



Articles

Terrorism Driven by High Population Growth

by Mario Coccia



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Abstract

A fundamental problem in conflict studies is how to explain the root causes of terrorism. This study suggests that terrorism thrives in specific regions with high growth rates of population that may generate income inequality and relative deprivation of people. In addition, geospatial analysis here reveals that countries with high association between fatalities for terrorist incidents and population growth are mainly in Sub-Saharan Africa, North Africa, Middle East, East and South Asia. Overall, then, one of the causes of terrorism is due to sociodemographic factors combined with psychosocial risk factors.

Keywords: Terrorism; Population Growth; Demographic Factors; Income Inequality; Poverty; Relative Deprivation, Psychosocial risk factors.

Overview of the problem

This paper has two goals. The first is to analyse the possible association between demographic factors and effects of terrorist attacks. The second is to suggest that terrorism thrives in the presence of high growth rates of population, which can support socioeconomic and psychosocial risk factors. These topics are basic in modern society because terrorism is growing both in rich and developing nations (Newman, 2006; Reardon, 2015). Many studies endeavour to clarify the direct and indirect determinants of terrorism (Abadie, 2005; Crenshaw, 1981; Newman, 2006; Freytag et al., 2011; McAllister and Schmid, 2011), though predictors of terrorism are often unclear factors in different societies (Krueger and Malečková, 2009). Some sources of terrorism are economic factors (Blomberg et al., 2004; Krueger and Malečková, 2003), political factors (Coggins, 2015), social factors (Krueger and Malečková, 2003), etc. However, *whether* and *how* demographic factors cause and sustain terrorism are hardly known. The study here confronts this scientific problem trying to analyse and explain whenever possible, the role of demographic factors associated with effects of terrorist incidents.

Theoretical framework and working hypothesis

The UN General Assembly claimed that terrorism can be due to socioeconomic issues of poverty, inequality, underdevelopment and the absence of social justice in some regions (United Nations, 2016). A popular hypothesis in these research fields is that terrorism and other forms of political violence are due to poverty and poor distribution of economic resources (Piazza, 2006; Piazza and Von Hippel, 2014). This "rooted-in-poverty hypothesis" explains terrorism as "expression of socioeconomic discontent and desperation" (Piazza, 2006, p. 160). In particular, terrorist organizations can use poor socioeconomic conditions as a base to foster their criminal activities (cf.,



Blomberg et al., 2004; Enders and Hoover, 2012; Krieger and Meierrieks, 2011). In fact, low levels of socioeconomic development increase the appeal of political extremism, encourage political violence and instability in society (Piazza, 2006). Piazza (2006, p. 463) also argues that unlike popular opinion, “no significant relationship between any of the measures of economic development and terrorism can be determined. Rather, variables such as population, ethno-religious diversity, increased state repression and, most significantly, the structure of party politics are found to be significant predictors of terrorism”. The study of these variables, such as demographic factors, is basic for understanding the sources and effects of terrorism in society. In general, scholars show that population growth can support resource scarcity and violence in countries (Christens and Speer, 2005; Lee, 2016). The theoretical background of these studies is the theory of Malthus (1817) that argues geometric growth rates for population, while food resources have arithmetic growth rates. The dissimilar rates of growth between population and subsistence food tend to decrease natural resources and generate a looming crisis and environmental conflicts. Many scholars are current proponents of neo-Malthusian approaches to explain economic and social issues, such as Ehrlich (1968) that foretold a coming crisis from overpopulation and limited resources (cf., Meadows et al., 2004). Linstone (2003, p. 288) argued that: “The world population is expected to increase from 6.2 billion to 9.3 billion in 2050 and 98% of this growth will be in the poorer countries” (cf., Rapoport, 2004). Ehrlich and Liu (2002, p. 188) observed that:

high population growth rates are expected to continue in many developing nations, with a projected annual growth rate for people aged 20–34 of 2.82% as opposed to a rate of 0.16% in developed countries during the years 2000–2050 ... In the face of such growth, job opportunities may be doomed to become much rarer.

In this context, Kaplan (2000) argued a possible threat to developed countries can be due to population increase of poor countries. Visaria (1989, p. 7) argues that one of the most serious consequences of the acceleration in population growth is the difficulty of generating adequate employment opportunities for the growing labour force of countries. Cassils (2004) claims that the poorest regions of the world, where population growth is still rapid, will continue to suffer with a decreased life expectancy because of resource depletion, conflicts and diseases. In general, the mismanagement of this equilibrium between population and natural–economic resources in specific regions can cause problems of violent crime and conflicts (Peluso and Watts, 2001). Krieger and Meierrieks (2010, p. 914) claim that: “Terrorism is also positively linked to larger populations, but this may simply indicate that terrorism is more likely in more populous countries”. Cassils (2004) suggests that population growth can contribute to the overexploitation of resources and space, reducing the freedoms of individuals mainly in poor and unstable regions of the globe, and possibly give rise to more violence and terrorism. In particular, the interconnections between overpopulation and low economic growth of specific areas are a critical factor of growing insecurity worldwide (Cassils, 2004, p. 172). However, *whether* and *how* population growth influences terrorism is hardly known. The studies discussed above suggest a critical relation between population growth and terrorism that can lay theoretical foundations to explore a hypothesis of general causes of terrorism driven by population growth.

Suppose that terrorism is a specific and distinct type of violent crime. This crime, in general, is due to some group organized that has technical skills to carry out a terrorist action directed to challenge a nation’s authority and induce fear and anxiety into civilian population (cf., Crenshaw, 1981, p. 380). Rice (2009, p. 253) argues that: “similarities between terrorism and crime are ... evident”, then the psychosocial research of crime is well positioned to frame environmental risk factors that can support terrorism’s psychological space (cf., LaFree and Dugan, 2009).



The working hypothesis of the study here is:

- *Hypothesis of terrorism driven by population growth*: The effectiveness of terrorism is positively affected by high growth rates of population over time and space, *ceteris paribus*.

The purpose of the present study is to see whether statistical evidence supports the hypothesis that fatalities from terrorist attacks are associated with high growth rates of population between countries.

Materials and methods

The study here analyses whether under the condition of high growth rate of population, confirmed fatalities for the incident from terrorist attacks increase, even when controlling other factors.

1.1 Sample and sources

The sample of this study is based on $N=132$ countries. Source of data is Democracy Cross-National Data by Norris (2015), World Development Indicators (World Bank, 2008) and Global Terrorism Database (START, 2015).

1.2 Measures

The measures of terrorism effectiveness, growth rates of population and other socioeconomic indicators are as follows.

GTD defines terrorist attacks (Global Terrorism Database codebook, 2015, p. 8): “the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation”. Effects of terrorist attacks in society are measured by the number of total confirmed fatalities for the incident for 2002-2014 period. This number includes all victims and attackers who died as a direct result of the incident (Global Terrorism Database, START, 2015).

- Annual population growth rate, 1975-2002 and 2002-2015 period, is the exponential rate of growth of midyear population from year $t-1$ to t , expressed as a percentage. Source of data is Norris (2015).
- Freedom House standardized scale 100 pts 2000 measures democratization. Source of data is Norris (2015).
- Kaufmann political stability 2000. It measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. Source of data is Norris (2015).
- Ethnic fractionalization index -combined linguistic and racial- (Alesina et al., 2003). Source of data is also Norris (2015).
- Human development index (HDI) 2005 (Norris, 2015).
- Gross Domestic Product per capita US\$ 2002 –GDPPC. Source of data is the World Bank (2008) and Norris (2015).
- Income Gini coefficient 2004 is a measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. Source of data is also the World Bank (2013) and Norris (2015).

1.3 Research Design and Data Analysis Procedure

The approach here performs a country-level analysis worldwide ($N=132$ countries). Statistical analyses apply the Statistics Software SPSS® version 24. Skewed variables are *ln*-transformed before including in statistical analyses. Statistical techniques to support the hypothesis of previous section are:

- Descriptive statistics, bivariate correlation and partial correlation (with control variables Gini coefficient of income inequality).
- Regression analysis with linear models. The specification of the model of simple regression is:

$$\ln Y_{i,t} = \lambda_0 + \lambda_1 \ln x_{i,t} + u_{i,t} \quad [1]$$

$$\text{country } i=1, \dots, N; \quad t=\text{time}$$

where:

- $Y_{i,t}$ = Number of total confirmed fatalities for the incident from terrorist attacks over 2002-2014 (dependent variable)
- $x_{i,t}$ = Annual population growth rate 1975-2002 (explanatory variable)
- $u_{i,t}$ = Error term

The model [1] is estimated with the Ordinary Least Squares (OLS) method.

This study also calculates arithmetic mean and standard deviation between the following geoeconomic regions based on Regional categories of the dataset by Norris (2015): North America, Central America & Caribbean, South America, East Asia, Southeast Asia, South Asia, Central Asia, Western Europe, Eastern Europe, Middle East & North Africa, Sub-Saharan Africa and Australasia & Oceania. In particular, this classification is used to analyse and compare demographic and socioeconomic factors underlying effectiveness of terrorist attacks between these geoeconomic regions of the globe.

- *Geospatial analysis of the association between lethality of terrorism and population growth*

The association between annual population growth and number of confirmed fatalities for terrorist incidents of country i (ASCT $_i$) is given by:

$$\text{ASCT}_i = \text{annual population growth rate (1975-2002)}_i \times \text{number of confirmed fatalities for terrorist incidents over (2002-2014)}_i \quad (i=\text{country, with } i=1, 2, \dots, N) \quad [2]$$

The sample of this analysis is based on $N=132$ countries. Countries i are divided in four categories:

1. low association: $\text{ASCT}_i \leq 25^{\text{th}}$ percentile
2. moderate association: 25^{th} percentile $< \text{ASCT}_i \leq 50^{\text{th}}$ percentile
3. high association: 50^{th} percentile $< \text{ASCT}_i \leq 75^{\text{th}}$ percentile
4. very high association: $\text{ASCT}_i > 75^{\text{th}}$ percentile



A geographic map of the globe visualizes each country according to the category to which it belongs.

Results

- *Statistical evidence with correlation and regression analyses*

The bivariate correlation shows a coefficient of Pearson correlation $r=.40$ ($p\text{-value} < .001$), which indicates a positive linear relationship between levels of annual population growth rate and number of confirmed fatalities for terrorist incidents. The partial correlation, controlling income inequality, also reveals a positive relationship between these variables ($r= .30$, $p\text{-value} < .01$). These results are consistent with the hypothesis stated above about the positive association between annual population growth and confirmed fatalities for terrorist incidents (Table 1).

Table 1. Correlation between LN number of confirmed fatalities for terrorist incidents over (2002-2014) and LN annual population growth rate (1975-2002)

Bivariate correlation r	.40
$p\text{-value}$.001
Partial correlation	.30
$p\text{-value}$.009
Control variable: Income Gini coefficient 2002y	

The OLS estimation of the model [1] in table 2 indicates that a 1% higher level of annual population growth rate, increases the expected number of confirmed fatalities for terrorist incidents by about 0.62% ($p\text{-value} < .001$).

Table 2. Regressions of confirmed fatalities for terrorist incidents on annual population growth rate

<i>Dependent variable:</i>	
LN number of confirmed fatalities for terrorist incidents over 2002-2014	
<i>Explanatory variable:</i>	
LN annual population growth rate 1975-2002	
Constant λ_0	-0.15
(St. Err.)	(0.14)
Coefficient λ_1	0.62***
(St. Err.)	(0.14)
R^2 adj.	0.15
(St. Err. of the Estimate)	(1.35)
F	20.77
(Sign.)	(0.001)

Note: ***= $p\text{-value} < .001$; other variables, such as wealth of nations, income inequality, etc., have not been added in the model of regression here because either they are not significant (e.g., LN Income Gini coefficient 2004 has $p\text{-value} = .939$) or national wealth and Human development Index, etc. are, together with demographic factors, already represented by annual population growth rate between countries.

- *Geospatial analysis of the association between terrorism and population growth*

The spatial distribution of the association between annual population growth rate and number of confirmed fatalities for terrorist incidents is in figure 1, whereas figure 2 shows the association under study between geoeconomic regions of the globe. The geospatial analysis here reveals that high levels of growth rates of population are associated with high number of confirmed fatalities for the terrorist incident in some regions of the globe, such as Sub-Saharan Africa, Middle East & North Africa, East and South Asia. However, an exception is the high association in the USA that may be due to different factors, such as the US foreign policy for the Middle East and other regions, US deterrence policy and preventive actions against non-state organizations of terrorism, US military actions, etc. These factors may nourish revenges of terrorist cells and individuals with deteriorated behaviour- at domestic, transnational and international level - that attack the civilian population in order to induce fear and anxiety in advanced society.

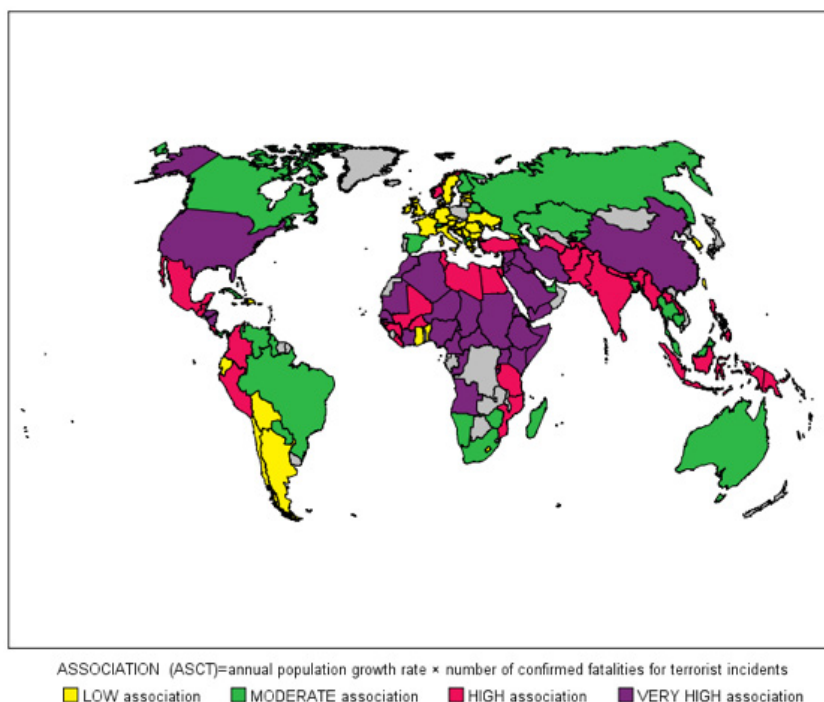


Figure 1. Global association between annual population growth rate 1975-2002 and number of confirmed fatalities for terrorist incidents over 2002-2014 between countries. Note: colour grey indicates missing values.

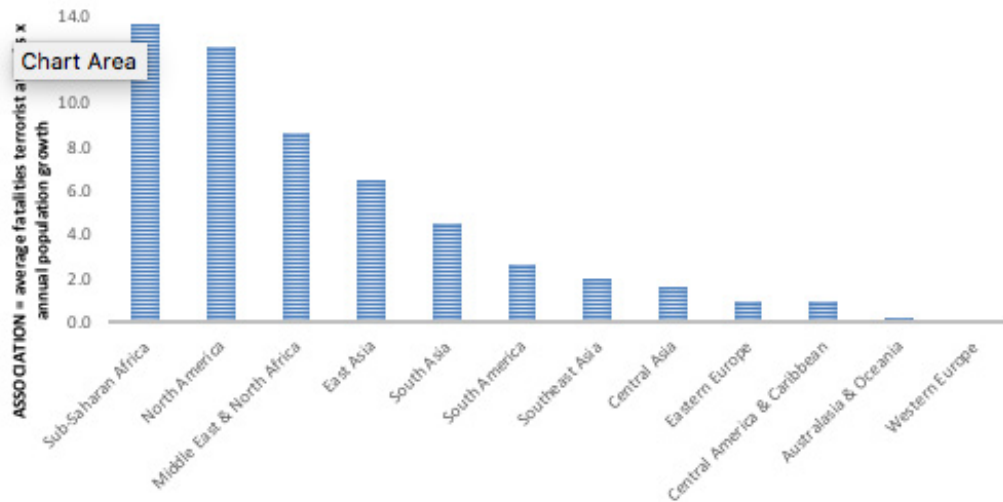


Figure 2. Association between annual population growth rate 1975-2002 and number of confirmed fatalities for terrorist incidents over 2002-2014 between geoeconomic regions of the globe.

Table 3 shows the arithmetic mean (M) and Standard Deviation (SD) of socioeconomic variables under study between geoeconomic regions. Results confirm previous statistical analyses. In this context, Ackoff and Rovin (2003, p. 146) claim that inequality of the distribution of wealth, low opportunities for economic development and low quality of life contribute to “the frustration and alienation that give rise to terrorism” (cf. Ezcurra and Palacios, 2016). A study for the Heritage Foundation in 2002 also argues that countries prone to terrorism are the least advantaged economically (Ackoff and Rovin, 2003, p. 146).

Table 3: Descriptive statistics between geoeconomic regions of the globe

Geoeconomic Regions	N.confirmed fatalities for terrorist incidents (2002-2014)	Freedom House standardized scale 100 pts (2000)	Kaufmann political stability (2000)	Ethnicfractionalization (combined linguistic and racial) (2002)	Annual population growth Rate (2002-2015)	Human development index (2005)	GDP per capita (US\$) (2002)	GINI coefficient (2004)
Central America & Caribbean	M 1.13	89.25	0.50	0.39	0.61	0.80	\$8,386.00	39.65
	SD 3.55	16.28	0.63	0.23	0.56	0.10	\$9,426.55	3.720
South America	M 1.32	74.03	-0.21	0.44	1.41	0.78	\$2,654.94	51.73
	SD 4.08	19.07	0.70	0.19	0.53	0.06	\$1,480.19	5.040
East Asia	M 5.23	64.26	0.40	0.14	0.70	0.84	\$10,714.8	36.30
	SD 17.67	36.41	0.49	0.15	0.48	0.12	\$14,473.9	9.609
Southeast Asia	M 0.93	42.13	-0.23	0.47	1.47	0.74	\$3,713.00	41.10
	SD 3.07	23.91	1.04	0.19	0.50	0.12	\$7,045.06	5.150
South Asia	M 1.99	52.02	-0.47	0.49	1.93	0.62	\$746.57	33.68
	SD 6.56	20.90	0.95	0.23	0.73	0.09	\$668.883	1.940
Central Asia	M 0.85	63.68	0.00	0.34	1.42	0.73	\$4,250.06	38.24
	SD 2.19	28.97	0.94	0.24	0.67	0.14	\$7,545.36	6.650
Western Europe	M 0.23	97.36	1.17	0.23	0.45	0.94	\$25,861.8	31.13
	SD 2.91	4.15	0.26	0.21	0.62	0.02	\$9,693.64	4.510
Eastern Europe	M 1.63	60.95	-0.29	0.40	0.12	0.80	\$2,709.85	31.77
	SD 10.89	27.24	0.91	0.18	0.97	0.07	\$2,561.54	5.170
Middle East & North Africa	M 2.80	35.70	-0.25	0.44	1.79	0.80	\$7,677.41	37.99
	SD 13.87	18.33	0.82	0.22	0.52	0.07	\$8,279.25	3.010
Sub-Saharan Africa	M 5.11	51.04	-0.64	0.65	2.03	0.51	\$926.26	48.32
	SD 15.27	22.92	1.03	0.23	1.00	0.12	\$1,515.71	10.69
Australasia & Oceania	M 0.19	83.48	0.46	0.27	1.36	0.76	\$4,496.92	40.77
	SD 0.601	17.82	0.89	0.23	0.66	0.15	\$6,559.16	8.790

Source : Norris (2015), START (2015). Note: M=arithmetic mean, SD=Standard Deviation.



Discussion

The statistical evidence reveals that, in average, regions with a high incidence of fatalities for terrorist incidents have also high growth rates of population. The positive correlation between population growth and terrorism found here can be explained with the theory of association between population density and poverty (cf., Curtis, 1975). Sociological studies also consider the perspective that high density of population produces deteriorated human functioning, which leads to violent crime (Thiessen and Rodgers, 1961). Other studies reveal that frustration generated by high levels of (population) density can stimulate violent behaviour and aggression between individuals (Regoeczi, 2003).

In addition, high growth rates of population modify the structure of population, increasing younger age categories (cf., Ehrlich and Liu, 2002). Younger populations in the presence of poverty in socioeconomic systems can be unable to achieve valued goals: the "blockage of goal-seeking behavior" (Agnew, 1985) is a source of frustration in society. Ehrlich and Liu (2002, p. 187) confirm that the vast majority of terrorists were young adult males: "Based on the information from the FBI's most wanted terrorist list. . . approximately 90% of those on the list were all males and from 22 to 34 years old when their first alleged terrorist act took place" (cf., Crenshaw, 1981, p. 384). Another possible effect of high growth rates of population is higher economic inequality in society (cf., Coccia, 2017; see also Tab. 3 here). The relationship between high growth rate of population, income inequality and terrorism can be explained with the sociological theory of "relative deprivation": inequality breeds social tensions and the less well-off individuals feel dispossessed when compared with wealthier people (Stack, 1984). Hsieh and Pugh (1993) argue that poverty and income inequality are an indicator of resource deprivation, which is associated with violent crime. Arthur (1991) finds in criminology that homicides can be explained with an individual's reaction to resource deprivation or material disadvantage that causes personal frustration and diffuse hostility (cf., Nettler, 1984, p. 229). Stolzenberg, Eitle and D'Alessio (2006) confirm that violence is based on economic deprivation that acts as a motivational factor in the manifestation of crime. Overall, economic inequality of countries, also driven by high growth rates of population, combined with poor economic resources in society, engenders resentment, hostility, frustration, which can be precipitating factors of terrorism and violence (cf., Blau & Blau, 1982). Messner and Golden (1992) claim that: " 'relative deprivation' . . . and that the inability of the disadvantaged to get a fair redistribution of resources, or more open access to wealth, generates anger and frustration, which ultimately leads to more crime" (as quoted by Stolzenberg et al., 2006, p. 304, original emphasis). As a matter of fact, high levels of population growth, in the presence of income inequality, induce feeling of disadvantage and unfairness that leads poor people to seek compensation and satisfaction by all means, including committing crimes against other individuals in society (Fajnzyblber et al., 2002, p. 2). According to Gilligan (2001), income inequality affects personality of people and generates disrespect and humiliation, which are amongst the most common triggers to violence and possibly to terrorism. In short, economic inequality and high population growth can generate negative social interactions, resource deprivation and low sense of control over one's life (Elgar & Aitken, 2010). These psychosocial risk factors may support terrorism in society.

Concluding observations

Terrorism and crime are alike (Rice, 2009) and are affected by demographic, socioeconomic and environmental features of particular locations (Cozens, 2008, p. 431). On the basis of the argument presented in this paper, we can therefore conclude that –in average- terrorism is also correlated to high growth rates of population, combined with poverty, high income inequality and political instability of countries, *ceteris paribus*. This theory here suggests main predictions: societies with low



growth rates of population, low income inequality, low relative deprivation, high standard of living and quality of life of young generations are not likely to produce a high effectiveness of terrorism. This study also predicts that current trend of high growth rates of population, associated with high income inequality and political instability in some societies (and communities) can continue to feed terrorism and terroristic threat for many years to come.

The results here can support fruitful insights for a policy of conflict resolution that ameliorates socioeconomic conditions of population, and indirectly reduces terrorism, such as programs of economic aid directed to eliminate income inequality and improve the standard of living and opportunities of young people in society (cf. Ackoff and Rovin, 2003; Ehrlich and Liu, 2002; Frey et al., 2003). The aim is to provide education and economic opportunity for young population to contrast the anti-modernization advocated by fundamentalists in society (cf., Krieger and Meierrieks, 2010, 2011). In particular, the rising economic prosperity of certain regions may help to lower high growth rates of population, which may be the *distal causes* of terrorism in society. In fact, Krieger and Meierrieks (2010, p. 902) confirm that social policies ameliorate short-run and long-run socioeconomic conditions of population (e.g., reduction of unemployment, poverty, inequality, and dissatisfaction), and indirectly can reduce relative deprivation of people and terrorism as a result. Fajnzylber et al. (2002) claim that economic growth and equal distribution of income reduce poverty, and the rate of poverty alleviation has a crime-reducing effect.

Overall, then, this study suggests that empirical and theoretical analyses should deeply investigate the effects of demographic factors on specific societies to understand *why* terrorism is happening in order to defuse the underlying principal causes. Findings of the study here can clarify whenever possible, one of the distal causes of terrorism that is the association between growth rate of population and lethality of terrorism. However, these conclusions are of course tentative, since we know that manifold factors causing terrorism are often not equal over time and space.

About the author

Mario Coccia is a social scientist at the National Research Council of Italy (CNR) and visiting scholar at Arizona State University (ASU). He has been research fellow at the Max Planck Institute of Economics and visiting professor at the Polytechnics of Torino and University of Piemonte Orientale (Italy). He has conducted research work at the Georgia Institute of Technology, Yale University, United Nations University-Maastricht Economic and Social Research Institute on Innovation and Technology (UNU-MERIT), RAND Corporation (Washington D.C.), University of Maryland (College Park), Bureau d'Économie Théorique et Appliquée (Strasbourg), Munk School of Global Affairs (University of Toronto), and Institute for Science and Technology Studies (University of Bielefeld). He leads CocciaLAB at ASU & CNR to investigate, with interdisciplinary scientific researches the determinants of socioeconomic phenomena, such as terrorism, war, crime, violence, new technology, evolution of scientific fields, economic growth, human progress, etc. He has written more than two hundred papers in several disciplines.

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