **Israel and the West Bank and Gaza Strip.** Hamas, Hizballah, Palestinian Jihad, the Popular Front for the Liberation of Palestine and its various factions, and the Al-Aqsa Martyrs Brigade.
- **Russian Federation.** Chechen separatists.
- **The United Kingdom of Great Britain and Northern Ireland.** The Provisional, Real, and Continuity IRA, al Qaeda-inspired conspiracies.
- **Greece.** ELA and other left-wing groups.
- **Spain, France, and Italy.** Basque separatists.
- **Poland.** Robbers.
- **Estonia.** One bomber.
- **Japan.** Deranged individuals.
- **Canada.** A disturbed Lebanese Christian who hijacked a bus; the incident was resolved peacefully in front of Parliament Square in Ottawa.

For U.S. stakeholders who have a tendency to see all terrorism as directed against Americans and their allies by "Middle Easterners," these figures provide some interesting contrasts.

First, terrorist attacks take place in a number of Islamic countries, including Egypt, Algeria, Indonesia, and Pakistan.

Second, the ideological motivation of the attacking groups runs from religious (Hamas and Hizballah in Israel, LeT in Pakistan, and Al Qaeda), to groups advocating secular independence (LTTE in Sri Lanka, PKK in Turkey, Chechen fighters in the Russian Federation), to Marxist or left-wing groups (FARC and NLA in Colombia, MLF in the Philippines, and ELA in Greece).

Third, if there is a common thread, it is the desire for some kind of local, regional, or national independence or autonomy. Although groups communicate, observe and imitate tactics, sometimes provide funding, and even form alliances (often uneasy), most terrorist campaigns, like politics and many wars, are local in their objectives and have to be understood locally, not simply with broad brushstrokes.

Fourth, some of most bloody campaigns have been conducted outside of the Islamic orbit, most notably by LTTE in Sri Lanka.

Thus, while terrorism against public transportation, including and perhaps especially bus transportation, has increased, this is the result of different campaigns, born out of different grievances. Nevertheless, the tactics are known, communicated, imitated, or improved upon as the general threshold against attacks involving innocent civilians erodes. It is alleged, for example, that LTTE in Sri Lanka, which may have observed Hamas's first suicide car bombs during the Israeli invasion of Lebanon in 1982, invented the suicide belt and first used female suicide bombers, two tactics that were then adopted and enhanced by Hizballah, Hamas, and other groups in Israel, Gaza, and the West Bank.

## DISTRIBUTION OF ATTACKS BY TARGET

We next look at the various target categories for public bus transportation and consider how frequently each has been attacked since 1970. As shown in Figure 21, passenger buses—including minivan and minibus scheduled service—are the targets of roughly 80 percent of all the attacks, and bus stations and stops are the targets of about 20 percent.

## All Bus Attacks – Targets

| Subtarget | # | % of Total |
|---|---|---|
| Bus, scheduled | 502 | 65.36% |
| Bus station – unspecified | 109 | 14.19% |
| Bus, tourist | 64 | 8.33% |
| Bus stop | 44 | 5.73% |
| Minivan or minibus | 34 | 4.43% |
| Bus, school | 15 | 1.95% |
| Bus station – enclosed building | 0 | 0.00% |
| Bus station – open air | 0 | 0.00% |
| Total | 768 | 100.00% |

**Figure 21**

When only explosives and incendiary attacks are considered (Figure 22), the percentage of attacks against passenger buses decreases significantly, by 9.4 percent, to about 70.6 percent, and the percentage of attacks aimed at bus stations and stops increases significantly, from 20 percent to about 29.4 percent.

## Bus Bomb Attacks – Targets

| Subtarget | # | % of Total |
|---|---|---|
| Bus, scheduled | 291 | 59.75% |
| Bus station – unspecified | 104 | 21.36% |
| Bus stop | 39 | 8.01% |
| Bus, tourist | 26 | 5.34% |
| Minivan or minibus | 18 | 3.70% |
| Bus, school | 9 | 1.85% |
| Bus station – enclosed building | 0 | 0.00% |
| Bus station – open air | 0 | 0.00% |
| Total | 487 | 100.00% |

**Figure 22**

In Figures 21 and 22, the terms “bus station—enclosed building” and “bus station—open air” are used only when there is enough information to determine that they are in fact enclosed or open air. If the type of station cannot be determined from the available evidence, the station is coded as “unspecified.” Since most of the attacks occur in developing countries, it is likely that the majority of the stations are open air.

## DISTRIBUTION BY TYPE OF ATTACK AND WEAPON

Figures 23 and 24 illustrate how frequently various attacks and weapons are used against all passenger bus targets and all passenger train targets, respectively.

Figure 23 indicates that explosives dominate, with explosives and incendiary devices being used in 63 percent of the attacks since 1970; automatic weapons were used in about 11 percent, arson in 5 percent, and armed hijacking and robbery (combined) in 7 percent. Many of the “multiple attacks” involve a combination of explosives and sometimes incendiaries, followed by assault with automatic weapons.

As shown in Figure 24, explosives dominate in attacks on passenger trains far more than they do in attacks on buses. Explosives and incendiary devices were used in 81 percent of the attacks on trains, in contrast to 63 percent of bus attacks.

From the data in Figures 23 and 24, we can determine the relative distributions of explosive devices for attacks on buses and trains. The distributions are shown in Figures 25 and 26. (The category “IED–unspecified” is used not only for attacks with so-called homemade bombs, but also for attacks in which the details of the explosive charge are not known, and this percentage would probably decrease somewhat if better information were available.)

For reasons discussed below, unspecified IEDs are used in 77 percent of the attacks against bus targets, as opposed to 90 percent of the attacks against train targets. The percentages also differ for attacks in which other devices are used:

- Grenades are more often tossed into buses than into trains (7.24 percent for buses, 1.1 percent for trains).

### How Are Buses Attacked?

| Attack and Weapon | # | % of Total |
|---|---|---|
| IED – unspecified | 373 | 48.57% |
| Assault with automatic weapons | 132 | 17.19% |
| Arson | 40 | 5.21% |
| IED - grenade | 35 | 4.56% |
| IID (improvised incendiary device) | 30 | 3.91% |
| Armed hijacking | 27 | 3.52% |
| Robbery | 25 | 3.26% |
| IED - mine | 22 | 2.86% |
| VBIED | 15 | 1.95% |
| Assault – other or unspecified | 14 | 1.82% |
| Multiple weapons | 13 | 1.69% |

| Attack and Weapon | # | % of Total |
|---|---|---|
| Kidnapping | 12 | 1.56% |
| Assault with RPG | 9 | 1.17% |
| IED – Dynamite | 5 | 0.65% |
| IED – Claymore mine | 6 | 0.78% |
| Other | 4 | 0.52% |
| Mortar | 2 | 0.26% |
| Sabotage, other | 2 | 0.26% |
| Unknown | 2 | 0.26% |
| Total | 768 | 100.00% |

**Figure 23**

## How Are Trains Attacked?

| Attack and Weapon | # | % of Total |
|---|---|---|
| IED - unspecified | 324 | 73.30% |
| Assault with automatic weapons | 28 | 6.33% |
| Sabotage through derailing | 15 | 3.39% |
| IID (improvised incendiary device) | 10 | 2.26% |
| IED – mine | 9 | 2.04% |
| Arson | 8 | 1.81% |
| Multiple weapons | 6 | 1.36% |
| IED – dynamite | 6 | 1.36% |
| Assault – other or unspecified | 6 | 1.36% |
| VBIED | 5 | 1.13% |
| IED – grenade | 4 | .90% |

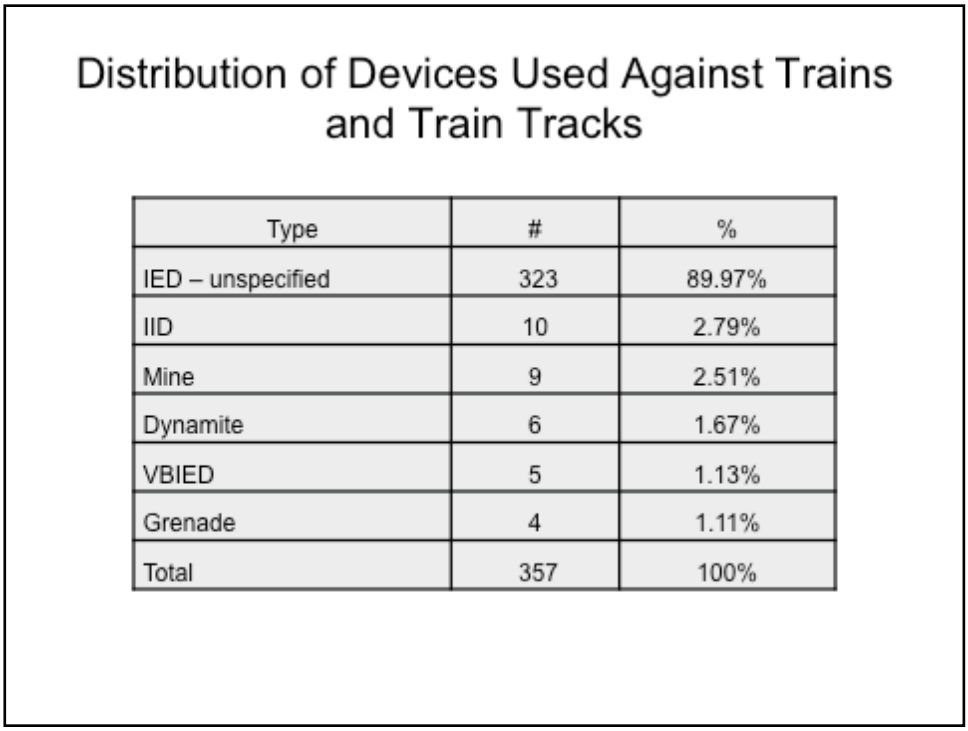
| Attack and Weapon | # | % of Total |
|---|---|---|
| Assault with RPG | 4 | 0.90% |
| Armed hijacking | 4 | 0.90% |
| Sabotage, other | 4 | 0.90% |
| Robbery | 3 | 0.68% |
| Other | 3 | 0.68% |
| Threat, bomb | 2 | 0.45% |
| Unconventional weapons | 1 | 0.23% |
| Total | 442 | 100.00% |

**Figure 24**

## Distribution of Devices Used Against Buses

| Type | # | % of Total |
|---|---|---|
| IED – unspecified | 373 | 76.9% |
| Grenade | 35 | 7.2% |
| IIDs | 30 | 6.2% |
| Mine | 22 | 4.5% |
| VBIED | 15 | 3.1% |
| Claymore mines | 6 | 1.2% |
| Dynamite | 5 | 1.0% |
| Total | 485 | 100.0% |

**Figure 25**



Distribution of Devices Used Against Trains and Train Tracks

| Type | # | % |
|---|---|---|
| IED – unspecified | 323 | 89.97% |
| IID | 10 | 2.79% |
| Mine | 9 | 2.51% |
| Dynamite | 6 | 1.67% |
| VBIED | 5 | 1.13% |
| Grenade | 4 | 1.11% |
| Total | 357 | 100% |

**Figure 26**

- Land mines are used more often on roads where buses travel, although they are also used in train derailments (4.5 percent for buses, 2.5 percent for trains).
- VBIEDs are used not only against bus stations and train stations, but also directly against buses (3.1 percent for buses, 1.3 percent for train targets, exclusively train stations).
- Claymore mines (used in 1.2 percent of all bomb attacks against buses) have not been used against trains and have been used almost exclusively against buses in Sri Lanka.
- IIDs are used more frequently against buses than against trains (6.2 percent for buses, 2.7 percent for trains). IIDs, often multiple devices, have been used in eight attacks against bus targets in Israel, six attacks in Turkey, three attacks in Egypt, and elsewhere, including two each in Bangladesh, Colombia, France, Greece, and Nepal. By contrast, IIDs (again, often multiple devices) have been used in four attacks against passenger train targets in the United Kingdom, one attack in India (the February 19, 2007, Peace Train firebombing that killed 68 people), and one each in Germany, France, Spain, Switzerland, and Turkey.

## LETHALITY BY TARGET

As shown in Figure 27, enclosed spaces such as scheduled buses (including minivans and minibuses) are, not surprisingly, where the most lethal attacks occur. Scheduled buses are the only targets in which lethality is above the average, but the lethality increase achieved by using bombs and incendiaries over that achieved by all weapons is not as great as might be expected: The average increase is one fatality for scheduled buses, and lethality is not affected or is even diminished in attacks against other targets.

In Figures 27 and 28, as in nearly all lethality charts, the number of attacks conducted is specified to indicate how often targets are attacked, rather than how lethal the attacks are. The number of attacks also helps identify potential outliers—particularly deadly attacks that indicate what terrorists have achieved once or twice, not what they normally achieve.

## Lethality by Bus Target: All Attacks and Bomb Attacks

| Target | # | All Attack Fatalities | All Attack Injuries | # | Bomb Attack Fatalities | Bomb Attack Injuries |
|---|---|---|---|---|---|---|
| Bus, scheduled | 502 | 5 | 11 | 291 | 6 | 16 |
| Minivan or minibus | 34 | 3 | 5 | 18 | 3 | 7 |
| Bus, school | 15 | 2 | 10 | 9 | 2 | 13 |
| Bus stop | 44 | 2 | 13 | 39 | 2 | 14 |
| Bus station – unspecified | 109 | 1 | 9 | 104 | 1 | 8 |
| Bus, tourist | 64 | 2 | 4 | 26 | 1 | 4 |
| Overall average | – | 4 | 10 | – | 4 | 13 |

**Figure 27**

## Average Lethality by Train Target: All Attacks and Bomb Attacks

| Target | # Attacks | All Attack Fatalities | All attack Injuries | # Attacks | Bomb Attack Fatalities | Bomb Attack Injuries |
|---|---|---|---|---|---|---|
| Passenger train | 264 | 6 | 20 | 200 | 6 | 22 |
| Subway train | 15 | 5 | 44 | 15 | 5 | 44 |
| Enclosed train station | 15 | 3 | 37 | 12 | 7 | 74 |
| Subway station – unspecified | 17 | 5 | 30 | 13 | 7 | 41 |
| train station – unspecified | 107 | 4 | 22 | 101 | 4 | 19 |
| Tourist train | 5 | 2 | 11 | 1 | 8 | 40 |
| Enclosed subway station | 4 | 2 | 0 | 4 | 2 | 0 |
| Station – train and bus | 9 | 2 | 7 | 7 | 1 | 6 |
| Trolley train | 5 | 2 | 9 | 4 | 0 | 11 |
| Total overall average | – | 6 | 22 | – | 5 | 24 |

**Figure 28**

Figure 28 indicates how much more lethal all attacks against trains are than all attacks against bus targets: Attacks on scheduled passenger trains have resulted in an average of six deaths, as opposed to five deaths per attack on scheduled buses, and an average of four deaths per attack on unspecified train stations, as opposed to an average of one death per attack on unspecified

bus stations. This may be because more people gather at train stations than at bus stations in many areas. Certainly, these are significant differences that need to be explored.

With an important exception, when only bomb attacks are considered, the lethality for train targets shifts, but only slightly. The overall average—which for buses remains constant—decreases by one fatality. When the targets most often hit—passenger trains and train stations—are considered, lethality drops when bombs are used against passenger trains, but remains constant for train stations. However, it increases significantly when bombs are used against enclosed train stations and most subway stations. By contrast, lethality increases for passenger buses but remains constant for bus stations and stops.

## LETHALITY BY ATTACK AND WEAPON

Another way to look at lethality is to consider different types of attacks against particular targets. Figure 29 presents the lethality of all attacks against bus targets, showing the number of times each attack method has been used next to the average lethality. This leads to the following observations.

First, the two most lethal attack methods have been used infrequently. Claymore mines were particularly effective against buses in Sri Lanka, and the two attacks coded as "sabotage, other" include a deadly 1991 sabotage of a tourist bus in Greece in which the exact weapon was unspecified in open sources. The next most lethal attack methods include the use of VBIEDs against bus targets in Israel; attacks involving "other or unspecified" assault, which include the execution by firearms of bus passengers in Colombia, two 1996 attacks in Algeria in which passengers' throats were slit, and a 1989 attack in Israel in which a bus was forced off the side of the road; and the use of mines in various countries, including a June 2005 attack in Nepal in which 53 people were killed and 73 were injured. Attacks with multiple weapons, which produced body counts similar to those of the most commonly used methods, often involved the use of an IED to stop a bus and automatic weapons to kill passengers.

All Bus Attacks: Lethality by Attack and Weapon

| Attack Type | # | Average Fatalities | Average Injuries |
|---|---|---|---|
| IED – Claymore mine | 6 | 21 | 28 |
| Sabotage, other | 2 | 18 | 4 |
| VBIED | 15 | 9 | 17 |
| Assault – other or unspecified | 14 | 8 | 3 |
| IED – mine | 22 | 7 | 15 |
| Assault with automatic weapons | 132 | 6 | 6 |
| Multiple weapons | 13 | 5 | 9 |
| IED – unspecified | 373 | 4 | 14 |
| IED – grenade | 35 | 2 | 12 |
| IID | 30 | 2 | 3 |
| Assault with RPG | 9 | 1 | 10 |
| Mortar | 2 | 1 | 5 |
| IED – dynamite | 5 | 1 | 2 |
| Kidnapping | 12 | 1 | 1 |
| Armed hijacking | 27 | 1 | 1 |
| Robbery | 25 | 1 | 1 |
| Arson | 40 | 0 | 1 |
| Total | – | 4 | 10 |

**Figure 29**

Second, the most lethal widely used attack method is assault with automatic weapons, which produced an average body count of six, and the ubiquitous unspecified IED, which produced an average body count of four. Not coincidentally, given that the majority of attacks are carried out with IEDs, this is the overall average for all attacks. The fact that automatic weapons are more lethal than IEDs is significant.

All other attack methods, including IIDs and grenades, have less-than-average lethality. This is not surprising for some types of attack, such as robbery and kidnapping, which are not intended to kill passengers, and arson, which is usually against buses emptied of passengers.

There are some interesting similarities and contrasts to be drawn when the same data are generated for the lethality of attacks against all train targets (Figure 30). The average lethality when all attacks are considered is one fatality more than in bus attacks.

Assaults with automatic weapons against trains also have a higher death toll than attacks with IEDs, topping the list of attack methods used. The lethality of derailments illustrates how deadly the mechanical sabotage of train tracks can be. Multiple weapons—again, often the use of a bomb to stop a train and assault weapons to kill passengers—have been a deadly combination. IIDs *can* be more lethal than IEDs, but the data primarily reflect the February 18, 2007, attack on the Peace Train in India.

Interestingly, IEDs are somewhat *more* lethal against trains than against buses—a result that needs more exploration, particularly in view of the bus bombing campaigns in Israel. The rest of the results represent relatively few attacks, and some of the same observations that applied to buses—i.e., about armed hijacking, kidnapping, and arson—apply here as well.

All Train Attacks: Lethality by Attack and Weapon

| Attack Type | # | Fatalities | Injuries |
|---|---|---|---|
| Assault with automatic weapons | 28 | 12 | 21 |
| Sabotage through derailing | 15 | 10 | 21 |
| Multiple weapons | 6 | 9 | 7 |
| IID (improvised incendiary device) | 10 | 7 | 7 |
| IED – unspecified | 324 | 5 | 26 |
| IED – mine | 9 | 4 | 10 |
| IED – dynamite | 6 | 3 | 2 |
| Assault with RPG | 4 | 3 | 8 |
| VBIED | 5 | 1 | 6 |
| Armed hijacking | 4 | 1 | 1 |
| Robbery | 3 | 1 | 0 |
| Assault – other or unspecified | 6 | 0 | 9 |
| IED – grenade | 4 | 0 | 5 |
| Sabotage, other | 4 | 0 | 0 |
| Arson | 8 | 0 | 0 |
| Total | – | 5 | 22 |

**Figure 30**

# BOMBS AND BOMBERS

## TYPES OF BOMBING ATTACKS

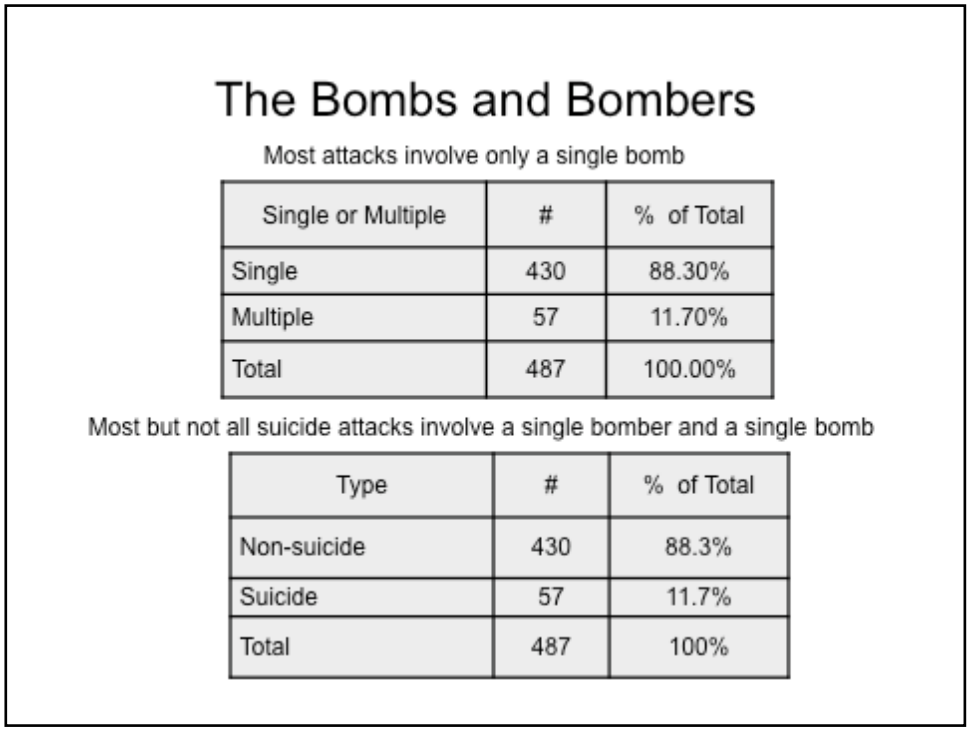
Figure 31 illustrates two key aspects of attacks on surface transportation in which explosive and incendiary devices are used: whether single or multiple devices are used, and how many of the attacks are suicide operations.

The proportion of all attacks involving a single device is quite high—about 88 percent, which is slightly higher than the equivalent figure for trains (87 percent). It should be noted that some of the attacks involving multiple devices were aimed at the same target, indicating attempts at redundancy, and because of the way the data are entered in the database, a few are single-device attacks against identical targets at the same time. Also, some of the multiple-device attacks were designed so that one or more devices detonated just as responders or explosives personnel arrived on the scene.

Almost 12 percent of the attacks on buses were suicide attacks. The fact that there were 57 suicide operations and 57 of the attacks used multiple bombs is purely a coincidence

## SUICIDE BOMBERS

We next compared the percentages of all attacks, train attacks, and bus attacks that were suicide operations and the percentages of fatalities and injuries they generated. The results are shown in Figure 32.



The Bombs and Bombers

Most attacks involve only a single bomb

| Single or Multiple | # | % of Total |
|---|---|---|
| Single | 430 | 88.30% |
| Multiple | 57 | 11.70% |
| Total | 487 | 100.00% |

Most but not all suicide attacks involve a single bomber and a single bomb

| Type | # | % of Total |
|---|---|---|
| Non-suicide | 430 | 88.3% |
| Suicide | 57 | 11.7% |
| Total | 487 | 100% |

**Figure 31**

## What About Suicide Bombers?

| Category | # | Suicide % | Fatalities | Suicide % | Injuries | Suicide % |
|---|---|---|---|---|---|---|
| All attacks | | | | | | |
| | # | % of Total | Fatalities | % of Total | Injuries | % of Total |
| # suicides | 73 | | 531 | | 2,625 | |
| # of all attacks | 1,481 | 4.93% | 5,694 | 9.33% | 17,807 | 14.74% |
| # of bomb attacks | 1,253 | 5.83% | 3,990 | 13.31% | 15,516 | 16.92% |
| Train Attacks | | | | | | |
| | # | % of Total | Fatalities | % of Total | Injuries | % of Total |
| # suicides | 14 | | 69 | | 720 | |
| # of all attacks | 442 | 3.17% | 2,400 | 2.88% | 9,533 | 7.55% |
| # of bomb attacks | 356 | 3.93% | 1,824 | 3.78% | 8,518 | 8.45% |
| Bus Attacks | | | | | | |
| | # | % of Total | Fatalities | % of Total | Injuries | % of Total |
| # suicides | 57 | | 414 | | 1,885 | |
| # of all attacks | 768 | 7.42% | 3,024 | 13.69% | 7,715 | 24.43% |
| # of bomb attacks | 487 | 11.70% | 1,946 | 21.47% | 6,513 | 28.94% |

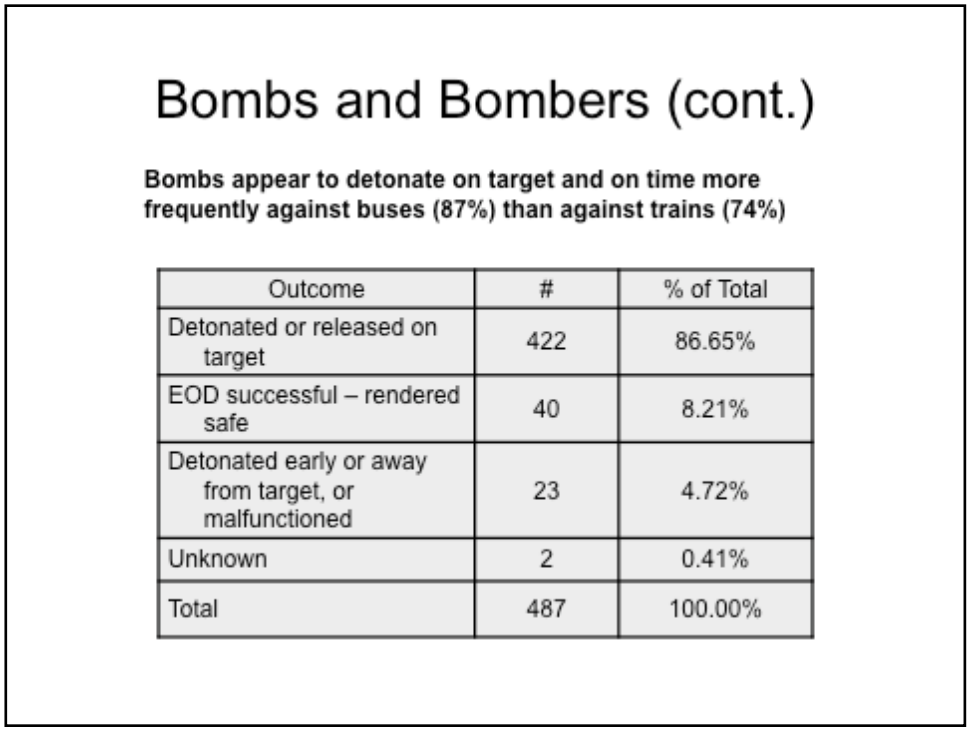
**Figure 32**

The percentages of all attacks against buses and all bomb attacks against buses that are suicide operations (nearly 7.5 percent of all attacks on buses and 12 percent of bomb attacks on buses) are roughly two and three times the percentages of attacks against trains that involve suicides (roughly 3 percent of all attacks on trains and 4 percent of all bomb attacks on trains). More striking, however, is the fact that suicide bombers create 13.7 percent of the fatalities in all attacks on buses and 21.5 percent of the fatalities in all bomb attacks on buses—twice their proportional share. The comparable figures for suicide train attacks are significantly less: 2.9 percent for all attacks and 3.21 percent for bomb attacks—less than their proportional share. Thus, suicide bombers are roughly *five times* more lethal when attacking bus targets than when attacking train targets.

There may be several reasons for this. The use of suicide bombers against bus targets in Israel, Sri Lanka, Pakistan, and India has been particularly lethal, and there are fewer passengers on buses and at bus stations than on trains. It is another trend that is worth exploring in more detail as more information on explosives and incendiary devices is collected.

## OUTCOMES OF BOMB ATTACKS

Figure 33 illustrates the “outcomes” of explosive and incendiary devices used in bus attacks. The majority (87 percent) of devices are presumed to have detonated or been released on target, considerably higher than the average for trains (74 percent). For bus targets, 82 percent of the devices were rendered safe, and 5.1 percent detonated early or away from the target or malfunctioned. These findings suggest—and are supported by case studies that will appear in the final report—that devices can be found and defused and passengers can be evacuated before an explosion when drivers, conductors, intelligence, police and security officials, and passengers are alert. In some instances, devices were also poorly designed. It appears that fatalism is not an appropriate response to explosive and incendiary devices used against public bus transportation.



## Bombs and Bombers (cont.)

**Bombs appear to detonate on target and on time more frequently against buses (87%) than against trains (74%)**

| Outcome | # | % of Total |
|---|---|---|
| Detonated or released on target | 422 | 86.65% |
| EOD successful – rendered safe | 40 | 8.21% |
| Detonated early or away from target, or malfunctioned | 23 | 4.72% |
| Unknown | 2 | 0.41% |
| Total | 487 | 100.00% |

**Figure 33**

## LETHALITY OF BOMB ATTACKS

Finally, we look at the lethality of bomb attacks in three ways. First, we consider the lethality of the device used. Second, we examine the lethality of different methods of delivering and concealing explosive or incendiary devices. Third, having already examined the bus subtarget categories where all attacks occur, we look at these same categories for bomb attacks. We then combine these three factors—device, method of delivery and concealment, and target—to determine the most lethal combinations for bus attacks, and we compare the lethality of these combinations to the 12 most lethal attacks against all public surface transportation targets.

Figure 34 illustrates the lethality of devices used against bus transportation, showing again the number of times various devices were used.

The reasons for the high lethality of Claymore mines have already been described, but it is interesting to note that VBIEDS and land mines are more lethal than unspecified IEDs, which are at the average point, followed by grenades, IIDs, and dynamite

Figure 35 presents the comparable data for passenger train attacks. Once again, unspecified IEDs and dynamite are more lethal, on average, in train attacks than in bus attacks. Also, the figure for the lethality of IIDs is influenced by the February 2007 Peace Train attack in India.

Figure 36 shows the average lethality of bus attacks by method of delivery and concealment of the device used, again indicating the number of times each method has been used. Concealing or placing the device in a non-passenger area is shown to be the most successful method. However, this finding is based on only two attacks, one in Sri Lanka in which there were no casualties and the 1996 attack in Pakistan that resulted in 40 fatalities.

## Bus Bomb Attacks: Lethality by Device

| Attack Type | # | Average Fatalities | Average Injuries |
|---|---|---|---|
| IED – Claymore mine | 6 | 24 | 28 |
| VBIED | 15 | 9 | 17 |
| IED – mine | 22 | 7 | 15 |
| IED – unspecified | 373 | 4 | 14 |
| IED – grenade | 35 | 2 | 12 |
| IID (improvised incendiary device) | 30 | 2 | 3 |
| IED – dynamite | 5 | 1 | 2 |
| Overall average – bomb attacks | – | 4 | 13 |

**Figure 34**

## Train Bomb Attacks: Lethality by Device

| Attack Type | # | Average Fatalities | Average Injuries |
|---|---|---|---|
| IID (improvised incendiary device) | 10 | 7 | 7 |
| IED – unspecified | 323 | 5 | 26 |
| IED – mine | 9 | 4 | 10 |
| IED – dynamite | 6 | 3 | 2 |
| VBIED | 5 | 1 | 6 |
| IED – grenade | 4 | 0 | 3 |
| Overall average – bomb attacks | – | 5 | 24 |

**Figure 35**

Bus Attacks: Average Lethality by Concealment and Delivery

| Delivery and Concealment | # | Average Fatalities | Average Injuries |
|---|---|---|---|
| Concealed/placed in non-pax area | 2 | 20 | 0 |
| Placed near target | 25 | 11 | 18 |
| Carried on person | 57 | 7 | 33 |
| Placed on vehicle road | 36 | 6 | 15 |
| Concealed in parcel or bags | 24 | 5 | 7 |
| Concealed/left in pax compartment | 196 | 4 | 12 |
| Concealed in or on vehicle | 1 | 2 | 2 |
| Physical thrown | 64 | 1 | 8 |
| Concealed/left in stations | 70 | 1 | 9 |
| Unknown | 4 | 1 | 6 |
| Concealed/placed outside of stations | 12 | 1 | 5 |
| Concealed/left at bus stop | 24 | 1 | 10 |
| Overall average | – | 4 | 13 |

**Figure 36**

Most of the other concealment methods are used frequently enough to suggest valid averages, with the next most lethal method—"placed near the bus or other target, unspecified"—usually referring to VBIEDs, which can include suicide bombers.

The third most lethal method, "carried on person," refers exclusively to suicide bombers. As noted above, suicide attacks are particularly lethal in buses, achieving an average of seven deaths. The next most frequently used methods are concealing the device in a parcel or bag (five deaths) and concealing or leaving the device in the passenger compartment (four deaths, which is also the average lethality for all types of bomb attacks).

Figure 37 shows the comparable data on concealment and method of delivery for attacks on passenger trains.

The average lethality achieved by suicide bombers in train attacks (five fatalities) is considerably lower than that achieved by the two most common methods of placing a bomb on a train—concealing it in parcels or bags (eight fatalities) or placing it in a passenger compartment (seven fatalities). The fatality rate of the most common method of attacking a train—placing a bomb on the tracks, on a bridge, or near a train[9] (three fatalities) is considerably lower than the lethality of suicide bombers. However, these are preliminary findings that could change with further scrutiny.

Figures 38 and 39 show the lethality of attacks on various bus and train subtargets. The targets most frequently attacked are scheduled buses, passenger trains, bus stations, and train stations. These two figures show that bombs are, on average, considerably more lethal when used against train targets than against bus targets. For both sets of targets, devices are more lethal when released or detonated in enclosed spaces, starting with tourist trains (although our data come from only one attack), followed by enclosed train and subway stations, then scheduled buses and passenger trains, followed by subway trains and unspecified train stations, and finally by minivans and minibuses. All other targets yielded only two fatalities or less.

## Train Bomb Attacks: Average Lethality by Concealment and Delivery

| Delivery and Concealment | # | Average Fatalities | Average Injuries |
|---|---|---|---|
| Concealed in parcel or bags | 39 | 8 | 73 |
| Concealed/left in passenger compartments | 143 | 7 | 27 |
| Carried on person | 16 | 5 | 51 |
| Concealed/left in stations | 84 | 4 | 16 |
| Unknown | 14 | 3 | 28 |
| Placed on railroad track or bridge, or near a train | 223 | 3 | 14 |
| Placed near the target | 8 | 1 | 10 |
| Concealed/placed outside of stations | 28 | 1 | 5 |
| Concealed/placed in non-pax area | 2 | 1 | 0 |
| Physical thrown | 7 | 0 | 5 |
| Concealed in or on vehicle | 1 | 0 | 3 |
| Concealed/placed inside of building or office | 3 | 0 | 0 |
| Overall average | – | 5 | 24 |

**Figure 37**

## Average Lethality by Bus Targets: Bomb Attacks

| Bus Subtarget | # | Fatalities | Injuries |
|---|---|---|---|
| Bus, scheduled | 291 | 6 | 16 |
| Minivan or minibus | 18 | 3 | 7 |
| Bus stop | 39 | 2 | 14 |
| Bus, school | 9 | 2 | 13 |
| Bus station – unspecified | 104 | 1 | 8 |
| Bus, tourist | 26 | 1 | 4 |
| Overall average | | 4 | 13 |

**Figure 38**

Average Lethality by Train Target: Bomb Attacks

| Train Subtarget | # | Fatalities | Injuries |
|---|---|---|---|
| Train, tourist | 1 | 8 | 40 |
| Train, passenger (intercity or commuter) | 200 | 6 | 22 |
| Train, subway | 15 | 5 | 44 |
| Train station – unspecified | 101 | 5 | 23 |
| Train station – enclosed building | 12 | 3 | 43 |
| Subway station – unspecified | 12 | 2 | 7 |
| Subway station – enclosed building | 4 | 2 | 0 |
| Station – train and bus | 7 | 1 | 6 |
| Train, trolley | 4 | 0 | 11 |
| Overall average | | 5 | 24 |

**Figure 39**

## THE MOST LETHAL COMBINATIONS OF DEVICES AND METHODS OF DELIVERY AND CONCEALMENT

For bus attacks, the small number of incidents that achieved greater average lethality than the most commonly used methods include

1. A 1996 attack in Pakistan (40 fatalities), in which a bomb was placed near the gasoline tank of a bus.
2. Two attacks involving Claymore mines in Sri Lanka (21 and 20 fatalities), one against a scheduled bus and the other against a government bus.
3. One 2007 suicide operation against a bus carrying police in Pakistan (18 fatalities).
4. Two instances in which flammable devices ignited in passenger buses (perhaps accidentally) in China in 1994 (an average of 14 fatalities).
5. A motorcycle bomb in Sri Lanka used against a government bus (13 fatalities).
6. Mines used once in Russia and twice in India against government buses (an average of 12 fatalities).

All 12 of the most lethal combinations of devices and methods used in bus attacks are shown in Figure 40. The combinations used most frequently were VBIEDs against buses (17 fatalities in Israel), which included some suicides; the much more common use of IEDs carried on buses by suicide bombers (averaging nine fatalities) and left in parcels or bags (averaging eight fatalities); and land mines in several countries (averaging eight fatalities). One of the most common combinations—concealing an IED in the passenger compartment of a bus, of which there were

## Bus Bomb Attacks: 12 Most Lethal Combinations

| Average Fatalities | # | Target | Device | Delivery/Concealment |
|---|---|---|---|---|
| 40 | 1 | Scheduled bus | IED - unspecified | Concealed in non-pax areas |
| 21 | 6 | Scheduled bus | IED – Claymore | Placed near the target |
| 20 | 1 | Co. or gov't bus | IED- Claymore | Placed near the target |
| 18 | 1 | Co. or gov't bus | IED - unspecified | Carried on person |
| 17 | 6 | Scheduled bus | VBIED | Placed near the target |
| 14 | 2 | Scheduled bus | IID | Concealed in parcel or bags |
| 13 | 1 | Co. or gov't bus | IED – unspecified | Concealed in or on vehicle (motorcycle) |
| 12 | 3 | Co. or gov't bus | IED – mine | Placed on vehicle road |
| 9 | 41 | Scheduled bus | IED – unspecified | Carried on person |
| 8 | 11 | Scheduled bus | IED – unspecified | Concealed in parcel or bags |
| 8 | 20 | Scheduled bus | IED – mine | Placed on vehicle road |
| 8 | 2 | Tourist bus | IED – unspecified | Placed on vehicle road |

**Figure 40**

slightly more than 140 instances—yielded an average of only four fatalities, less than half the lethality of suicide bombers carrying an IED and exactly half that of IEDs left in parcels or bags.

The final report will address the lethality rates of various delivery/concealment methods when only bombs that detonated on target are considered. Since nearly all suicide bombers detonate on target, the difference in lethality between suicide and non-suicide operations *may* decrease.

Again, all of these preliminary findings must be explored further.

Figure 41 shows the most lethal combinations for all attacks against public surface transportation. Eight of the 12 most lethal combinations were used in attacks on buses, and this does not include the 2007 suicide bombing of a truck convoy carrying Chinese workers, which we really consider an ersatz bus or minibus.

The remaining three attacks involving train targets were

1. A 1989 train attack in China in which dynamite was hidden in a toilet (20 fatalities).

2. The detonation of four gasoline bombs (IIDs) on the Peace Train in India in 2007 (68 deaths and 50 injuries).

3. The placement of 19 bombs on the commuter rail system of Madrid on March 11, 2004 (191 deaths and 1,800 injuries).

The most common combination of target, device, and concealment method—hiding an IED in the passenger compartment of a passenger train, which was used 103 times—achieved an average of eight fatalities, twice the fatality rate of placing an IED in the passenger compartment of a scheduled bus, the most common combination used in bus attacks.

## All Bomb Attacks: 12 Most Lethal Combinations

| Average Fatalities | # | Target | Device | Delivery/Concealment |
|---|---|---|---|---|
| 40 | 1 | Scheduled bus | IED – unspecified | Concealed in non-pax areas |
| 30 | 1 | Truck (ersatz minibus) | IED – unspecified | Carried on person |
| 21 | 6 | Scheduled bus | IED – Claymore | Placed near the target |
| 20 | 1 | Co. or gov't bus | IED – Claymore | Placed near the target |
| 20 | 1 | Passenger train | IED – dynamite | Concealed in pax compartment |
| 18 | 1 | Co. or gov't bus | IED – unspecified | Carried on person |
| 17 | 4 | Passenger train | IID | Concealed in pax compartment |
| 17 | 6 | Scheduled bus | VBIED | Placed near the target |
| 14 | 2 | Scheduled bus | IID | Concealed in parcel or bags |
| 13 | 1 | Co. or gov't bus | IED – unspecified | Concealed in or on vehicle (motorcycle) |
| 13 | 17 | Passenger train | IED – unspecified | Concealed in parcel or bags |
| 12 | 3 | Co. or gov't bus | IED – mine | Placed on vehicle road |

**Figure 41**

# THE FINAL MTI REPORT

Security measures that help alert security and intelligence officials, bus operators and managers, and passengers to suspicious behavior and devices can potentially increase the difficulty of mounting a successful attack or decrease the lethality of an attack that does occur.

To help guide the development of such measures, the final report will use data from the most current version of the MTI database, which will prompt some changes in the empirical analysis. Also, to help determine what actions can be most effective in reducing risk, the final report will explore attacks in which

- Particularly lethal tactics and weapons have been employed, including the use of suicide attackers.
- Actions by on-scene security personnel, operators, or passengers would likely not have stopped or mitigated the attack without significant advance warning.
- Enhanced awareness and actions by security personnel, operators, or passengers did in fact prevent or mitigate attacks.
- Particularly lethal bombs or incendiary devices were used.
- Bombs or incendiary devices malfunctioned or were ineffective.
- Multiple bombs were involved, timed to detonate to increase casualties, especially among emergency responders.

# APPENDIX

## NOVEMBER 12, 2009, BRIEFING FOR DHS COUNTER-IED WORKING GROUP

### Explosives Used Against Public Surface Transport: Preliminary Observations

Brian Michael Jenkins
Bruce Robert Butterworth
Mineta Transportation Institute
National Transportation Security Center

Briefing for DHS
Counter-IED Working Group
November 12, 2009
Washington DC

# Agenda

- Overview of MTI interim data base
- All attacks against all public surface transport targets
- Bomb attacks against all public surface transport targets
- All Attacks against passenger train targets
- Bomb attacks against passenger train targets
- All Attacks against bus targets
- Bomb attacks against bus targets

# MTI Interim Data base

Overview

# Current Data

- New attacks captured since 9/01/09, mostly for buses and some for train stations:
  - 1,384 (1206) attacks on all *public* surface transport
  - 438 ( 416) attacks against passenger trains/stations
  - 354 ( 338) explosive attacks against passenger trains
  - 684 ( 540) attacks against all buses
  - 439 ( 336) explosives attacks against all buses
- Time:
  - All Attacks: January 1970 (July 1974) to Present
  - Attempted Derailments – 1920 to Present (11 out of 91 occurred between 1920 and 1970)
- Sources:
  - 1920-2009: Published MTI Chronologies and Updated Open Sources
  - 1998-2007 UMSTART accounts with narratives

# Recent and Planned Enhancements

- Recent:
  - Added under 200 new attacks from terrorist campaigns against buses in Russia, Israel, Sri Lanka, India, Pakistan, Turkey, Colombia, Thailand, the Philippines and Indonesia, and some train station and road attacks
  - Focused road attacks on those clearly aimed at bridge and tunnel destruction or road system disruption.
- Underway:
  - Information from explosives communities on recent explosives attacks.
  - Additional data fields (see next two slides) on 50 bus attacks (for bus operator project) train attacks; 50 train attacks will then be added.
  - Moving to more stable and robust platform.
  - More powerful system will enable multiple median calculations which will give a truer picture.
- WE ARE SEEKING YOUR SUGGESTIONS

# Some Current Fields

Targets (37 types):

- Bus (scheduled, school, tourist, government)
- Train (inter-city and commuter passenger, subway, Trolley, elevated, government, tourist)
- Train infrastructure: Track, Bridge, Tunnel, Communications
- Stations (enclosed, open air) and bus stops
- Vehicle highway, road, bridge, tunnel

Weapon and Attack (26 types:

- IED & IID
- VBIED
- Assault automatic weapons
- Assault with RPG
- Arson
- Sabotage by derailing, or other sabotage
- Robbery, Armed Hijacking and Kidnapping

# Some Current Fields for Explosives

**Explosives**

- **IED Unspecified**
- **Mines & Claymore Mines**
- **Dynamite**
- **Grenades**
- **VBIEDS**
- **IIDs**
- **Other**

**Location:**

- **Above or under Ground**
- **In enclosed or open area**

**Outcome:**

- **Detonated or released on target**
- **Malfunctioned, detonated, released early or away from target**
- **Failed to detonate or release**
- **Detonated during unsuccessful EOD**
- **Rendered Safe**

**Delivery and Concealment (16 types)**

- **On Person (Suicide)**
- **Left in bag or parcel in train or bus**
- **Left in station or bus stop**
- **Left outside station or bus stop**
- **Left in passenger compartment of train or bus**
- **Left in non-passenger compartment of train or bus**
- **Placed on tracks or near trains**
- **Placed near buses**
- **Physically thrown**
- **Other**

# Some Future Data Fields

- **When attacks take place (peak versus off-peak)**
- **Size of cities in which attacks take place**
- **Type of train or bus, and type of service, and any other data on environment in which bombs detonate**
- **IED details: Type and size of charge, type of detonator and timer**
- **Success in detecting attack/device:**
  - **Intelligence**
  - **Security personnel**
  - **Employees**
  - **Passengers**
  - **Canines**
  - **Technology**
- **Security measures before and after attack**

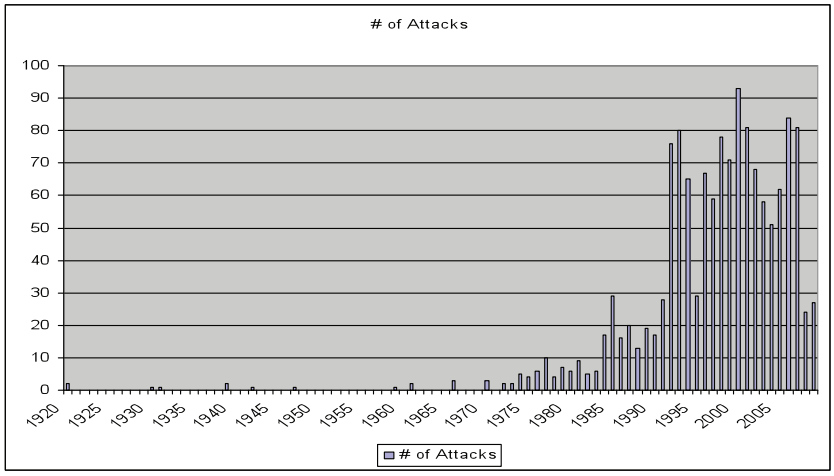
- **NOTE: Because accurate information is difficult to get, focus will be on more recent attacks, and attacks in countries with more reliable public reporting.**

# All Attacks Against Public Surface Transport Targets

# Body Counts "Count"

- **Terrorists seek slaughter; attacks with body counts of 50 to 100 considered good returns on investment**
- **Substantial percentage of *all* attacks against surface transport designed to kill, not to cause economic harm:**
  - **39% of attacks resulted in at least 1 death**
  - **18% of attacks resulted in at least 5 deaths**
  - **10% of attacks resulted in at least 10 deaths**
    - **Majority of recent attacks appear intended to kill**
  - **Most of remaining 61% of attacks**
    - **failed or were stopped, or**
    - **Aimed at disruption (often in areas of insurgency), especially against road targets (e.g., FARC and also IRA campaigns against tracks and roads)**

# Surface Transportation Attacks: A Relatively Recent Problem



# What About Suicide Bombers?

**Train attacks: Small % of attacks and also proportional % of fatalities;**
**Different Story for Bus attacks: Higher Percentage and more lethal attacks**

| Category | # | Suicide % | Fatalities | Suicide % | Injuries | Suicide % |
|---|---|---|---|---|---|---|
| All attacks | | | | | | |
| # suicides | 71 | | 530 | | 2624 | |
| # of all attacks | 1384 | 5.13% | 5460 | 9.71% | 16385 | 16.01% |
| # of bomb attacks | 1191 | 5.96% | 3915 | 13.54% | 14319 | 18.33% |
| Train Attacks | | | | | | |
| # of Suicides | 14 | | 69 | | 720 | |
| # of Train Attacks | 439 | *3.19%* | 2527 | *2.73%* | 8784 | *8.20%* |
| # of Train Bomb attacks | 354 | *3.95%* | 1951 | *3.54%* | 7769 | *9.27%* |
| Bus Attacks | | | | | | |
| # of Suicides | 55 | | 413 | | 1884 | |
| # of Bus Attacks | 685 | *8.03%* | 2653 | *15.57%* | 7081 | *26.61%* |
| # of Bus Bomb Attacks | 441 | *12.47%* | 1734 | *23.82%* | 6102 | *30.88%* |

# All Attacks - Distribution by Region

| Region | # | % |
|---|---|---|
| South Asia | 403 | 29.12% |
| Middle East and North Africa | 283 | 20.45% |
| Southeast Asia | 149 | 10.77% |
| Western Europe | 189 | 13.66% |
| Russia and the NIS | 110 | 7.95% |
| South America | 98 | 7.08% |
| Sub-Saharan Africa | 56 | 4.05% |
| East Asia | 31 | 2.24% |
| Eastern Europe | 28 | 2.02% |
| Central America & Caribbean | 16 | 1.16% |
| North America | 14 | 1.01% |
| Australasia & Oceania | 4 | 0.29% |
| Central Asia | 3 | 0.22% |
| Total | 1384 | 100.00% |

# All Bomb Attacks

**Bombings dominate: No differences in distribution**

| Region | # | % |
|---|---|---|
| South Asia | 332 | 32.6% |
| Middle East and North Africa | 203 | 20.0% |
| Southeast Asia | 101 | 9.9% |
| Western Europe | 153 | 15.0% |
| Russia and the NIS | 91 | 8.9% |
| South America | 56 | 5.5% |
| Sub-Saharan Africa | 23 | 2.3% |
| East Asia | 25 | 2.5% |
| Eastern Europe | 12 | 1.2% |
| Central America & Caribbean | 5 | 0.5% |
| North America | 9 | 0.9% |
| Australasia & Oceania | 4 | 0.4% |
| Central Asia | 3 | 0.3% |
| Total | 1017 | 100.0% |

# All Attacks: Leading Countries

**With exception of Israel, developing countries suffer more**

| Rank | Developing | # | % of total | Rank | Developed | # | % of total |
|---|---|---|---|---|---|---|---|
| 1 | India | 202 | 14.60% | 1 | Israel | 140 | 10.12% |
| 2 | Pakistan | 126 | 9.10% | 2 | Russian Federation | 94 | 6.79% |
| 3 | Philippines | 72 | 5.20% | 3 | United Kingdom | 67 | 4.84% |
| 4 | Turkey | 51 | 3.68% | 4 | Spain | 43 | 3.11% |
| 5 | Colombia | 60 | 4.34% | 5 | France | 26 | 1.88% |
| 6 | Sri Lanka | 55 | 3.97% | 6 | Germany | 20 | 1.45% |
| 7 | Thailand | 42 | 3.03% | 7 | Greece | 10 | 0.72% |
| 8 | Egypt | 34 | 2.46% | 8 | Italy | 9 | 0.65% |
| 9 | Algeria | 37 | 2.67% | 9 | United States | 7 | 0.51% |
| 10 | China | 19 | 1.37% | 10 | Japan | 8 | 0.58% |

# Bomb attacks: Leading Countries

**Bombs Dominate: No significant differences**

| Rank | Developing | # | % of total | Rank | Developed | # | % of total |
|---|---|---|---|---|---|---|---|
| 1 | India | 162 | 15.96% | 1 | Israel | 113 | 11.13% |
| 2 | Pakistan | 109 | 10.74% | 2 | Russian Federation | 81 | 7.98% |
| 3 | Philippines | 53 | 5.22% | 3 | United Kingdom | 64 | 6.31% |
| 4 | Turkey | 38 | 3.74% | 4 | Spain | 32 | 3.15% |
| 5 | Colombia | 33 | 3.25% | 5 | France | 19 | 1.87% |
| 6 | Sri Lanka | 49 | 4.83% | 6 | Germany | 11 | 1.08% |
| 7 | Thailand | 25 | 2.46% | 7 | Greece | 8 | 0.79% |
| 8 | Egypt | 16 | 1.58% | 8 | Italy | 8 | 0.79% |
| 9 | Algeria | 23 | 2.27% | 9 | United States | 6 | 0.59% |
| 10 | China | 17 | 1.67% | 10 | Japan | 5 | 0.49% |

# All Attacks: Distribution by Target Groups

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 543 | 39.23% |
| Passenger Trains | 286 | 20.66% |
| Train Stations | 152 | 10.98% |
| Bus stations/stops | 141 | 10.19% |
| Railway Tracks | 85 | 6.14% |
| Vehicle Bridge | 56 | 4.05% |
| Highway or Road | 28 | 2.02% |
| Freight Train | 21 | 1.52% |

1. **Buses targets dominate: 49.42%**
2. **Passenger train targets (including track) follow: 37.41%**
3. **Road targets are last major group: 6.06% (mostly bridge attacks)**

## All Bomb Attacks: Distribution by Target Group

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 307 | 30.19% |
| Passenger Trains | 217 | 21.34% |
| Train Stations | 137 | 13.47% |
| Bus stations/stops | 133 | 13.08% |
| Railway Tracks | 74 | 7.28% |
| Vehicle Bridge | 55 | 5.41% |
| Highway or Road | 21 | 2.06% |
| Freight Train | 0 | 0.00% |

1. Rankings do not change and buses still dominate over trains, but
2. Bus stations and stops are roughly same as train stations and there are no attacks on freight trains

## Target Distribution for 1384 Attacks

| TARGET | # | % |
|---|---|---|
| Bus, Scheduled | 447 | 32.30% |
| Train, Passenger | 261 | 18.86% |
| Train Station, Unspecified | 106 | 7.66% |
| Bus Station – Unspecified | 101 | 7.30% |
| Railway Tracks | 85 | 6.14% |
| Vehicle Bridge | 56 | 4.05% |
| Bus, Tourist | 56 | 4.05% |
| Bus Stop | 40 | 2.89% |
| Bus, Company or Gov't | 33 | 2.38% |
| Highway or Road | 28 | 2.02% |
| Minibus or Minivan | 26 | 1.88% |
| Enclosed Train Station | 15 | 1.08% |
| Train, Freight | 15 | 1.08% |
| Subway station, unspecified | 18 | 1.30% |
| Train, Subway | 21 | 1.52% |
| Railway Bridge | 14 | 1.01% |

| TARGET | # | % |
|---|---|---|
| Truck | 10 | 0.72% |
| Train, Trolley | 5 | 0.36% |
| Other | 5 | 0.36% |
| Train, Tourist | 7 | 0.51% |
| Station -- Train and Bus | 9 | 0.65% |
| Enclosed Subway Station | 4 | 0.29% |
| Railway Signals/ Comm System | 3 | 0.22% |
| Vehicle Tunnel | 2 | 0.14% |
| Enclosed Bus Station | 1 | 0.07% |
| Railway Tunnel | 1 | 0.07% |
| Train, Troop | 1 | 0.07% |
| Railway-Unspecified | 1 | 0.07% |
| Transport Office Multiple targets, Open Air Bus, Subway, Train Stations, Elevated trains, Overpasses | 0 | 0.00% |

# Target Distribution for 1017 Bomb Attacks

**Few Significant Differences: See below when rank is off by more than one place**

| Target | # | % |
|---|---|---|
| Bus, Scheduled | 260 | 25.6% |
| Passenger Trains | 197 | 19.4% |
| train station, unspecified | 100 | 9.8% |
| Bus Station – Unspecified | 96 | 9.4% |
| Railway Tracks | 74 | 7.3% |
| Vehicle Bridge | 55 | 5.4% |
| Bus Stop | 37 | 3.6% |
| Bus, Company or Gov't | 23 | 2.3% |
| Bus, Tourist *(9th - was 7th)* | 21 | 2.1% |
| Highway or Road | 21 | 2.1% |
| Train, Freight | 20 | 2.0% |
| Minivan or Minibus | 18 | 1.8% |
| train, subway | 15 | 1.5% |

| Target | # | % |
|---|---|---|
| Enclosed Train Station *(14th was 12th)* | 13 | 1.3% |
| Railway Bridge | 13 | 1.3% |
| Subway station, unspecified | 13 | 1.3% |
| Bus, School | 8 | 0.8% |
| Station -- Train and Bus | 7 | 0.7% |
| Truck | 5 | 0.5% |
| Enclosed Subway Station | 4 | 0.4% |
| Train, Trolley | 4 | 0.4% |
| Other | 4 | 0.4% |
| Railway Signals/Comm System | 2 | 0.2% |
| Transport Company Office | 2 | 0.2% |
| Multiple Targets, Tourist Train *(had 7)*, Troop Train, Vehicle Tunnel, Unspecified Railway: | 1 | 0.1% |
| Enclosed and Open Bus station | 0 | 0.1% |

# All Attacks: Lethality by Target Group:

**More attacks against bus targets, but train attacks more Lethal**

| Target Group | Average Fatalities | Average Injuries |
|---|---|---|
| Trains and Train Stations | 6 | 20 |
| Bus, Bus Stops and Bus stations | 4 | 10 |
| Track | 1 | 1 |
| Road Targets | 0 | 0 |
| Overall Average | 4 | 10 |

## Bomb Attacks: Lethality By Target Group

1. **Bombs Equalize: Differences between train and bus targets decrease**
2. **Road Attacks increase in lethality (developing country campaigns).**
3. **Track attacks: Lack of mechanical derailments decrease lethality.**

| Target Group | Average Fatalities per Explosion | Average Injuries per Explosion |
|---|---|---|
| Train | 5 | 19 |
| Bus | 4 | 13 |
| Road | 1 | 0 |
| Track | 0 | 1 |
| Overall Average | 4 | 12 |

## All Attacks: Lethality By Target

**Trains, stations and *then* buses most lethal targets**

| Target | Average Deaths | Average Injuries |
|---|---|---|
| Passenger train | 7 | 20 |
| Enclosed Train Station | 6 | 64 |
| Subway station, unspecified | 5 | 44 |
| train station, unspecified | 5 | 30 |
| Co & Gov't bus | 5 | 12 |
| train, subway | 5 | 11 |
| Bus, Scheduled | 5 | 3 |
| Bus, School | 4 | 10 |
| Train, Freight | 3 | 5 |
| Enclosed Subway Station | 3 | 1 |
| Bus Stop | 2 | 14 |
| Bus, Tourist | 2 | 11 |
| Minivan or Minibus | 2 | 10 |
| Other | 2 | 7 |
| Highway or Road | 2 | 4 |
| Train, Tourist | 2 | 0 |
| Truck | 1 | 9 |
| Bus Station - Unspecified | 1 | 3 |
| Vehicle Bridge | 1 | 1 |
| Railway Tracks, Enclosed & Open Air Bus Stations, Train and Bus Stations, Multiple Targets, Railway Bridges and Tunnels, Trolley, Troop Trains, Transport Company Office, Railway Signals/Comm System | 0 | 0 |
| Overall Average | 4 | 10 |

## Bomb Attacks: Lethality By Target (per explosion):

**Bombs equalize: Buses, trains and train stations become equally lethal targets**

| Target | Average Fatalities | Average Injuries |
|---|---|---|
| Tourist Train ( Very Few) | 8 | 40 |
| Subway station, unspecified | 6 | 38 |
| Bus, Scheduled | 5 | 16 |
| Enclosed Train Station | 5 | 54 |
| Bus, Company or Gov't | 5 | 12 |
| Passenger Train | 5 | 18 |
| train, subway | 5 | 39 |
| train station, unspecified | 4 | 11 |
| Truck (often ersatz bus) | 3 | 1 |
| Bus, School | 3 | 15 |
| Minivan or Minibus | 2 | 6 |

| Target | Average Fatalities | Average Injuries |
|---|---|---|
| Enclosed Subway Station | 2 | 0 |
| Other | 2 | 0 |
| Bus Stop | 2 | 14 |
| Train, Freight | 1 | 3 |
| Bus Station unspecified | 1 | 8 |
| Highway or Road | 1 | 1 |
| Station -- Train and Bus | 1 | 5 |
| Bus, Tourist | 1 | 2 |
| Train, Trolley | 0 | 11 |
| Overall Average | 4 | 12 |

## Distribution By Attack and Weapon

**(1) Explosives and incendiaries (73% of total) & automatic weapons (10.77%) dominate; (2) Hijacking and Robbery still important; (3) Mechanical derailments are effective**

| Attack and Weapon | # | % |
|---|---|---|
| IED - unspecified | 846 | 61.17% |
| Assault with Automatic Weapons | 149 | 10.77% |
| Arson | 54 | 3.90% |
| IID (Improvised Incendiary Device) | 42 | 3.04% |
| IED - Mine | 38 | 2.75% |
| Armed Hijacking | 31 | 2.24% |
| Robbery | 28 | 2.02% |
| Assault- Other or Unspecified | 19 | 1.37% |
| IED - Dynamite | 20 | 1.45% |
| IED - Grenade | 36 | 2.60% |
| VBIED | 27 | 1.95% |
| Sabotage through Derailing | 20 | 1.45% |

## Distribution by Attack and Weapon (con't)

| Attack and Weapon | # | % |
|---|---|---|
| Sabotage, Other | 13 | 0.94% |
| Assault with RPG | 13 | 0.94% |
| Multiple Weapons | 13 | 0.94% |
| Kidnapping | 10 | 0.72% |
| IED - Claymore Mine | 6 | 0.43% |
| Other | 8 | 0.58% |
| Unknown | 3 | 0.22% |
| IED - Other | 1 | 0.07% |
| Mortar | 2 | 0.14% |
| Unconventional weapons | 1 | 0.07% |
| Sniper or other stand-off attacks | 0 | 0.00% |
| Threat, Bomb | 3 | 0.22% |
| TOTAL | 1383 | 100.00% |

## All Attacks: Lethality by Attack and Weapon

**(1) Some weapons are local (claymores) or few (Other assault); (2) Suicide bombers cause 7.07 deaths and 34.99 injuries -- overall deaths are closed to automatic weapons assaults; (3) Mechanical derailments can be deadly**

| Attack and Weapon | Average Fatalities | Average Injuries |
|---|---|---|
| IED - Claymore Mine | 23 | 24 |
| Sabotage through Derailing | 8 | 16 |
| Assault with Automatic Weapons | 7 | 9 |
| Assault- Other or Unspecified | 6 | 5 |
| Multiple Weapons | 6 | 8 |
| VBIED | 5 | 11 |
| IED - Mine | 5 | 10 |
| IED - unspecified | 4 | 15 |
| IID (Improvised Incendiary Device) | 4 | 3 |
| Sabotage, Other | 3 | 1 |

| Attack and Weapon | Average Fatalities | Average Injuries |
|---|---|---|
| IED - Grenade | 2 | 12 |
| Assault with RPG | 2 | 9 |
| Mortar | 1 | 5 |
| Other | 1 | 4 |
| Kidnapping | 1 | 1 |
| IED - Dynamite | 1 | 1 |
| Armed Hijacking | 1 | 1 |
| Robbery | 1 | 1 |
| Arson | 0 | 1 |
| IED - Other | 0 | 0 |
| Overall Average | 4 | 12 |

# Bomb Attacks Against All Public Surface Transport Targets

# Single or Multiple Bombs

**86% are single bomb attacks; No trends over time**

| Number of Bombs | # | % |
|---|---|---|
| Single Bomb Attacks | 877 | 86.2% |
| Multiple Bomb Attacks | 140 | 13.8% |
| Total Attacks | 1017 | 100.0% |

## Outcome of All Bomb Attacks

**77% On Target, 14.5% Detected and rendered safe, 7% didn't work as planned**

| Bomb Results | # | % |
|---|---|---|
| Detonated or released on Target | 921 | 77.33% |
| EOD successful - rendered safe | 173 | 14.53% |
| Detonated Early or Away from Target, or Malfunctioned | 62 | 5.21% |
| Failed to Detonate or Release | 21 | 1.76% |
| Unknown | 10 | 0.84% |
| Detonated during unsuccessful EOD | 4 | 0.34% |
| Total | 1191 | 100.00% |

## Lethality by Target per Explosion

**Trains, Subways, Buses and Enclosed *Train* and *Subway* Stations Dominate**

| Target | Deaths | Injuries |
|---|---|---|
| Passenger Train | 7 | 20 |
| Enclosed Train Station | 6 | 64 |
| Subway Train | 5 | 44 |
| Bus, Scheduled | 5 | 11 |
| Subway station, unspecified | 5 | 30 |
| Truck (ersatz bus) | 5 | 3 |
| train station, unspecified | 5 | 12 |
| Bus, Company or Gov't | 4 | 10 |
| Minivan or Minibus | 3 | 5 |
| Other | 3 | 1 |
| Bus Stop | 2 | 14 |

| Target | Deaths | Injuries |
|---|---|---|
| Train, Tourist | 2 | 11 |
| Bus, School | 2 | 10 |
| Station -- Train and Bus | 2 | 7 |
| Bus, Tourist | 2 | 4 |
| Enclosed Subway Station - | 2 | 0 |
| Bus Station - Unspecified | 1 | 9 |
| Train, Freight | 1 | 3 |
| Highway or Road | 1 | 1 |
| Overall Average | 3 | 12 |

## Lethality Per Device by Explosion:

**VBIEDs, Mines and IIDs More Lethal than Average**

| Device | Average # Fatalities per Explosion | Average # of Injuries per Explosion |
|---|---|---|
| VBIED | 5 | 10 |
| IED - Mine | 4 | 8 |
| IID (Improvised Incendiary Device) | 4 | 3 |
| IED - unspecified | 3 | 13 |
| IED - Grenade | 2 | 10 |
| IED - Dynamite | 1 | 1 |
| IED - Other | 0 | 0 |
| Overall Average | 3 | 12 |

## Lethality Per Explosion by Delivery/Concealment

**Suicide attacks account for only 5.13% of bomb attacks and 9.71% of all deaths and are lethal…. But not *the* most lethal method of delivering a bomb**

| Delivery/Concealment | Average Fatalities | Average Injuries |
|---|---|---|
| Concealed/placed in non-passenger areas | 10.50 | 0.00 |
| Carried on Person | 7.07 | 34.99 |
| Concealed/Left in Passenger Compartments | 4.98 | 16.63 |
| Placed near the bus or other target - unspecified | 4.87 | 12.26 |
| Concealed in Parcel or Bags | 4.84 | 31.35 |
| Concealed/left in Stations (Trash bins, Under benches, near trains or buses) | 3.45 | 7.29 |
| Placed on Vehicle Road, Bridge or in Tunnel | 2.83 | 4.56 |
| Unknown | 2.14 | 10.00 |
| Concealed in or on Vehicle | 1.70 | 10.70 |
| Placed on Railroad track or bridge, or near a train | 1.06 | 4.45 |
| Concealed/left at Bus Stop | 0.90 | 10.65 |
| Physical Thrown | 0.67 | 6.60 |
| Concealed/placed outside of Stations | 0.51 | 2.78 |
| Overall Average | 3.34 | 12.21 |

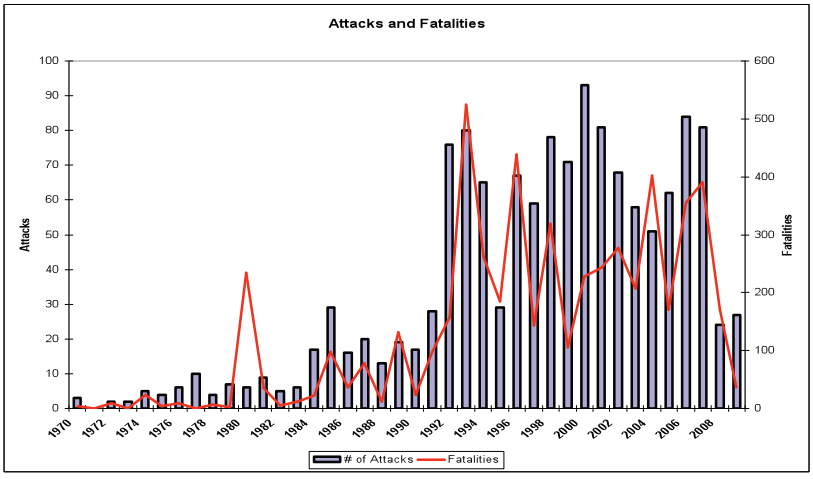
## All Bomb Attacks: Most Lethal Combinations

**(1) Buses, Trains and enclosed stations dominate (2) VBIEDS and IIDs can be lethal; (3) Suicides not most deadly.**

| Avg. Fatalities | Target | Device | Delivery/Concealment |
|---|---|---|---|
| 40 | Bus, Scheduled | IED Unspecified | Placed in non-Passenger area |
| 35 | Subway Station | IED - Unspecified | Concealed in Parcel or Bag |
| 34 | Passenger Train | IID | Left in Passenger Compartment |
| 31 | Enclosed Train Station | IED unspecified | Concealed in Parcel or Bag |
| 30 | Truck (ersatz Minivan) | IED unspecified | Carried on Person |
| 30 | Bus, Scheduled | IED Grenade | Physically Thrown |
| 20 | Passenger Train | IED Dynamite | Left in Passenger compartment |
| 18 | Co or Gov't Bus | IED unspecified | Carried on Person |
| 17 | Bus, Scheduled | VBIED | Placed Near Bus or Target |
| 14 | Bus, Scheduled | IID | Concealed in Parcel or Bag |

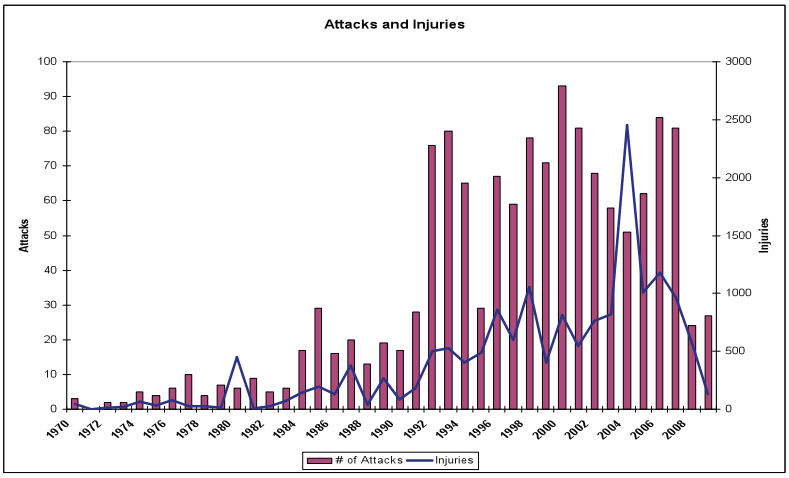
## Attacks and Fatalities Over Time

**Notice Spikes in fatalities; normally but not always coincide with spikes in attacks**



# Attacks and Injuries over time

**Injuries fluctuate less, with one major spike in 2005 (Reporting on Injuries is probably less accurate)**




# All Attacks Against Passenger Train Targets

# Body Counts Count

- **True also for passenger trains; but % of attacks with highest death rates is greater:**
  - **35% (vice 29%) of attacks resulted in at least 1 death**
  - **20% (vice 21%) of attacks resulted in at least 5 death**
  - **12% (vice 10%) of attacks resulted in at least 10 deaths**
  - **Most of the remaining 65% failed or were stopped**
  - **Some railway bridge or track bombings in South Asia, Southeast Asia, and some (IRA) in UK appear designed to disrupt rail systems**
- **Average deaths and injuries per bomb against passenger rail targets are 5.5 and 21.9; however, 66% of bomb attacks failed and resulted in no casualties**
- **Some of the most deadly bomb attacks have yielded an average body count of 24 per bomb**

# Where: Train Attacks By Region

- **Trains a major target but not yet in North America**
- **Top 5 Regions & North America:**
  - **South Asia: 135 (30.75%)**
  - **Western Europe: 114 (25.97%)**
  - **Middle East & North Africa: 49 (11.16%)**
  - **Russia and the NIS 47 (10.71%)**
  - **Southeast Asia: 31 ( 7.06%)**
  - **North America: (9th) 7 (1.59%)**
- **Regional distribution was somewhat different for all attacks**
  - **Middle East and North Africa was 2nd region (20.45%)**
  - **Southeast Asia was 3rd region (10.77%)**
  - **Western Europe was 4th region (13.66%)**
  - **North America was in 11th position for all attacks**

# How: All Attacks and Train Attacks

- **All Attacks: Explosives and incendiaries dominate. Automatic weapons, and fire are used next. Top 5**
  - **IEDs, IIDs & 17 VBIEDS: 73.00%**
  - **Automatic Weapons: 10.77%**
  - **Arson: 3.90%**
  - **Armed Hijacking 2.24%**
  - **Robbery 2.02%**
- **Passenger Train Attacks: Explosives *really* dominate; followed by automatic weapons, mechanical derailing, and then fire. Top Five**:
  - **IEDs & 4 VBIEDS: 78.50%**
  - **Automatic Weapons: 6.38%**
  - **Mechanical derailing: 3.42%**
  - **IIDs: 2.51%**
  - **Arson: 1.82%**

# What: Passenger Trains

- Top targets for attacks against passenger trains:
  - Train (Intercity or Commuter): 261 (59.51%)
  - Train Stations: 130 (29.68%)
  - Subway Stations: 19 ( 5.02%)
  - Subway Trains: 15 ( 3.42%)
  - Tourist Trains: 5 ( 1.14%)
  - Trolleys: 5 ( 1.14%)

# Most Lethal Train Targets

• **NOTE: Enclosed locations most lethal: Trains and some stations**

| Train Sub-Target | Average Fatalities | Average Injuries |
|---|---|---|
| Train, Passenger (Intercity or Commuter) | 6.7 | 20.0 |
| Train Station, Enclosed Building | 6.4 | 64.3 |
| train, subway | 5.3 | 44.3 |
| Subway station, unspecified | 4.9 | 29.7 |
| train station, unspecified | 4.7 | 11.7 |
| Train, Tourist | 2.0 | 11.4 |
| Subway Station - Enclosed Building | 2.0 | 0.0 |
| Station -- Train and Bus | 1.6 | 6.8 |
| Train, Trolley | 0.0 | 9.1 |
| Total Overall Average | 5.8 | 20.0 |

# Bomb Attacks Against Passenger Train Targets

## Passenger Train Attacks using Explosives: The Bombs and Bombers

- **Suicide bombers may not be our biggest problem: Suicides constitute a small percentage of attacks, even fewer than for all attacks against surface transport**
  - **5.13% of all attacks**
  - **3.19% of all attacks on trains**
  - **3.95% of all explosive attacks on trains**
- **For all attacks, they cause a disproportionate percentage of casualties; but for attacks on trains, and explosives attacks on trains, fatalities are roughly proportional to attacks.**
  - **9.71% of all fatalities and 16.01% of all injuries for all attacks**
  - **2.73% of all fatalities and 8.20% of all injuries for all attacks on trains**
  - **3.54% of all fatalities and 9.27% of all injuries for train attacks using explosives**

## The Bombs and Bombers (con't)

- **In train attacks, suicide not as lethal as other methods of delivery, yielding 3 fewer fatalities on average than next most lethal methods (see slide 48)**
- **Number of bombs used:**
  - **Only 12.7% of attacks used more than 1 device**
  - **No discernable trends over time**
- **Successful Bombs:**
  - **74.08% of bombs successful**
  - **14.93% percent found – EOD successful**
  - **6.48% detonated early, or away from primary target**
  - **1.97% failed to detonate**

# What: Train Targets

| Sub-target | # | % |
|---|---|---|
| Train, Passenger (Intercity or Commuter) | 197 | 55.65% |
| Train station, unspecified | 100 | 28.25% |
| Train, subway | 15 | 4.24% |
| Subway station, unspecified | 13 | 3.67% |
| Train Station, Enclosed Building | 13 | 3.67% |
| Station -- Train and Bus | 7 | 1.98% |
| Subway Station - Enclosed Building | 4 | 1.13% |
| Train, Trolley | 4 | 1.13% |
| Train, Tourist | 1 | 0.28% |
| Total | 354 | 100.00% |

## All Attacks: Lethality Per Explosion by Delivery/Concealment

**Suicide attacks constitute only 5.96% of train bomb attacks, are lethal, but not THE most lethal method of delivering a bomb**

| Delivery/Concealment | Average Fatalities | Average Injuries |
|---|---|---|
| Concealed/placed in non-passenger areas | 10.50 | 0.00 |
| Carried on Person | 7.07 | 34.99 |
| Concealed/Left in Passenger Compartments | 4.98 | 16.63 |
| Placed near the bus or other target - unspecified | 4.87 | 12.26 |
| Concealed in Parcel or Bags | 4.84 | 31.35 |
| Concealed/left in Stations (Trash bins, Under benches, near trains or buses) | 3.45 | 7.29 |
| Placed on Vehicle Road, Bridge or in Tunnel | 2.83 | 4.56 |
| Unknown | 2.14 | 10.00 |
| Concealed in or on Vehicle | 1.70 | 10.70 |
| Placed on Railroad track or bridge, or near a train | 1.06 | 4.45 |
| Concealed/left at Bus Stop | 0.90 | 10.65 |
| Physical Thrown | 0.67 | 6.60 |
| Concealed/placed outside of Stations | 0.51 | 2.78 |
| Overall Average | 3.34 | 12.21 |

## Delivery/Concealment – Significant differences

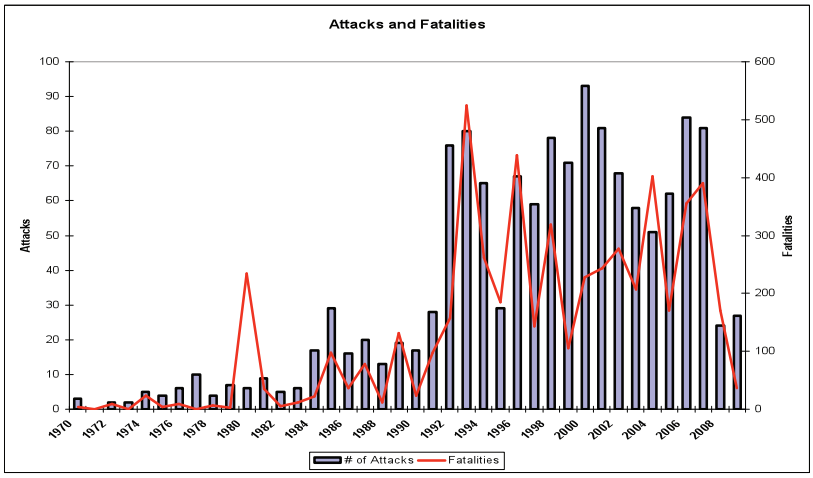
**Suicides relatively less lethal in trains**

| Delivery and Concealment | Average Fatalities | Average Injuries |
|---|---|---|
| Concealed/Left in Passenger Compartments *(was 3rd, now 1st)* | 8 | 27 |
| Concealed in Parcel or Bags (*was 5th, now 2nd*) | 8 | 70 |
| Concealed/left in Stations (*now 3rd,was 6th*) | 6 | 7 |
| Carried on Person *(was 2nd, now 4th)* | 5 | 51 |
| Placed on Railroad track or bridge, or near a train | 3 | 13 |
| Placed in non-passenger areas | 1 | 0 |
| Placed outside of Stations | 1 | 5 |
| Placed near the bus or other target - unspecified | 1 | 10 |
| Physical Thrown | 0 | 5 |
| Concealed in or on Vehicle | 0 | 3 |
| Overall Average | | |

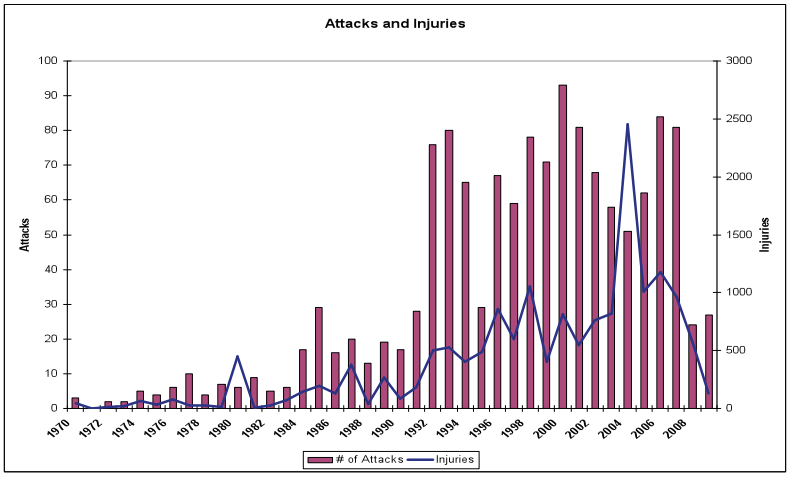
## Most Lethal Combinations: Trains

| Average Fatalities | Target | Device | Delivery/Concealment |
|---|---|---|---|
| 35 | Subway Station | IED unspecified | Concealed in Parcel or Bags |
| 34 | Passenger Train | IID | Concealed/left in Passenger Compartment |
| 31 | Enclosed Train Station | IED unspecified | Concealed in Parcel or Bags |
| 20 | Passenger Train | IED - Dynamite | Concealed in Parcel or Bags |
| 13 | Subway Train | IED unspecified | Carried on Person |
| 11 | Subway Station | IED unspecified | Carried on Person |
| 8 | Train Station | IED unspecified | Left in Station |
| 8 | Passenger Train | IED unspecified | Left in Passenger Compartment |
| 8 | Tourist Train | IED unspecified | Placed on Track or Bridge |
| 7 | Passenger Train | IED - Mine | Placed on Track or Bridge |

## Explosives Train Attacks & Fatalities Over Time




## Explosives Train Attacks & Injuries Over Time



# All Attacks Against Buses

# 685 Bus Attacks: By Region

| Region | # | % of total |
|---|---|---|
| Middle East and North Africa | 204 | 29.78% |
| South Asia | 196 | 28.61% |
| Southeast Asia | 85 | 12.41% |
| South America | 46 | 6.72% |
| Russia and the NIS | 46 | 6.72% |
| Sub-Saharan Africa | 30 | 4.38% |
| Western Europe | 25 | 3.65% |
| East Asia | 21 | 3.07% |
| Eastern Europe | 14 | 2.04% |
| Central America & Caribbean | 13 | 1.90% |
| North America | 3 | 0.44% |
| Central Asia | 1 | 0.15% |
| Australasia & Oceania | 1 | 0.15% |
| Total | 685 | 100.00% |

# 441 Bus Bomb Attacks: Regions Shift

| Region | # | % of total |
|---|---|---|
| South Asia *( Was 2nd)* | 156 | 35.37% |
| Middle East and North Africa *(was 1st)* | 140 | 31.75% |
| Southeast Asia | 56 | 12.70% |
| Western Europe *(was 7th)* | 17 | 3.85% |
| East Asia *(was 8th)* | 16 | 3.63% |
| Russia and the NIS *(was 5th)* | 30 | 6.80% |
| South America *(was 4th)* | 16 | 3.63% |
| Sub-Saharan Africa *(was 6th)* | 5 | 1.13% |
| Central America & Caribbean | 2 | 0.45% |
| Central Asia | 1 | 0.23% |
| Eastern Europe | 1 | 0.23% |
| Australasia & Oceania | 1 | 0.23% |
| North America *was 11th with 3 attacks)*( | 0 | 0.00% |
| Total | 441 | 100.00% |

# All Bus Attacks: Leading Countries

**Developing countries suffer more; Major campaigns in developed countries are Israel (current) and UK (mostly past - IRA)**

| Rank | Developing Country | # | % of total | Rank | Developed Country | # | % of total |
|---|---|---|---|---|---|---|---|
| 1 | India | 81 | 11.82% | 1 | Israel | 129 | 18.83% |
| 2 | Pakistan | 66 | 9.64% | 2 | Russian Federation | 36 | 5.26% |
| 3 | Philippines | 59 | 8.61% | 4 | United Kingdom | 8 | 1.17% |
| 4 | Colombia | 34 | 4.96% | 3 | Greece | 7 | 1.02% |
| 5 | Sri Lanka | 34 | 4.96% | 5 | France | 4 | 0.58% |
| 6 | Turkey | 22 | 3.21% | 6 | Spain | 3 | 0.44% |
| 7 | Algeria | 22 | 3.21% | 7 | Japan | 2 | 0.29% |
| 8 | Egypt | 20 | 2.92% | 8 | Poland | 2 | 0.29% |
| 9 | China | 17 | 2.48% | 9 | Bosnia/Herzegovina | 1 | 0.15% |
| 10 | Indonesia | 13 | 1.90% | 10 | Canada | 1 | 0.15% |

# Bus Bomb Attacks – Leading Countries

**Some changes in developing countries; no significant changes in developed countries**

| Rank | Developing Country | # | % of total | Rank | Developed Country | # | % of total |
|---|---|---|---|---|---|---|---|
| 1 | India | 60 | 13.61% | 1 | Israel | 102 | 23.13% |
| 2 | Pakistan | 57 | 12.93% | 2 | Russian Federation | 25 | 5.67% |
| 3 | Philippines | 42 | 9.52% | 3 | United Kingdom | 6 | 1.36% |
| 4 | Sri Lanka | 31 | 7.03% | 4 | Greece | 5 | 1.13% |
| 5 (9) | China | 15 | 3.40% | 5 | France | 3 | 0.68% |
| 6 | Turkey | 13 | 2.95% | 6 | Estonia | 1 | 0.23% |
| 7 (4) | Colombia | 13 | 2.95% | 7 | Italy | 1 | 0.23% |
| 8 | Algeria | 10 | 2.27% | 8 | Sweden | 1 | 0.23% |
| 9 | Egypt | 8 | 1.81% | 9 | | | |
| 10 | Indonesia | 8 | 1.81% | 10 | | | |

# All Bus Attacks: How?

**Bombs Predominate (60.23%) -- followed by automatic weapons (16%) Fire - Arson and IIDs - (10%); Hijacking (3.95%) -- but bombs dominate less so than for all Attacks (73%) and trains (78.5%)**

| Attack and Weapon | # | % |
|---|---|---|
| IED - unspecified | 343 | 50.15% |
| Assault with Automatic Weapons | 109 | 15.94% |
| Arson | 39 | 5.70% |
| Armed Hijacking | 27 | 3.95% |
| IID (Improvised Incendiary Device) | 28 | 4.09% |
| Robbery | 23 | 3.36% |
| IED - Grenade | 29 | 4.24% |
| Assault- Other or Unspecified | 13 | 1.90% |
| IED - Mine | 16 | 2.34% |
| VBIED | 14 | 2.05% |

| Attack and Weapon | # | % |
|---|---|---|
| Assault with RPG | 9 | 1.32% |
| Kidnapping | 9 | 1.32% |
| IED - Dynamite | 5 | 0.73% |
| IED - Claymore Mine | 5 | 0.73% |
| Multiple Weapons | 5 | 0.73% |
| Mortar | 2 | 0.29% |
| Other | 4 | 0.58% |
| Sabotage, Other | 2 | 0.29% |
| Unknown | 2 | 0.29% |
| Total | 684 | 100.00% |

# All Bus Attacks: Targets

**Scheduled buses and bus stations predominate, followed by tourist buses and bus stops**

| Sub-Target | # | % |
|---|---|---|
| Bus, Scheduled | 447 | 65.35% |
| Bus Station - Unspecified | 101 | 14.77% |
| Bus, Tourist | 56 | 8.19% |
| Bus Stop | 40 | 5.85% |
| Minivan or Minibus | 26 | 3.80% |
| Bus, School | 14 | 2.05% |
| Bus Station - Enclosed Building | 0 | 0.00% |
| Bus Station - Open Air | 0 | 0.00% |
| Total | 684 | 100.00% |

# Bus Bomb Attacks: Targets

**Note: Somewhat smaller % of attacks against scheduled buses (65.35%) and tourist buses (8.19%) than for all bus attacks; and higher % against stations and stops (14.11% and 5.85%)**

| Sub Target | # | % of total |
|---|---|---|
| Bus, Scheduled | 261 | 59.18% |
| Bus Station - Unspecified | 96 | 21.77% |
| Bus Stop | 37 | 8.39% |
| Bus, Tourist | 21 | 4.76% |
| Minivan or Minibus | 18 | 4.08% |
| Bus, School | 8 | 1.81% |
| Enclosed Bus Station | 0 | 0.00% |
| Bus Station - Open Air | 0 | 0.00% |
| Total | 441 | 100.00% |

# Bomb Attacks Against Buses

## The Bombs and Bombers

**The % of single bombs are about the same as for all bomb attacks and all train bomb attacks**

| Single or Multiple | # | % of total |
|---|---|---|
| Single | 389 | 88.21% |
| Multiple | 50 | 11.34% |
| Total | 441 | 100.00% |

**The % of suicides is considerably higher than in all bomb attacks (5.96%) and much higher than in bomb attacks against trains (3.95%): Most likely attributed to suicide campaigns in Israel, Sri Lanka and Russia**

| Type | # | % of total |
|---|---|---|
| Non-Suicide | 386 | 87.53% |
| Suicide | 55 | 12.47% |
| Total | 441 | 100% |

# Bombs and Bombers (con't)

**Bombs appear to detonated on target and on time more frequently against buses (88.21%) than against all targets (77.33%) and against trains (74.08%)**

| Outcomes | # | % of Total |
|---|---|---|
| Detonated or released on Target | 389 | 88.21% |
| EOD successful - rendered safe | 38 | 8.62% |
| Detonated Early or Away from Target, or Malfunctioned | 14 | 3.17% |
| Total | 441 | 100.00% |

# Bus Bomb Attacks: Lethality by Target

**Lethality increases for some targets over all bus attacks, especially scheduled and school buses; it remains about the same for the rest, and the overall average also remains about the same**

| Target | Average Fatalities | Average Injuries |
|---|---|---|
| Bus, Scheduled | 6 (5) | 17 (11) |
| Minivan or Minibus | 3 (3) | 7 (5) |
| Bus, School | 3 (2) | 15 (10) |
| Bus Stop (same) | 2 (2) | 14 (14) |
| Bus Station – Unspecified | 1 (1) | 9 (9) |
| Bus, Tourist | 1 (2) | 3 (4) |
| Total Overall Average | 4 (4) | 14 (10) |

## All Bus Attacks: Lethality by Attack & Weapon

**Claymores (Sri Lanka) and Other Sabotage and Assault - (a few events) are unique. VBIEDS, Automatic Weapons, Mines, and IEDs give average or better lethality**

| Attack Type | Average Fatalities | Average Injuries |
|---|---|---|
| IED - Claymore Mine | 24 | 29 |
| Sabotage, Other | 18 | 4 |
| VBIED | 9 | 18 |
| Assault- Other or Unspecified | 9 | 3 |
| Automatic Weapons | 6 | 6 |
| IED - Mine | 4 | 14 |
| IED - unspecified | 4 | 15 |
| Multiple Weapons | 3 | 10 |
| Other | 3 | 8 |
| IED - Grenade | 3 | 13 |

| Attack Type | Average Fatalities | Average Injuries |
|---|---|---|
| IID (Improvised Incendiary Device) | 2 | 2 |
| Kidnapping | 1 | 1 |
| Mortar | 1 | 5 |
| Assault with RPG | 1 | 10 |
| Armed Hijacking | 1 | 1 |
| IED - Dynamite | 1 | 2 |
| Robbery | 1 | 1 |
| Arson | 0 | 1 |
| Overall Average | 4 | 10 |

## Bomb Attacks: Lethality by Device

**Claymores unique to Sri Lanka; but VBIEDs and mines used in many countries and quite lethal, along with IEDs**

| Attack Type | Average Fatalities | Average Injuries |
|---|---|---|
| IED - Claymore Mine | 24 | 29 |
| VBIED | 9 | 18 |
| IED - unspecified | 4 | 15 |
| IED - Mine | 4 | 14 |
| IED - Grenade | 3 | 13 |
| IID (Improvised Incendiary Device) | 2 | 2 |
| IED - Dynamite | 1 | 2 |
| Overall Average | 4 | 14 |

## Lethality by Concealment and Delivery

**Suicide is lethal but the same as method used for VBIEDs and Claymores, and lower than placing in the non-passenger compartment**

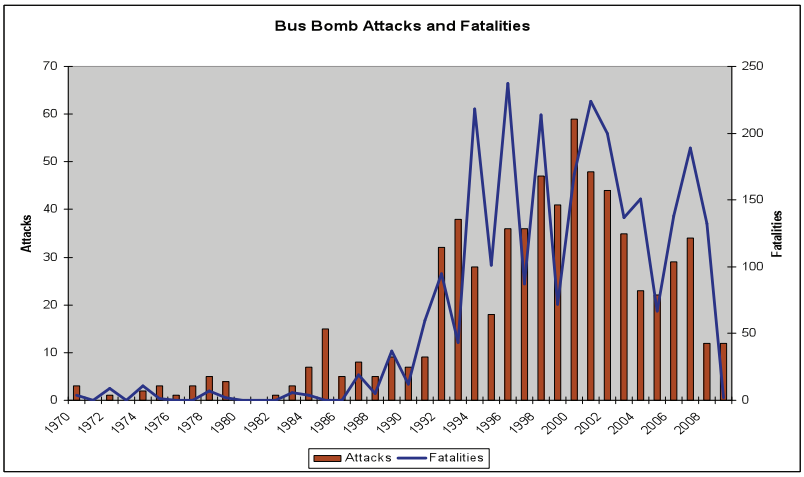
| Delivery and Concealment | Average Fatalities | Average Injuries |
|---|---|---|
| Concealed/placed in non-passenger areas | 20 | 0 |
| Carried on Person | 8 | 34 |
| Placed near the bus or other target - unspecified | 8 | 18 |
| Concealed in Parcel or Bags | 6 | 9 |
| Concealed/Left in Passenger Compartments | 4 | 13 |
| Concealed/left in Stations (Trash bins, Under benches, near trains or buses) | 1 | 9 |
| Physical Thrown | 1 | 7 |
| Concealed/placed outside of Stations | 0 | 3 |
| Total | 4 | 14 |

## Most Lethal Combinations

| Average Fatalities | Target | Device | Delivery/Concealment |
|---|---|---|---|
| 40 | Bus, Scheduled | IED Unspecified | Concealed/Placed in Non-Passenger Areas |
| 30 | Bus, Scheduled | IED-Grenade | Physically Thrown |
| 18 | Bus, Co or Gov't | IED - Unspecified | Carried on Person |
| 17 | Bus, Scheduled | VBIED | Placed near the bus |
| 14 | Bus, Scheduled | IID | Concealed in Parcel or Bags |
| 13 | Bus, Co or Gov't | IED - Unspecified | Concealed in or on Vehicle |
| 10 | Bus, Scheduled | IED - Unspecified | Concealed in Parcel or Bags |
| 9 | Bus, Scheduled | IED - Unspecified | Carried on Person |
| 9 | Bus Station - Unspecified | VBIED | Placed near the bus |
| 8 | Bus, Scheduled | IED - Grenade | Placed near the bus |

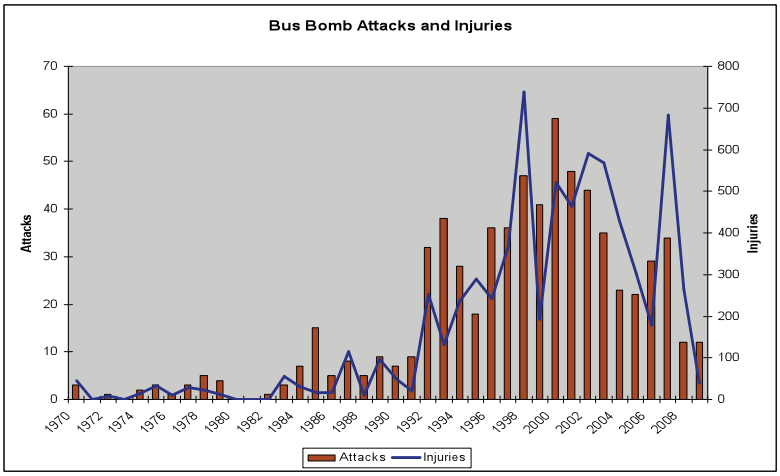
# Bus Bomb Attacks: Attacks and Fatalities Over Time

**Spikes in fatalities coincide with attacks**




# Bus Bomb Attacks: Attacks and Injuries Over Time

**Injuries also generally coincide with attacks**



# APPENDIX B

## DECEMBER 3, 2009, PRESENTATION TO DHS BUS OPERATOR FOCUS GROUP

Bus Operator Security Discussion

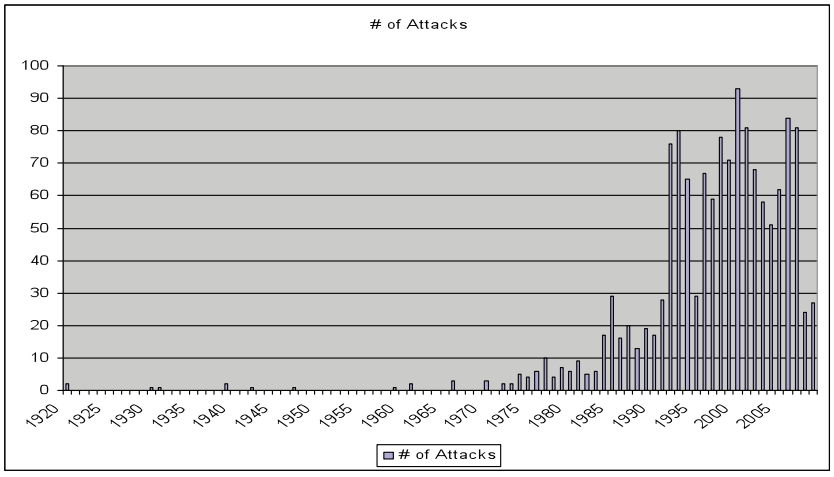
## Words of Caution

- ***First,*** many of the attacks the data comes from are only marginally relevant to U.S. They
  - Are part of local, national or regional campaigns
  - Involve tactics unlikely to be used here, and
  - Most often occur in countries more reliant on bus transportation
- ***Second,*** the information is pulled from a variety of sources and in many situations – particularly those attacks that occurred in developing countries – is hard to find and verify. These results are ***preliminary***
- ***Third,*** the averages include instances in which there are only 2 or 3 attacks. In those situations they represent what attackers can achieve, not what they most often achieve.
- **So, keep all of this in mind and remember, good data just helps you ask questions and helps you focus**

## Where the Data Comes From: MTI Data Base

- Sources: Published MTI Chronologies, MTI-found press accounts, and Univ. of Maryland START records for 1998-2007
- Time: January 1970 to Present
- The data base as of November 12, 2009 – from which these charts were drawn -- included
  - 1,384 attacks on all public surface transport
  - 438 attacks against passenger trains/stations (354 were bomb/incendiary attacks)
  - 684 attacks against buses (439 were bomb/incendiary attacks)
- New attacks keep being found: System just updated to:
  - 1,434 attacks against all public surface transportation
  - 441 attacks against passenger trains/stations (356 were bomb/incendiary attacks)
  - 724 attacks against buses (465 were bomb/incendiary attacks)
- We *are* finding more bus attacks than train attacks.

## Surface Transportation Attacks: A Recent Problem

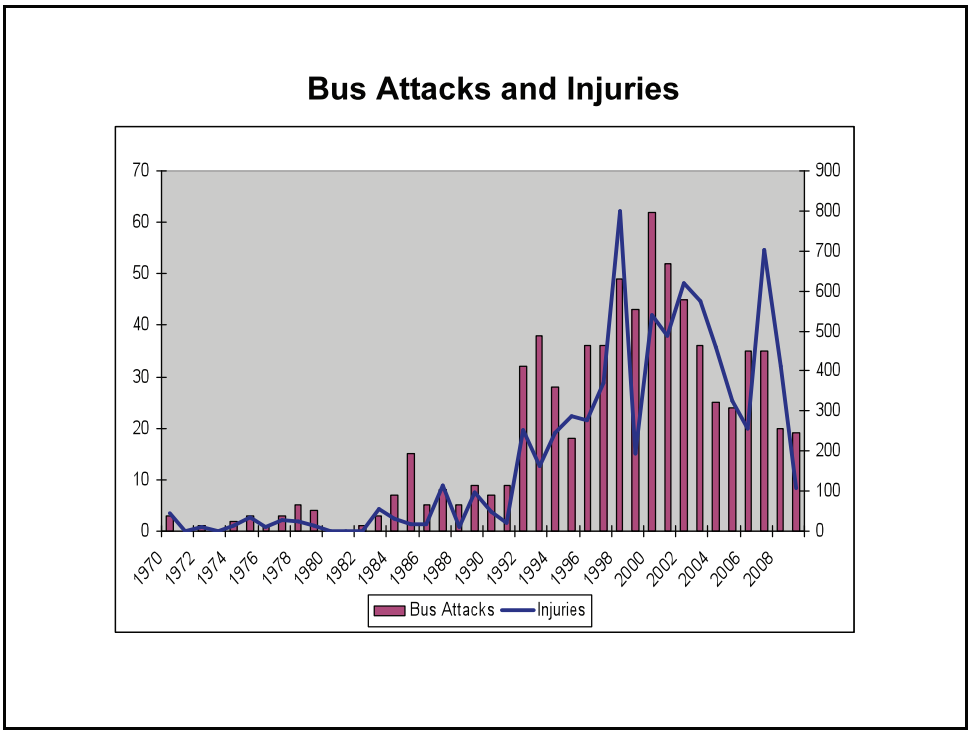


## How often do Buses, Bus stations and Bus Stops get attacked compared to trains and other targets?

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 543 | 39.23% |
| Passenger Trains | 286 | 20.66% |
| Train Stations | 152 | 10.98% |
| Bus stations/stops | 141 | 10.19% |
| Railway Tracks | 85 | 6.14% |
| Vehicle Bridge | 56 | 4.05% |
| Highway or Road | 28 | 2.02% |
| Freight Train | 21 | 1.52% |

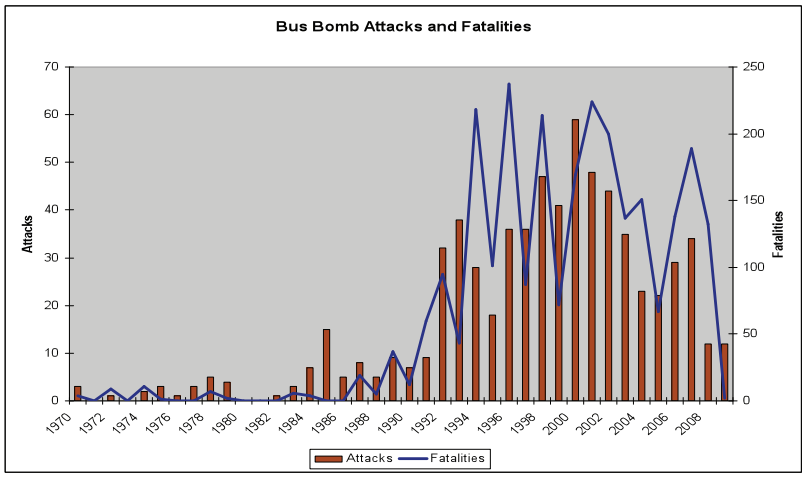
## Bomb Attacks Only

| Target | # Attacks | % of Total |
|---|---|---|
| Buses | 307 | 30.19% |
| Passenger Trains | 217 | 21.34% |
| Train Stations | 137 | 13.47% |
| Bus stations/stops | 133 | 13.08% |
| Railway Tracks | 74 | 7.28% |
| Vehicle Bridge | 55 | 5.41% |
| Highway or Road | 21 | 2.06% |
| Freight Train | 0 | 0.00% |




# Bus Bomb Attacks: Attacks and Fatalities Over Time

**Spikes in fatalities coincide with attacks**



# Question

***How does this af f ect your concern about terrorist attacks against buses in the United States, and where you operate?***

# Where do most bus attacks occur?

| Region | # | % of total |
|---|---|---|
| Middle East and North Africa | 204 | 29.78% |
| South Asia | 196 | 28.61% |
| Southeast Asia | 85 | 12.41% |
| South America | 46 | 6.72% |
| Russia and the NIS | 46 | 6.72% |
| Sub-Saharan Africa | 30 | 4.38% |
| Western Europe | 25 | 3.65% |
| East Asia | 21 | 3.07% |
| Eastern Europe | 14 | 2.04% |
| Central America & Caribbean | 13 | 1.90% |
| North America | 3 | 0.44% |
| Central Asia | 1 | 0.15% |
| Australasia & Oceania | 1 | 0.15% |
| Total | 685 | 100.00% |

## Bus Bomb Attacks

| Region | # | % of total |
|---|---|---|
| South Asia ( Was 2nd) | 156 | 35.37% |
| Middle East and North Africa (was 1st) | 140 | 31.75% |
| Southeast Asia | 56 | 12.70% |
| Western Europe (was 7th) | 17 | 3.85% |
| East Asia (was 8th) | 16 | 3.63% |
| Russia and the NIS (was 5th) | 30 | 6.80% |
| South America (was 4th) | 16 | 3.63% |
| Sub-Saharan Africa (was 6th) | 5 | 1.13% |
| Central America & Caribbean | 2 | 0.45% |
| Central Asia | 1 | 0.23% |
| Eastern Europe | 1 | 0.23% |
| Australasia & Oceania | 1 | 0.23% |
| North America (was 11th with 3 attacks) | 0 | 0.00% |
| Total | 441 | 100.00% |

## All Bus Attacks: Leading Countries

| Rank | Developing Country | # | % of total | Rank | Developed Country | # | % of total |
|---|---|---|---|---|---|---|---|
| 1 | India | 81 | 11.82% | 1 | Israel | 129 | 18.83% |
| 2 | Pakistan | 66 | 9.64% | 2 | Russian Federation | 36 | 5.26% |
| 3 | Philippines | 59 | 8.61% | 4 | United Kingdom | 8 | 1.17% |
| 4 | Colombia | 34 | 4.96% | 3 | Greece | 7 | 1.02% |
| 5 | Sri Lanka | 34 | 4.96% | 5 | France | 4 | 0.58% |
| 6 | Turkey | 22 | 3.21% | 6 | Spain | 3 | 0.44% |
| 7 | Algeria | 22 | 3.21% | 7 | Japan | 2 | 0.29% |
| 8 | Egypt | 20 | 2.92% | 8 | Poland | 2 | 0.29% |
| 9 | China | 17 | 2.48% | 9 | Bosnia/Herzegovina | 1 | 0.15% |
| 10 | Indonesia | 13 | 1.90% | 10 | Canada | 1 | 0.15% |

## Question

*You know that buses are attacked a lot in the world. But you also know that few attacks take place in countries that are similar to the United States, and there have been no successful terrorist attacks against buses in the United States (the one in Canada was a hijacking in Ottawa).*

***What does this do to your level of concern or confidence?***

***By the way, how applicable do you think the experience in Israel and the UK is to the United States?***

## All Bus Attacks: Targets

| Sub-Target | # | % |
|---|---|---|
| Bus, Scheduled | 447 | 65.35% |
| Bus Station - Unspecified | 101 | 14.77% |
| Bus, Tourist | 56 | 8.19% |
| Bus Stop | 40 | 5.85% |
| Minivan or Minibus | 26 | 3.80% |
| Bus, School | 14 | 2.05% |
| Bus Station - Enclosed Building | 0 | 0.00% |
| Bus Station - Open Air | 0 | 0.00% |
| Total | 684 | 100.00% |

## Bus Bomb Attacks: Targets

| Sub Target | # | % of total |
|---|---|---|
| Bus, Scheduled | 261 | 59.18% |
| Bus Station - Unspecified | 96 | 21.77% |
| Bus Stop | 37 | 8.39% |
| Bus, Tourist | 21 | 4.76% |
| Minivan or Minibus | 18 | 4.08% |
| Bus, School | 8 | 1.81% |
| Enclosed Bus Station | 0 | 0.00% |
| Bus Station - Open Air | 0 | 0.00% |
| Total | 441 | 100.00% |

## Question

***Besides buses being the prime target, what does that tell you about the importance of bus stops and stations particularly where bombs and incendiaries are concerned?***

# How are Buses Attacked?

| Attack and Weapon | # | % |
|---|---|---|
| IED - unspecified | 343 | 50.15% |
| Assault with Automatic Weapons | 109 | 15.94% |
| Arson | 39 | 5.70% |
| Armed Hijacking | 27 | 3.95% |
| IID (Improvised Incendiary Device) | 28 | 4.09% |
| Robbery | 23 | 3.36% |
| IED - Grenade | 29 | 4.24% |
| Assault- Other or Unspecified | 13 | 1.90% |
| IED - Mine | 16 | 2.34% |
| VBIED | 14 | 2.05% |

| Attack and Weapon | # | % |
|---|---|---|
| Assault with RPG | 9 | 1.32% |
| Kidnapping | 9 | 1.32% |
| IED - Dynamite | 5 | 0.73% |
| IED - Claymore Mine | 5 | 0.73% |
| Multiple Weapons | 5 | 0.73% |
| Mortar | 2 | 0.29% |
| Other | 4 | 0.58% |
| Sabotage, Other | 2 | 0.29% |
| Unknown | 2 | 0.29% |
| Total | 684 | 100.00% |

# Question

***What does that tell you about the need to be aware not just of bombs, but other methods of attack, such as assault with automatic weapons?***

## The Bombs and Bombers

**Most attacks involve only a single bomb.**

| Single or Multiple | # | % of total |
|---|---|---|
| Single | 389 | 88.21% |
| Multiple | 50 | 11.34% |
| Total | 441 | 100.00% |

**The 12.5% of suicides is considerably not as high as you might think, but much higher than in bomb attacks against trains (3.95%)**

| Type | # | % of total |
|---|---|---|
| Non-Suicide | 386 | 87.53% |
| Suicide | 55 | 12.47% |
| Total | 441 | 100% |

## Bombs and Bombers

**•Most but not all attacks involve bombs that detonated on target and on time – but a lot of them were spotted by passengers, train operators and security personnel**

| Outcomes | # | % of Total |
|---|---|---|
| Detonated or released on Target | 389 | 88.21% |
| EOD successful - rendered safe | 38 | 8.62% |
| Detonated Early or Away from Target, or Malfunctioned | 14 | 3.17% |
| Total | 441 | 100.00% |

## Question

***What does this tell you about how important it is f or you to be observant?***

***What does that tell you about what you have to be watchf ul f or, both bef ore you f ind something suspicious, and then af ter?***

## Lethality by Concealment and Delivery

**NOTE: Suicides account for 4% of attacks and 3.5% of the deaths in train attacks; they cause 12.5% of the attacks and 24% of the deaths in bus attacks**

| Delivery and Concealment | Average Fatalities | Average Injuries |
|---|---|---|
| Concealed/placed in non-passenger areas | 20 | 0 |
| Carried on Person (Suicide Bombers) | 8 | 34 |
| Placed near the bus or other target – unspecified (Usually a VBIED) | 8 | 18 |
| Concealed in Parcel or Bags | 6 | 9 |
| Concealed/Left in Passenger Compartments | 4 | 13 |
| Concealed/left in Stations (Trash bins, Under benches, near trains or buses) | 1 | 9 |
| Physical Thrown | 1 | 7 |
| Concealed/placed outside of Stations | 0 | 3 |
| Total | 4 | 14 |

## Question

***What does all of this tell you about suicide bombers and their importance as an attacker?***

***What do you remember more – the relatively few times that suicides are used in an attack, the fact that they're used more frequently than against trains, the lethality of their attacks, or all three?***

## Question

***How should that influence the training you receive?***

***Do you think the suicide bomber is the only threat we have to worry about? If not, why not?***

## Lethality by Target: All Attacks and Bomb Attacks

| Target | All Attack Fatalities | Bomb Attack Fatalities | All Attack Injuries | Bomb Attack Injuries |
|---|---|---|---|---|
| Bus, Scheduled | 5 | 6 | 11 | 11 |
| Minivan or Minibus | 3 | 3 | 5 | 7 |
| Bus, School | 2 | 3 | 10 | 15 |
| Bus Stop | 2 | 2 | 14 | 14 |
| Bus Station – Unspecified | 1 | 1 | 9 | 9 |
| Bus, Tourist | 2 | 1 | 4 | 3 |
| Overall Average | 4 | 4 | 10 | 14 |

## Question

***What does this tell you about buses, versus bus stops and stations as potential targets?***

***How much of your training should be devoted to people getting on the bus, and people at the bus stop or station?***

## All Bus Attacks: Lethality by Attack & Weapon

| Attack Type | Average Fatalities | Average Injuries |
|---|---|---|
| VBIED (Car Bombs) | 9 | 18 |
| *Assault with Automatic Weapons* | *6* | *6* |
| IED - Mine | 4 | 14 |
| IED - unspecified | 4 | 15 |
| Multiple Weapons | 3 | 10 |
| IED - Grenade | 3 | 13 |
| IID (Improvised Incendiary Device) | 2 | 2 |
| Kidnapping | 1 | 1 |
| Mortar | 1 | 5 |
| Assault with RPG | 1 | 10 |
| Armed Hijacking | 1 | 1 |
| IED - Dynamite | 1 | 2 |
| Robbery | 1 | 1 |
| Arson | 0 | 1 |
| Overall Average | 4 | 10 |

## Bomb Attacks: Lethality by Device

| Device | Average Fatalities | Average Injuries |
|---|---|---|
| VBIED | 9 | 18 |
| IED - unspecified | 4 | 15 |
| IED - Mine | 4 | 14 |
| IED - Grenade | 3 | 13 |
| IID (Improvised Incendiary Device) | 2 | 2 |
| IED - Dynamite | 1 | 2 |
| Overall Average | 4 | 14 |

## Question

***Given this inf ormation, and given the ready availability of assault weapons in the United States, and widespread concern about car bombs, what should you be looking f or in addition to the person carrying a bomb?***

## Most Lethal Combinations

| Average Fatalities | Target | Device | Delivery/Concealment |
|---|---|---|---|
| 40 | Bus, Scheduled | IED Unspecified | Concealed/Placed in Non-Passenger Areas |
| 30 | Bus, Scheduled | IED - Grenade | Physically thrown |
| 18 | Bus, Co or Gov't | IED - Unspecified | Carried on Person |
| 17 | Bus, Scheduled | VBIED | Placed near the bus |
| 14 | Bus, Scheduled | IID | Concealed in Parcel or Bags |
| 13 | Bus, Co or Gov't | IED - Unspecified | Concealed in or on Vehicle |
| 10 | Bus, Scheduled | IED - Unspecified | Concealed in Parcel or Bags |
| 9 | Bus, Scheduled | IED - Unspecified | Carried on Person |
| 9 | Bus Station - Unspecified | VBIED | Placed near the bus |
| 8 | Bus, Scheduled | IED - Grenade | Physically Thrown |

## Question

***What does this chart tell you about targets, weapons and ways that attackers get their bombs into or near the bus or the station or bus stop?***

BREAK

Some cases to consider

## August 31, 2004: Beersheva Israel: Twin Suicide Bus Attacks Kill 16, injures 100; Hamas claims responsibility.

- Both buses had just left the central bus station *on routes* # 6 and 12.
- Two bombs carried by suicide bombers exploded minutes apart just before 3 PM
- Most of the passengers on the second bus (route 12) fled the bus before the bomb exploded on hearing the first explosion.

## May 2008: Colombo, Sri Lanka: A bomb in a bag left in a bus kills 25 and injures 70.

- The attacker's alias was Wasanthan
- Wasanthan arrived in Colombo many days before the operation, shifting locations
- On April 15, Wasanthan was called by a contact that a parcel bomb would be hidden in the bush behind a public bus stand
- On April 25, Wasanthan got orders to commence the operation as retaliation for a Sri Lanka army operation; specifically, he was to target a civilian bus.
- Wasanthan joined the waiting passengers, got on, and took a seat, four rows behind the driver. He put the bag containing the bomb in the luggage rack. When the bus started moving, he got off.
- He then pulled out a remote control device from his pocket and pressed its button.
- The bomb exploded instantly.

## Car Bombs Used Against Buses in Israel

- **May 25, 2001: Hadera, Israel**: A booby-trapped car with suicide bombers in it exploded alongside a bus in the city of Hadera, Israel, injuring about 60 people. The Palestinian Islamic Jihad (PIJ) claimed responsibility
- **June 5, 2002: Megiddo, Israel:** An explosives-packed car drove alongside a bus and exploded, killing 16 and injuring 38. (Bus Driver Mickey Harel survived this, his fourth attack – see BBC account that follows)

## Bus Driver Survives 4 attacks

June 5, 2002: Israel. Driver Survives Fourth Bus Attack. MEGIDDO, Israel — Bus driver Micky Harel's fourth brush with death came in a massive fireball from **an explosives-packed car that raced up beside bus No. 830 on his Wednesday morning route.** The blast rolled the bus twice like a kicked soda can, engulfed it in flames and hurled passengers onto the highway. The attack, carried out by an Islamic militant, killed at least 16 Israelis and wounded 38.

Harel, who said he survived three other bombing and shooting attacks along the same route in northern Israel, escaped with a few cuts and bruises. The driver managed to drag some passengers to safety. Then the flames grew. "I was in despair because I couldn't get any more of them out," he said. The bus route passes Arab towns, and it's likely some of the passengers were Arab citizens. Officials said it was difficult to count and identify the dead because bodies were so badly shredded and burned and the bus was incinerated down to its frames. "It's a tough sight," said a regional police chief, Yaakov Borovsky. The militant Islamic Jihad group said it carried out the bombing to mark the 35th anniversary of the 1967 Mideast War.

The bus set out from Tel Aviv at 5:50 a.m. and was headed for Tiberias on the Sea of Galilee.... On Wednesday, like he does each day, Harel picked up many soldiers from bus stops in the coastal cities of Netanya, Hadera and Karkur and the Camp 80 army base. He's gotten to know many of them. Some of them slipped on headphones and dozed off.

## Bus Driver Survives 4 attacks (con't)

Soldier Sharon Levinger got on, and a friend grabbed two seats for them in the first row and asked Levinger to wake him up when they arrived at their base. On highway 66, as they neared the Megiddo Prison, Levinger caught a quick glimpse **of a car alongside the bus**. A moment later the blast ripped through the cabin, he recalled from a hospital bed. The bus rolled twice and careened into the patch of roadside weeds and grass in front of the prison. Harel gripped the steering wheel even as the large windshield shattered into a spray of glass.…

In Wednesday's attack, his scorched bus was tossed onto a highway embankment just outside the barbed wire fence of the prison. Inmates, many of them Palestinian security prisoners, cheered when they heard the explosion, police said. Guards in nearby watchtowers saw the bus tumble and crash. "It lit up instantly," a guard named Andre told Army Radio. "People were fleeing from it like ants." He saw a female soldier sitting on the road, her face covered in blood, apparently unable to see to move. Another soldier picked her up.

In the bus' front seat, Levinger was able to kick the door open and escape. An advertisement was blown off the back of the bus. It read: "To bus drivers, security forces and rescue teams. the heart says thank you." The car driven by the bomber disintegrated, leaving behind just a bit of the smoldering engine. Witnesses said some passengers were trapped alive in the burning bus, among them a man and a woman who burned to death in each other's arms.

## Question

***What does this tell you about how the more determined and competent ("prof essional') terrorist operations are carried out, and the importance of being aware not only of what goes on your bus, but who is at the bus stop, and what is around the bus?***

## June 16, 2007: The Philippines: What Bus Drivers and Passengers Have Done

•The buses that travel between Davao and Cotabato in Mindanao were halted because of an extortion campaign against them, which included three successful bombings.

• A bomb exploded inside of a parked bus but no one was injured.

•But then another bus (Weena Bus # 1104) was pulling out of the public market when a passenger approached the bus conductor to check a bag left by a 30-35 year old male passenger, who was seated next to him.

## The Philippines: Drivers and Passengers (con't)

•The black bag with an IED inside was placed under the suspected bomber's seat. The conductor saw that it was suspicious because it contained a plastic container of cooking oil filled with what looked like sand. It was also heavy.

•Along with the help of an army corporal, the conductor and driver carried it outside of the bus just before it went off. There were a total of 10 fatalities

•Although those who took the bomb off were killed (including the conductor and the driver) –the bus passengers were largely unharmed and the death toll would have been much worse. It was a very powerful bomb.

•The operators were clearly heroic and gave their own lives

## Other Cases: What Drivers and Passengers have done

- **April 16, 1979: Israel**: A bomb apparently planted by guerrillas exploded on a bus minutes after a 13-year-old boy spotted a satchel and ***the driver ordered his passengers of f*** The blast totally wrecked the bus. ***There were no casualties.***
- **August 2, 2001; Israel:** A teenager entered an Israeli bus carrying a bag full of explosives near Tel Temoim Israel. ***The bomber was wrestled to the ground by the bus driver and other passengers, thwarting the attack. There were no causalities***
- **September 16, 2008: Colombo, Sri Lanka**: A bus driver noticed a suspicious bag, contacts police and evacuated the bus – ***Sixty passengers were on the busthere were only 4 inj uries.***

## Other Cases (con't): What Drivers and Passengers have done

- **October 5, 1997 –Tel Aviv, Israel:** A small bomb exploded on a Tel Aviv bus. Passengers evacuated the bus before the bomb went off, ***thanks to an observant passenger who witnessed an individual place an obj ect in a trash bin on the bus and then f lee the scene.There were no casualties.***
- **December 31, 2008**: **Manila, the Philippines**: Police defused two homemade bombs made from 81-mm and 60-mm mortar shells, found inside a passenger bus. The bombs were hidden in abandoned baggage inside the bus. Passengers immediately got off the bus after they noticed the suspicious bags, which contained explosives. ***There were no casualties***

## January 1, 2009: Zamboanga City in Mindanao Island

- IED: 81 mm motor round connected to a clock and left near a commuter bus depot is discovered by residents
- EOD personnel render IED safe

## Question

**What kind of choices do you have when you see a suspicious package?**

**What is your responsibility and what should you do?**

**What does this tell you about the important role passengers and even citizens play?**

## Deranged Persons: A threat Anywhere

**•May 3, 2000: Japan: A 17 year old teenager entered a bus and held a knife against the drivers' body. He ordered the driver down the highway.**
**•Police were alerted only when he allowed a woman passenger off the bus to go to the bathroom; she in turn alerted authorities.**
**•Police then chased the 40 passenger bus. Two passengers leapt out of the bus and suffered only minor injuries.**
**• Five hours later, the bus came to a stop in front of a tunnel. Police then blocked off all routes except one to a parking lot and surrounded the bus.**
**•Negotiations ensued. One more passenger escaped. The bus started to move again.**
**•Then Police brought tea and food to the hijacker and resumed negotiations, accompanied by his parents. The hijacker gave up.**
**•But he had stabbed 3 women in the neck in the course of the event, including one fatally.**

## Question

**Are your chances of encountering a dangerous, deranged person who is not a terrorist greater than encountering a terrorist?**

**What parts of security awareness training and emergency response help you to deal with BOTH situations?**

# Back Up Slides

## 10 years of Terrorist Attacks in the United States

- Data taken from UMSTART: 1/1/97 to 12/31/07
- 147 attacks, including the four 9/11 attacks; of the 143 remaining attacks
- Lethality limited: 11 deaths and 51 injuries
- No public transportation targets
- Only one attack attributed to "Palestinians:" February 23, 1997 attack on tourists at the Empire State building: 1 death, 6 injuries.
- The attacks break down roughly like this:
  - 43% against abortion institutions by individuals or extreme anti-abortion groups
  - 25% against institutions by the Earth Liberation Front
  - 16% against institutions by the Animal Liberation
  - 16% against businesses and other targets by unknown individuals
  - 1 attack by KKK and 1 by the Republic of Texas
  - And single attacks against institutions by other non-Jihhadist groups and individuals

## From an MTI Publication yet to be released

- Other (non jihadist) sources of terrorist attacks in the United States range from the Animal Liberation Front and violent environmental activists to right-wing extremists and white supremacists. For these groups, the priority of targets is primarily dictated by the specific objective of the attack, because these groups are motivated by narrowly defined issues.
- While the Oklahoma City bombing resulted in a significant number of casualties, it is important to realize that in the mind of the bomber, Timothy McVeigh, the objective was to destroy a federal government building with government employees, not civilian bystanders.

## From an MTI Publication yet to be released

- It is difficult to define precisely the ranking of targets for such a large range of groups. However, certain trends do emerge. Declarations, plots, and actions show that these attackers tend to:
  - **Focus on targets (individuals, infrastructure, or buildings) that are specifically associated, as part of the government or as part of a company, with the specific policies or entity being targeted.** Two examples are the bombings of IRS offices and the assaults on laboratories or individuals engaged in animal research.
  - **Focus on controlling economic damage and on limiting collateral casualties**. For example, recent environmental fires set in housing developments by environmental extremists specifically excluded occupied buildings. Attacks on animal testing labs have similarly avoided human casualties, although some animal-rights extremists have targeted individuals.
  - **Make no mention of transportation**
  - **Almost never target bystanders, either in open-air public gatherings or inside residential or other public buildings**.

## April 7, 1989: U.S.-Bound Greyhound Bus Hijacked in Canada

- Summary: A gunman of Lebanese descent hijacked a Greyhound bus en route to New York and forced it to drive to the Canadian parliament in Ottawa. The man claimed to be a member of the Lebanese Liberation Front and demanded that Syrian forces withdraw from Lebanon. The incident ended peacefully.

## Bus Hijacking - Details

- Hijacker: Charles Yacoub, 33 a Lebanese-Canadian born in Lebanon and moved to Canada in 1976. He settled in Montreal and owned a Jewelry store, married and had two children.
- Motive: He claimed to represent the Christian Lebanese Liberation Front, although it appears he was acting alone. He claimed his goal was to draw attention to the situation in Lebanon
- Sequence:
  - On April 7 he boarded a Greyhound bus traveling from Montreal to New York. At 12:20 pm on the Champlain Bridge, just outside of Montreal, he brandished a .45 calibre semi-automatic handgun, held the gun to the head of the bus driver, and ordered him back to Ottawa. He also held a device which he claimed would detonate a bomb hidden in the back of the bus, though no bomb was eventually found. There were nine other passengers on the bus.
  - At a bridge toll booth he released a former police officer, whothen alerted the authorities. The Sûreté du Québec began to search for the bus, **but could not find it believing it was still continuing south.** They did not alert the Royal Canadian Mounted Police or Ontario Provincial Police who were caught unaware when it arrived in Ottawa around 2:45.

# Bus Hijacking – Details (con't)

- The bus arrived in Ottawa and Yacoub ordered it driven up to Parliament Hill, which was then open to public vehicles. The bus then proceeded onto the lawn of the Parliament Buildings where it became stuck in the spring mud. A long hostage standoff began with Yacoub gradually releasing hostages. Over the course of the event he fired three shots into the ground, though he never threatened to harm the hostages.
- The parliament was evacuated, and police surrounded the bus. The event, unfolding for hours in the centre of the nation's capital, became a major media story covered live by the country's networks. At 7:55 Yacoub released the remaining five hostages and exited the bus where he was taken into custody.
- Yacoub faced five charges, and went to trial in 1990. He was convicted of forcible confinement and use of a weapon to commit an offence, but in a surprise to many was acquitted of the more serious charges of hostage taking, intimidation of Parliament, and aggravated assault. While he could have faced life in prison, he was sentenced to only six years in prison.

# ENDNOTES

1. Brian Michael Jenkins, MTI Report #97-04: *Protecting Surface Transportation Systems and Patrons from Terrorist Activities: Case Studies of Best Security Practices and a Chronology of Attacks*, San Jose, CA: Mineta Transportation Institute, December 1997.

2. Brian Michael Jenkins and Larry N. Gerston, MTI Report # 01-07: *Protecting Public Surface Transportation Against Terrorism and Serious Crime: Continuing Research on Best Security Practices*, San Jose, CA: Mineta Transportation Institute, September 2001.

3. Twice in December 1994, a disgruntled individual detonated incendiary devices on subway trains in New York; he was not connected to any terrorist organization.

4. Brian Michael Jenkins and Bruce R. Butterworth, MTI Report #09-03: *Potential Terrorist Uses of Highway-Borne Hazardous Materials*, San Jose, CA: Mineta Transportation Institute, January 2010.

5. Ibid.

6. It is important to put these cases in context in terms of actual plots. Twenty-four of the 44 cases involved actual plots. In 19 of these 24 plots, potential targets were identified, and operational plans were discussed. In 10 of the plots, the would-be terrorists actually conducted reconnaissance, and in 11 cases, they possessed, acquired, or tried to acquire explosives or other weapons, often without taking much care to avoid being identified.

7. See Brian Michael Jenkins, Bruce R. Butterworth, and Jean-François Clair, MTI Report # XXXX: *Off the Rails; The 1995 Attempted Derailing of the French TGV (High-Speed Train) and a Quantitative Analysis of 91 Rail Sabotage Attempts*, San Jose, CA: Mineta Transportation Institute, February 2010.

8. The categorization of developed and developing countries may not fit all regions of all countries. Major cities of Turkey and South America are quite developed, yet the two countries are categorized as developing. MTI will seek a more updated approach to this problem in line with current economic classifications from the United Nations.

9. This method is used not only to derail trains, which often involves multiple bombs, but also in some attacks where bombs are placed near trains.

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# ABOUT THE AUTHORS

## BRIAN MICHAEL JENKINS

Brian Michael Jenkins is the Director of the Mineta Transportation Institute National Transportation Security Center of Excellence and since 1997 has directed the Institute's continuing research on protecting surface transportation against terrorist attacks. He received a Bachelor of Arts degree in fine arts and a Masters degree in history, both from UCLA. He also studied at the University of Guanajuato, Mexico, and in the Department of Humanities at the University of San Carlos, Guatemala, where he was a Fulbright Fellow and received a second fellowship from the Organization of American States.

Commissioned in the infantry at the age of 19, Mr. Jenkins became a paratrooper and ultimately a captain in the Green Berets. He is a decorated combat veteran, having served in the Seventh Special Forces Group in the Dominican Republic during the American intervention and later as a member of the Fifth Special Forces Group in Vietnam (1966–1967). He returned to Vietnam on a special assignment in 1968 to serve as a member of the Long Range Planning Task Group; he remained with the Group until the end of 1969, receiving the Department of the Army's highest award for his service. Mr. Jenkins returned to Vietnam on an additional special assignment in 1971.

In 1983, Mr. Jenkins served as an advisor to the Long Commission, convened to examine the circumstances and response to the bombing of the U.S. Marine Barracks in Lebanon. In 1984, he assisted the Inman Panel in examining the security of American diplomatic facilities abroad. In 1985–1986, he served as a member of the Committee of the Embassy of the Future, which established new guidelines for the construction of U.S. diplomatic posts. In 1989, Mr. Jenkins served as an advisor to the national commission established to review terrorist threats following the bombing of Pan Am 103. In 1993, he served as a member of the team contracted by the New Jersey–New York Port Authority to review threats and develop new security measures for the World Trade Center following the bombing in February of that year.

In 1996, President Clinton appointed Mr. Jenkins to the White House Commission on Aviation Safety and Security. From 1999 to 2000, he served as an advisor to the National Commission on Terrorism, and since 2000, he has been a member of the U.S. Comptroller General's Advisory Board. Mr. Jenkins is a Special Advisor to the International Chamber of Commerce (ICC) and a member of the advisory board of the ICC's investigative arm, the Commercial Crime Services. Over the years, he has served as a consultant to or carried out assignments for a number of government agencies, including the Department of Homeland Security (DHS). As part of its international project to create a global strategy to combat terrorism, the Club of Madrid in 2004 appointed Mr. Jenkins to lead an international working group on the role of intelligence.

Mr. Jenkins is the author of *International Terrorism: A New Mode of Conflict*; the editor and co-author of *Terrorism and Personal Protection*; the co-editor and co-author of *Aviation Terrorism and Security*; and a co-author of *The Fall of South Vietnam*. His latest books are *Unconquerable Nation: Knowing Our Enemy, Strengthening Ourselves* and *Will Terrorists*

*Go Nuclear?* He is also the author of numerous articles, book chapters, and published research reports on conflict and crime.

## BRUCE ROBERT BUTTERWORTH

Bruce Butterworth is a Mineta Transportation Institute National Transportation Security Center of Excellence Research Associate. He has had a distinguished government career working at congressional, senior policy, and operational levels. Between 1975 and 1980, as a professional staff member for the House Government Operations Committee, he ran investigations and hearings on many transportation safety issues, particularly in aviation. He spent 11 years in the Department of Transportation, eight of them in the Office of the Secretary. He managed negotiations on air and maritime services in the General Agreement on Tariffs and Trade (GATT) (now the World Trade Organization (WTO)), chaired U.S. delegations to United Nations committees, dealt with transport issues related to border inspections, and was part of the U.S. response to the Lockerbie bombing.

Mr. Butterworth has held two executive posts in aviation security and in both worked closely with Congress as the informal but primary liaison. He was Director of Policy and Planning (l991–1995), establishing strategic, long-term, and contingency plans and federal rules. As Director of Operations (l995–2000), he was responsible for federal air marshals, hijacking response, and 900 field agents; he worked to improve security and the performance of security measures by U.S. airports in this country and by U.S. airlines worldwide. He ran the Federal Air Administration's (FAA's) Aviation Command Center, successfully managing the resolution of hijackings and security emergencies. He launched a successful program of regulation of dangerous goods and cargo security after the 1995 ValuJet crash, oversaw the conversion of the air marshal program to a full-time program with high standards, was a key player in the response to the ValuJet and TWA 800 accidents, and was a frequent media spokesperson. He has worked closely with Congress, the National Security Council staff, the intelligence community, law enforcement agencies, and authorities of other nations.

He was an Associate Director at the U.S. Holocaust Memorial Museum (2000–2003), responsible for security and building operations. He designed and implemented a "best practice" procedure to deal with mail possibly containing anthrax powder and developed and conducted comprehensive emergency planning and exercises. Between January 2003 and September 2007, he was one of two deputy directors in a 1,300-person Engineering Directorate at NASA's Goddard Space Flight Center, managing workforce planning, budgeting, and human-capital management for complex robotics space missions, substantially reducing overhead and improving workplace safety there. In addition to having helped the Department of Homeland Security (DHS) in information sharing, he is a research associate at the Mineta Transportation Institute. He has written a peer-reviewed report on security risks created by highway-borne hazardous materials for the State of California, is updating prior work on selective screening in the rail environment, and is constructing an IED-focused database of surface transport attacks, along with Brian Michael Jenkins.

He co-authored with Mr. Jenkins the following reports published by the Mineta Transportation Institute: *Selective Screening of Rail Passengers* (MTI Report 06-07), February 2007; a supplement to that report, published in January 2010; *Potential Terrorist Uses of Highway Borne Hazardous Materials* (MTI Report 09-03), January 2010; and *Implementation and Development of Vehicle Tracking and Immobilization Technologies* (MTI Report 09-04). He also co-authored a study with P. J. Crowley, Senior Fellow and Director of Homeland Security at the Center for American Progress, *Keeping Bombs Off Planes: Securing Air Cargo, Aviation's Soft Underbelly*, May 2007. In February 2009, he published with Mr. Jenkins an opinion piece on information sharing entitled "A Campaign the Secretary Must Win."

Mr. Butterworth received a Master of Science degree from the London School of Economics in 1974 and a Bachelor of Arts degree from the University of the Pacific in 1972 (Magna Cum Laude). He was a California State Scholar and a Rotary Foundation Fellow and has received numerous special achievement and performance awards.

## KARL S. SHRUM

Karl Shrum retired in 2006 after a 28-year career in the federal government that spanned three agencies and included key leadership positions in aviation and transportation security. He began his federal career in 1979 as a motor carrier safety investigator in the Federal Highway Administration. In 1982, he earned special distinction as the case agent in the first felony conviction under the Hazardous Materials Transportation Act. In 1986, Mr. Shrum transferred to the Federal Aviation Administration (FAA) as an aviation security inspector and then became the regional hazardous-materials coordinator. In 1989, he was promoted to FAA Headquarters as an aviation security specialist, became air carrier branch manager, and then served eight years as manager of the Civil Aviation Security Division in the Office of Policy and Planning. These were tumultuous years in aviation security, years that saw the Pan Am 103 bombing, the Gulf War, Ramzi Yousef and the Bojinka plot, and ultimately 9/11. In 1997, Mr. Shrum was nominated for the honor of Government Security Professional of the Year by the American Society for Industrial Security. When the Transportation Security Administration (TSA) was created in 2002, Mr. Shrum became director of cargo, maritime and land policy and then senior advisor in the Office of Intermodal Policy. At TSA, Mr. Shrum was heavily engaged in the analysis of risk scenarios and countermeasures for bulk shipments of hazardous material by highway and rail in the context of critical infrastructure such as bridges and tunnels.

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