

# UNDERSTANDING TERRORISM AND EXPLORING ITS IMPACTS

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## Abstract

This report provides a detailed analysis of the changing trends in terrorism since the 1970s. It investigates terrorism by geographic activity, methods of attack, organizations involved weapons involved etc. Most of the indicators of terrorism, like the number of terrorist attacks, number of suicide attacks and multiple incident attacks, the damage caused in terms of human lives and property damages have peaked in the recent years. Other factors such as primary targets of attacks, dominance of terrorist groups have also been studied in this report. The report also attempts to investigate the impact of terrorism on the economy of a country using Spearman's Rank Correlation Coefficient<sup>3</sup> on Terrorism Index and GDP index of countries.

## Introduction

Terrorism is on the rise. It has filled main stream news and social media. The primary goal of this study is to understand the trend of terrorism and to compare with the past. To understand terrorism, we have to study it from different angles – geographic locations, political regions, primary targets, weapons used etc.

The purpose of this project is to provide a detailed analysis of changing trends in terrorism since 1970, with a special focus in the recent years. The first part is dedicated to understanding terrorism in depth and later on, we will analyze the effects of terrorism on the economy of countries.

The following questions are main motivation behind this study:

1. What is the trend of terrorism in the world right now?
2. What place (geolocations) are facing the highest number of terrorist attacks?
3. How frequent are chain attacks? Where do they mostly occur?
4. Have the success rates for terrorist attacks changed?
5. Who are the primary targets of the attacks?
6. Which terrorist groups are most dominant and how spread are their influences?
7. How safe is the US? Are there particular states where attacks are more?
8. Does terrorism influence other sectors like economy and health?

## Data / Materials

### Source of Data

The data used for this study is extracted from datasets of Global Terrorism Database (GTD)<sup>1</sup> and World Bank<sup>2</sup>. GTD is an open-source unclassified database which includes over 140,000 records

containing information of terrorist events around the world from 1970 through 2014. GTD is collected and maintained by National Consortium for Study of Terrorism and Responses to Terrorism (START).

The World Bank provides free and open access to data about development in countries around the world. It has maintained datasets containing Development Indicators of different countries of the world from 1960 till 2015.

### **Data Cleaning**

The global terrorism dataset was in xlsx format which was not readily readable. It was converted it to a csv file. Data cleaning was performed on every step of it. We came across many situations where the country names were not valid, empty and invalid data was being represented in different forms. Irrelevant results like, Values like “Unknown”, n/a”, “..” etc. were skipped during the analysis.

For the World Bank data, we selected our data mostly manually. Selections of countries, year range and the indicators would be transformed into a database which we could download in a format of our choice. The dataset had majority of fields empty. While making plots, we used as much data as available. When merging our datasets, we considered only those countries which had values on both the datasets. When comparing data sets, since most values from recent years were present and most from earlier years were found to be missing, we opted to use recent data (i.e. after 2000 A.D. on both the cases).

## **Results**

During the analysis, we found the region with highest number of incidents were Middle East, Central America followed by South Asia. The most affected countries since the 70s included Iraq, Pakistan, India, Colombia and Afghanistan and the cities of Baghdad, Karachi, Lima, Belfast and Santiago were found to observe highest numbers of attacks. The countries with least number of documented terrorist activities included Gibraltar, Brunei, Cayman Islands, New Hebrides and North Korea. Investigating the reasons for attacks, we found that 98.80% of terrorist activities were influenced by some political, economic, religious or social reason behind it and about 99% of the terrorist activities were to convey message of intimidation.

### **Current Trend of Terrorism**

To understand the terrorism trend, we collected the number of terrorist attacks by year throughout history and plotted them against year (Figure 1). Figure 2 shows the top 5 countries facing the highest number of attacks since 2000 and their trend in history.

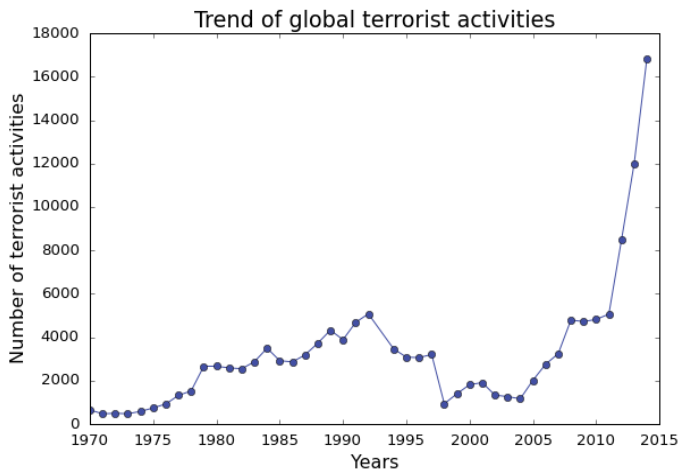


Figure 1 Global terrorism trend

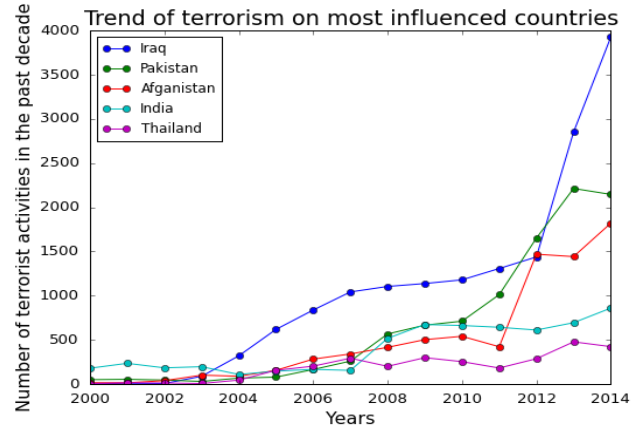


Figure 2 Terrorism trend in top 5 countries

Because terrorist attacks are spread throughout the world, we divided the world in a network of latitude longitude pairs and categorized the terrorist events into the nearest latitude longitude pair available as shown in Figure 3. We also categorized those plots into three groups based on the number of attacks observed on the location pairs. Red color was for areas that observed over 1000 terrorist activities, yellow for between 1000 and 300 activities, and for less than 300 activities, we used a weighted green circles - the bigger the circle, the larger the impact.

Figure 4 shows the trend of terrorist activities on different titles throughout the world. Each title has been converted to a scale of 0 to 100 to bring all data to common scale. We can see that the total number of attacks per year, number of suicide attacks per year and the number of deaths due to terrorist activities per year have all been increasing since the dawn of 21st century. The success rate of attacks has stayed fairly constant between 80 and 90 percent throughout fell slightly after 2005.

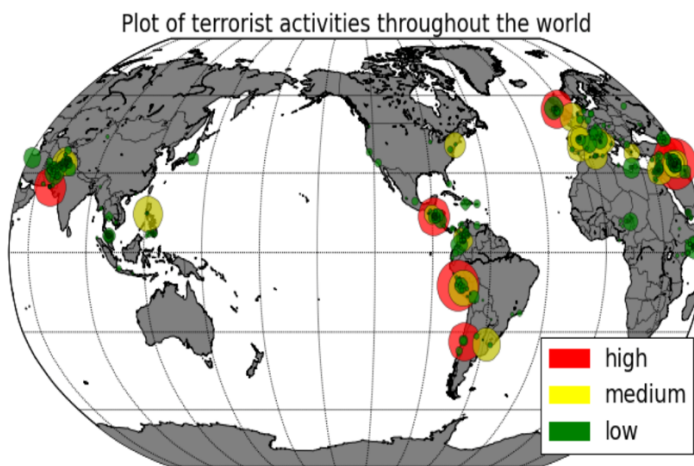


Figure 3 Global plot of terrorism intensities

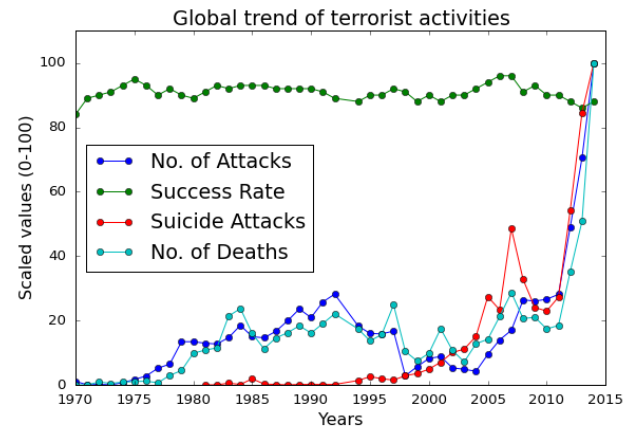


Figure 4. Plot of consequences of terrorism

## Terrorism in the US

United States has become the target of many terrorist activities. We made a heat plot of the attacks in each of the states based on the number of attacks occurred. 577 terrorist activities in California followed closely by New York (498 attacks), Florida (144), Illinois (109) and Washington (92). Fig. 5 shows the heat map for attacks in the US.

USA State by Terrorist activities involved



Figure 5 Heat map for attacks in USA

## Chain Attacks and Prevented Attacks

GTD has maintained a column where it has specified if an attack is a single incident or part of a multiple series of attacks. We collected multiple attack information throughout the years. 12.55% attacks throughout the years were found to be part of chain of events. Iraq, Peru, Pakistan, India and Colombia are the top 5 nations observing the highest number of recurrent attacks. A quick line plot shows that the trend of multiple attacks has increased exponentially in the past few years (Fig 6). Also, we wanted to check the success rates of attacks throughout the years. The line graph on figure 7 shows the percentage of prevented attacks throughout the years.

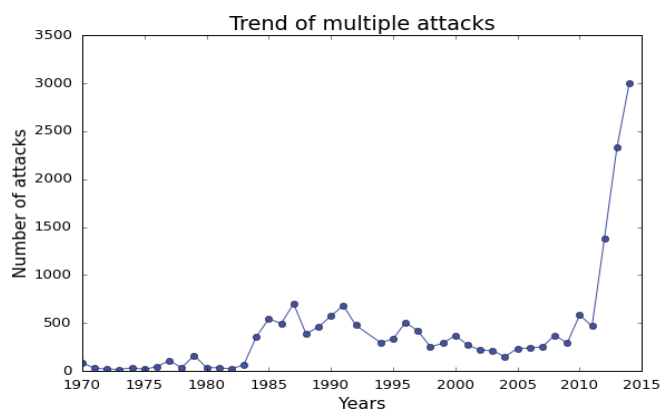


Figure 6 Trend of Multiple Attacks

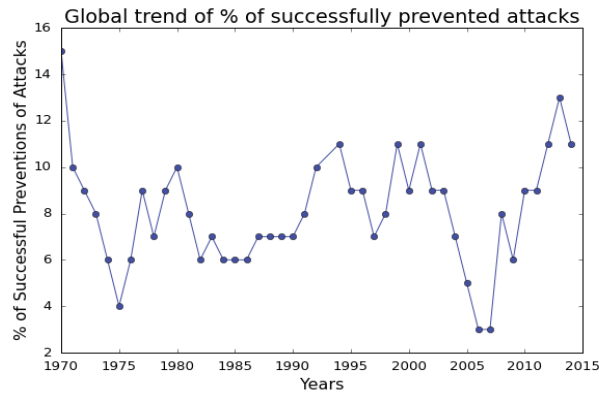


Figure 7 Trend of Successful Attacks

### **Terrorist Groups and their Influence**

The number of terrorist groups were about 50 throughout the world in the early 70s, which increased to a peak value of 400 in the early 90s. It started falling then but in the past three years, the number of active terrorist groups have doubled. There are now about 300 active terrorist group throughout the world. (Fig 8)

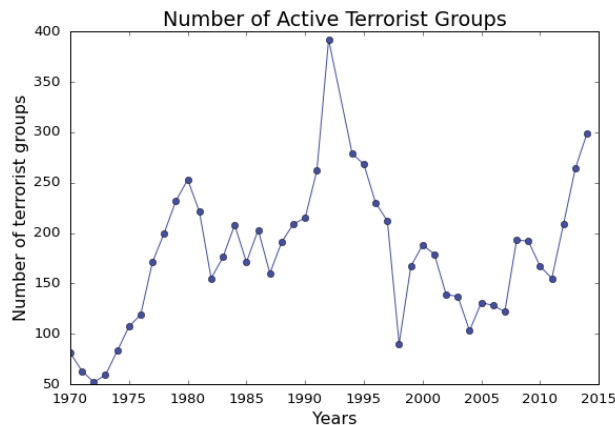


Figure 8 Number of Active Terrorist Groups

We also studied the operation area of the groups and the number of events each group was responsible for. We found out that a group being spread over a greater number of countries does not necessarily mean it is responsible for more attacks. Even though Muslim Fundamentalists, Neo-Nazi Group, Palestinians etc. were the groups with the widest spread, it was terrorist groups like Shining Path (6 countries), Taliban (3 countries), Farabundo Marti National Liberation Front (FMLN) (5 countries) etc. that were responsible for most activities.

### **Target Analysis and Weapon Analysis**

Targets in our study are the victims of terrorist attacks. Primary targets are private citizens, followed by military, police, government and business Table 1. Analyzing the weapons used for terrorist activities chiefly involves automatic automobiles followed closely by Projectiles, Handgun etc. Fig 9. 2.9% of all terrorist attacks are suicide attacks and as indicated as in fig 4,

their trend is rising exponentially. Figure 10 shows percentage of death occurred in different countries throughout the year, shows that top three countries constitute majority of the deaths.

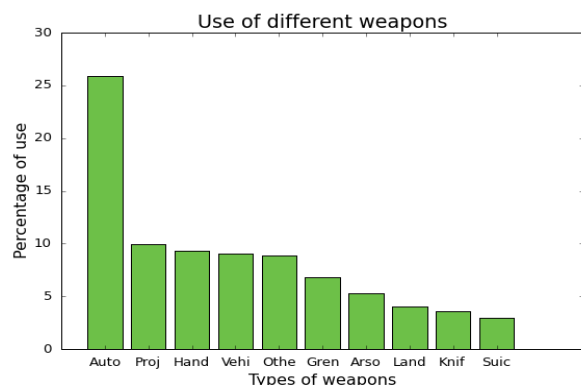


Figure 9 Weapons Use for Terrorism

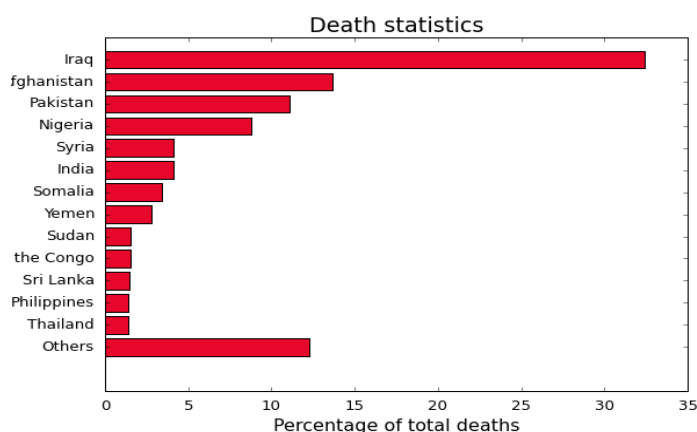


Figure 10. Deaths % in different countries.

Region	Target 1	Target 2	Target 3	Target 4	Target 5
Overall	Citizens	Military	Police	Government	Business
Middle East	Citizens	Military	Police	Government	Business
South Asia	Citizens	Police	Government	Military	Business
South America	Business	Citizens	Government	Police	Utilities
West Europe	Business	Citizens	Government	Police	Military
Africa	Private	Military	Government	Police	Business

Table 1 Primary Targets

### Comparing Terrorism with other fields

We tried to look for relationship between terrorism and different factors of health - life expectancy, birth rates, death rates, injury analysis etc. While we observed a slight indication in some change in nature of curve of the indicators with a drastic change in the curve of terrorism activities, we cannot consider them to be following a rigid pattern. For example: while the death of 4000 people is a lot, it is unlikely that it will significantly alter the birth rate, life expectancy and death rate of a country with more than 33.5 million people.

Our next analysis was the amount of dollars on damage due to terrorist activities. We found a sharp spike in what seems to be 9/11 and a steady increase since 2005. The property damage due to terrorism has doubled in the past two years to reach a historically high 6 billion dollars.

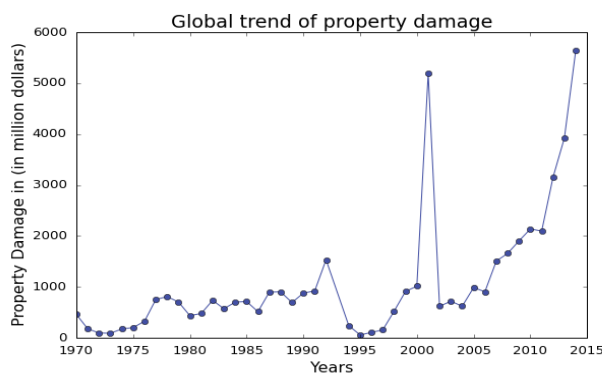


Figure 11. Damage due to terrorist activities

Our final analysis was to compare the effects of terrorism on the economy of a country. To do this, we considered Gross Domestic Product (GDP). Using Spearman's Rank correlation<sup>3</sup>, we ranked the countries based off of the number of terrorist attacks the country faced in the last decade (named Terror Rank) and the GDP gain in the last decade (named GDP rank). We considered the countries with top 50 GDP rank and top 50 terror rank and plotted them in a scatterplot with Terror rank on X-axis and GDP-rank on Y-axis. Doing a little binning, the results showed a correlation between the two ranks - Countries that observe higher terrorist activities generally observe lower improvements in GDP (Fig 12).

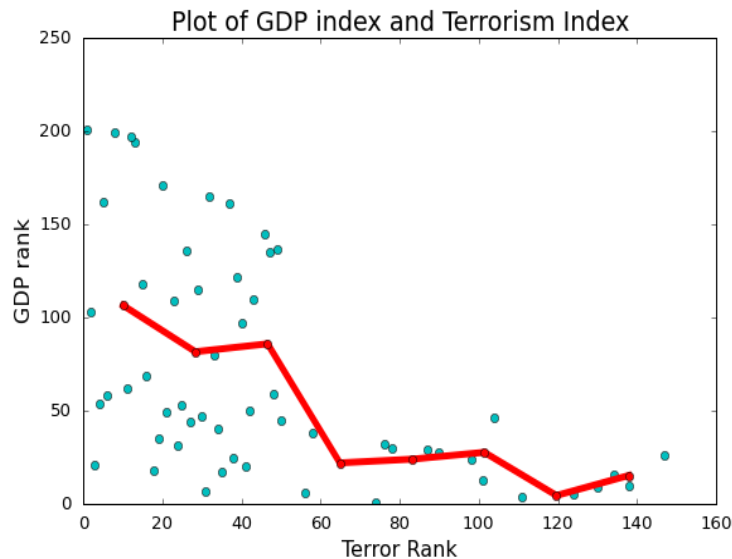


Figure 12. Plot of GDP Index Vs Terrorism Index

### Discussion or Conclusions:

The report highlights that terrorism is on the rise. The results of this research show the trend of terrorism in recent years and how it has been increasing. The graphs for number of deaths, number of terrorist activities, property damage, number of active terrorist groups etc. all have peaked in the current year. The economic cost of terrorism increased by 60% from last year, the number of deaths have increased by over 80% from last year. Overall, terrorism is on its peak right now. We found evidence suggesting correlation between terrorism and GDP of a country.

The study helps to visualize the effects of terrorism in different areas, and to analyze trends. The analysis will be helpful to develop a plan that can be put to work to reduce such activities or to minimize the effect of terrorism in the affected areas. Terrorism has focus on different zones which can be prioritized by law enforcing agents, and they are targeting different groups of people in different places, which can be used as a ground of analysis for further improvement. The result of this study will be helpful for individuals working in growth and economy sector of the world to see the effect of terrorism in this sector and make them aware of such situations in the future. The study might be helpful for economists in developed and developing countries to come with better solutions to improve economy by taking terrorism into account. In the future, more elaborated experiments can be conducted based on the current report to look for relationships on terrorism with economy or other development indicators.

## **References**

1. "Information on More than 140,000 Terrorist Attacks." Global Terrorism Database. Accessed December 7, 2015. <http://www.start.umd.edu/gtd/>.
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3. Kotz, Samuel. "Spearman's Rank Correlation." In *Encyclopedia of Statistical Sciences*. New York: Wiley, 1982.