Journal of
Economics and Political Economy
www.kspjournals.org
Volume 5 March 2018 Issue 1

The relation between terrorism and high population growth

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Abstract. A fundamental problem in socioeconomic sciences is how to explain the root causes of terrorism. The literature has analyzed several determinants of terrorism. However, the precise role of demographic factors for the origin and evolution of terrorism in specific geoeconomic areas is hardly known. Results here show that high population growth seems to be basic for the source and evolution of terrorism. This study found that terrorism thrives, in average, in specific cultural zones with high growth rates of population combined with collective identity factors and low socioeconomic development. Overall, then, the main aim of this study is to clarify and generalize whenever possible, the demographic source of the terrorism and suggest appropriate socioeconomic policies to preempt this critical problem in society over the long run.
Keywords. Terrorism, Population growth, Fertility rate, Poverty, Middle East.
JEL. I30, I24, N35, Q56, Z12.

1. Introduction

This essay has two goals. The first is to show that one of root causes of terrorism is the high growth rate of population. The second is to stress the importance of appropriate policies of growth that ameliorate socioeconomic conditions of population and indirectly reduce terrorism. These topics are basic because terrorist activity is growing worldwide in the last decades with several incidents in the USA, European countries and other rich and/or developing nations and it is essential to understand *why* this is happening in order to defuse the underlying principal causes (Editorials Nature, 2015; Reardon, 2015; Norris *et al.*, 2013; Rosendorff & Sandler, 2005; Li & Schaub, 2004). In particular, Americans have been targeted in about 25 per cent of the terrorist incidents during the past 20 years (Linstone, 2003; *cf.* Park & Bali, 2015). Devezas & Santos (2006) argue, by fitting over 10,000 terrorist incidents since 1961 to a logistic growth curve, that the current period is only at the very low stage of development of international terrorism and that an inflection point will be reached at 2030s or thereabout. Several studies in literature endeavour to clarify the direct and indirect factors of terrorism (Newman, 2006; Abadie, 2005; Crenshaw, 1981), although predictors of terrorism are often unclear factors (Krueger & Malečková, 2009). Some sources of terrorism are explained with economic factors (Enders *et al.,* 2016), political factors (Coggins, 2015), social factors (Schaafsma & Williams, 2012), etc. However, *how* demographic factors in certain environments cause and sustain terrorism are hardly known. This study endeavors to explain some research questions: *What demographic and socio-economic factors have originated terrorism in specific geoeconomic areas? And Why?* The underlying problem of these research questions is to explain the root causes of the terrorism in society. The study here confronts this scientific problem trying to explain whenever

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possible, the source and development of terrorism in the geoeconomic regions considering critical demographic factors. Findings can clarify one of contributing factors of the origin and evolution of the terrorism in certain problematic environments. In addition, the results here can also support fruitful insights for a policy of resolution directed to reduce demographic and socioeconomic problems that lead to terrorism in selected geocultural zones over the long run. In order to position this analysis in the field of terrorist studies, next section begins by briefly reviewing the literature and then developing the theoretical framework of this contribution.

2. Theoretical framework

Crenshaw (1981) argues that terrorism was coined to describe the systematic inducement of fear and anxiety to control and direct a civilian population: **"**Terrorism is an attractive strategy to groups of different ideological persuasions who challenge a nation's authority. …to dramatize a cause… to gain popular support, to provoke regime violence, to inspire followers" (Crenshaw, 1981, p. 389). Ackoff & Rovin (2003) claim that terrorism, "a special type of fundamentalism", is "violence against innocent" and "is a response to an environment that is undergoing an accelerating rate of change and rapidly increasing complexity". Terrorism can be described by four characteristics: violence, non-combatant targets, a desire for power, and the need to attract attention, send a message, or provoke an extreme response (Linstone, 2003). Coates (1996) claims that a terrorist threat exists when, there must be an issue, there must be some group organized and with a purpose related to that issue and the terrorist group must have the technical skills to carry out a terrorist action for a political purpose. Linstone (2007) argues of a current wave of terrorism, from 1970s to 2020s, based on "religious"– and claims that terrorism is a form of warfare that violates the conventions of conduct developed in wars between states, where warfare is conducted between uniformed armed forces only and people stay out of the way except for providing money and manpower (*cf.* Rapoport, 2004; Ball, 2005; Schuurman & Horgan, 2016; Desouza *et al.,* 2007).

Crenshaw (1981) also suggests that an appropriate theoretical framework to analyse the settings of terrorism should separate between preconditions (factors that set the stage for terrorism over the long run) and precipitants (specific events that precede the occurrence of terrorism). Some preconditions of terrorism are economic factors such as low income, poverty, inequality, etc. (Newman, 2006; Ezcurra & Palacios, 2016; Coccia, 2017e). Ackoff & Rovin (2003) argue that the "countries that are the breeding grounds for terrorists are the least advanced economically". Moreover, Enders *et al.,* (2016) observe that domestic and transnational terrorist attacks are more concentrated in middle-income countries/areas and the point of concentration is shifted to lower income countries after the rising influence of the religious fundamentalist. Some studies show that poverty and large numbers of young men facing dim economic prospects, also are likely contributors to terrorism (Ehrlich & Liu, 2002). Other studies of terrorism analyse the political factors, such as government repression, human rights violation, state failure, etc. (Coggins, 2015; Abadie, 2005; Krieger & Meierrieks, 2011). Causes of terrorism are also due to social factors, such as low levels of education and of human development, etc. (van Berger *et al.,* 2015; Burgoon, 2006). Schaafsma & Williams (2012) argue that social exclusion and rejection among ethnic minority and majority members lead to increased intergroup hostility and stronger fundamentalist religious beliefs. Choma *et al.,* (2016) posit that: "religious fundamentalism, or the belief that there is one true religious teaching to abide by, is associated with intolerance toward outgroups", whereas Schuurman & Horgan (2016, p. 90) claim that: " 'radicalization' … is … a cognitive process, i.e., … the adoption of increasingly radical and extremist convictions … leading up to involvement in terrorism". In general, the religious fundamentalism has the capacity to disrupt the stability of societies/communities and to generate violence

and terrorism (Butler, 2015). Although several studies about the causes of terrorism, current theoretical frameworks are not comprehensive approaches because it is clear that there are at least some factors about terrorism that the current literature has trouble explaining. Next section presents the theoretical framework of this study that endeavors to investigate and explain, whenever possible *how* the interplay between demographic and socioeconomic factors of specific geoeconomic areas can influence the evolution of terrorism over the long run.

3. Theoretical grounding and working hypothesis

Piazza (2006) argues that a popular hypothesis is that terrorism and other forms of political violence are due to poverty and poor distribution of economic resources. The UN General Assembly also claimed that the crisis of international terrorism can be due to the issues of poverty, inequality, underdevelopment and the absence of social justice in the developing world (United Nations, 2016; Coccia, 2017e). This general "rooted-in-poverty hypothesis" explains the terrorism as "expression of socioeconomic discontent and desperation" (Piazza, 2006). In fact, terrorist organizations can use poor socioeconomic conditions of geoeconomic areas as a base to support their criminal activities (cf., Krieger & Meierrieks, 2010; Enders & Hoover, 2012). Moreover, low levels of economic and social development increase the appeal of political extremism and encourage political violence and instability in society (Piazza, 2006). Many studies confirm that low income and high inequality are conducive to violent crime (Christens & Speer, 2005; Cahill & Mulligan, 2003; cf., Muller & Seligson 1987, 1990; Blomberg *et al.,* 2004a, 2004b; Coccia, 2017e). However, Piazza (2006) analyses this hypothesis that poverty, inequality, and poor economic development are root causes of terrorism and shows 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 critical for understanding the relation between different socioeconomic environments and terrorist activity (Parsons, 1991). In general, scholars show that the high population density and population growth can lead to resource scarcity and violence (Christens & Speer, 2005; Lee, 2016; cf., Christian, 1961). The theoretical background of these studies is the theory of Malthus (1817[1798]) presented in the book *An Essay on the Principle of Population* where T. R. Malthus wrote that the population has geometric growth rates, while the food resources have arithmetic (*lower*) growth rates. This disproportionate growth rate between population and subsistence food decreases natural resources and space for people and creates a looming crisis and environmental conflicts. Malthus (1817[1798]) was the first scholar to analyse the socioeconomic problems of high growth rates of population that generate scarcity of resources and are a "future cause of strife" (Lee, 2016). Several scholars are current proponents of neo-Malthusian approaches in different research fields to explain economic phenomena and social issues, such as Ehrlich (1968) that foretold a coming crisis from overpopulation and limited resources (Meadows *et al.,* 2004; cf., Coccia, 2005, 2007, 2009d, 2012d, 2014c, 2017a). Kaplan (2000) argued a possible threat to the developed world due to population increase of poor countries that, as a consequence, may increase the violence. This research stream supports the thesis that high growth rates of population, combined with scarce environmental resources, can lead to conflicts and violence. Lee (2016) claims that: "Overt violence is site-specific with ties to local relationships and histories, but the larger process of material transformation and power relations plays a crucial role". Visaria (1989) 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 labor force (*cf.,* Keyfitz, 1993). Cassils (2004) argues

that the poorest geoeconomic 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. Abernethy (1993) confirmed these results adding that: "rapid population growth causes poverty.... fundamentalism and hate may become more likely when people's expected standard of living is slipping away, beyond control… religious fundamentalism and violence appear together ... to thrive alongside the spread of poverty and unemployment". Lemsine (1992), for instance, argued that in Algeria, the inequality between rich and poor is rapidly increasing, and religious fundamentalism as well. In short, the mismanagement of this equilibrium population-natural and economic resources in specific regions can cause problems of violence that revolve around issues of power rather than around issues of absolute scarcity of resources (Peluso & Watts, 2001). In fact, overpopulation, socioeconomic growth and security have several interconnections and overpopulation can be a main factor of growing insecurity worldwide (Cassils, 2004). Linstone (2003, p. 288, original emphasis) 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. ….The billions of frustrated and angry individuals will constitute a vast pool of potential 'true believers' eager to find release in terrorism". Ehrlich & Liu (2002) also 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. And large numbers of unemployed, disaffected young men, who see the West as their enemy, provide the cannon fodder for terrorism.

Moreover, Krieger & Meierrieks (2010) claimed that terrorism as a random event is more likely in a larger country: "Terrorism is also positively linked to larger populations, but this may simply indicate that terrorism is more likely in more populous countries". In general, population growth in specific geoeconomic zones may contribute to support deteriorated human behaviour in society and, as a consequence, violent crime and terrorism (cf., Curtis, 1975; Altman, 1978). Animal studies also show that a high number of subjects in a limited space may generate environments aversive and related deteriorated behaviour (Hebb, 1958 as quoted by Cassils, 2004). In addition, people from countries with poverty, overpopulation and on-going conflicts tend to migrate towards more prosperous areas alike of the current human flow from the Middle East and Africa to Western Europe (White, 2016). This mass migration is a phenomenon closely associated with the expansion of human population from poor to rich geographical areas and is a characteristic of the history of humanity that if food becomes scarce in one region, population migrates towards regions of greater abundance (*cf.,* hunter-gatherer approach, *see* Bowles, 2009). The mass migration, because of high population in specific geoeconomic regions, can also generate socioeconomic and security problems throughout wide areas of the globe.

Hence, population growth contributes to congestion the overexploitation of resources and space, thereby reducing the freedoms of individuals. The forecasted high growth rates of population, mainly in poor and unstable geoeconomic regions, can increase socioeconomic problems and possibly give rise to more violence and terrorism (Cassils, 2004).

Although many studies about socioeconomic causes of terrorism, *how* population growth influences the emergence of terrorism is hardly known. In fact, among the literature of terrorism, convincing arguments that explain the relationship between demographic factor and terrorism are scarce. In particular, many studies do not explain the precise effect of population growth on terrorism, and a number of important factors linked to terrorism and population in specific environments has been largely ignored, such as age composition of population, religious fractionalization, political stability of countries, etc. The study here has the goal of clarifying, as far as possible, *how* demographic factors can support the

source and evolution of terrorism over the long run. This theoretical framework discussed above suggests a main relation between population growth, environmental aversion and terrorism that can lay the theoretical foundations to posit and explore the following hypothesis of terrorism driven by population growth. This hypothesis can clarify the problem of the root causes of terrorism underlying the research questions stated in the introduction of the paper.

Suppose that:

a) Middle East is a cultural zone with high population growth

b) Terrorism is a specific and distinct type of violent crime

The hypothesis, based on these assumptions, is as follows:

Hypothesis of terrorism driven by population growth:

High growth rates of population, in certain environments, cause and sustain the source and evolution of terrorism, *ceteris paribus*.

Figure 1 shows the model of this study, underlying the hypothesis, of how the high population growth can influence the terroristic activity. Specifically, the high growth rates of population, combined with socioeconomic stressors of specific areas (1st round rectangle at left in fig. 1), generate aversive environments and cultural deviance (central dashed rectangle), and terrorism as a result (small rectangle at right in fig. 1).

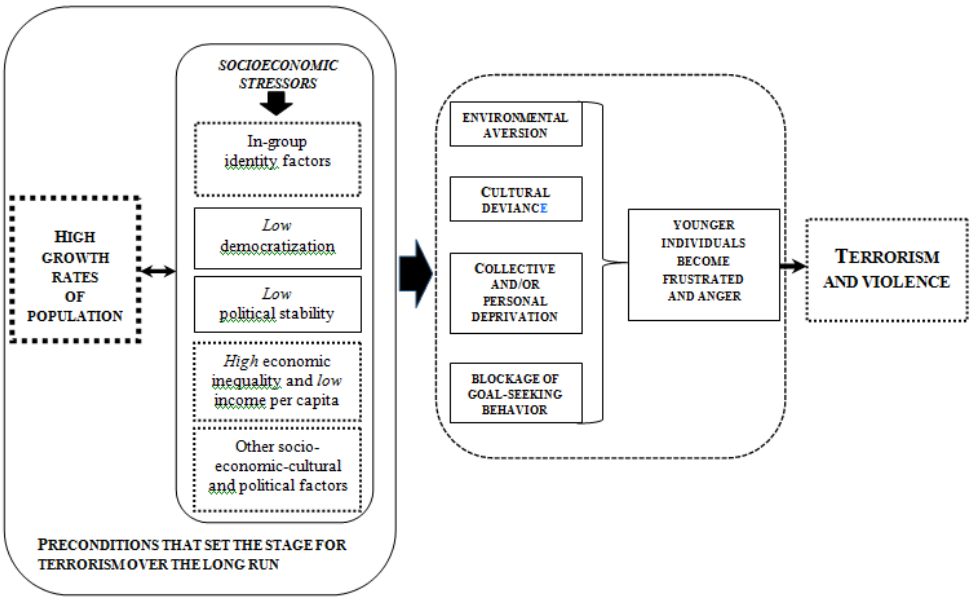

Figure 1. *Model from problematic socio-demographic factors to terrorism in selected geoeconomic areas. Note: The high growth rate of population can also explain the source of terrorism in some areas of countries with an enclave of immigrants, environmental aversion, connectedness to mainstream society and collective identity factors.*

The purpose of the present study is to see whether statistical evidence supports the hypothesis that the source and evolution of terrorism in specific geoeconomic areas can be explained by the high level of population growth over time. The research design to substantiate the hypothesis is described in the next section.

4. Methods

Figure 1 shows the basic elements and connections of the model, underlying the hypothesis stated above, that will be validated with statistical evidence. The variables under study are in table 1. Sources of data are Democracy Cross-National Data by Norris (2015), World Development Indicators (World Bank, 2008) and Global Terrorism Database (START, 2015). In particular, the Global Terrorism Database (GTD) is an open-source database including information on terrorist

events and incidents around the world (more than 140,000 cases) from 1970 to 2014. This study divides the countries in three cultural zones considering some Regional categories of the dataset by Norris (2015): North America, Western Europe, and Middle East. This classification is used to analyse demographic and socioeconomic factors of these selected geoeconomic areas. The dataset by Norris (2015) does not include terrorist data and this study uses the Global Terrorism Database (START, 2015) to analyse the data of terrorist attacks, the number of total fatalities and non-fatal injuries for incidents across similar geoeconomic regions for creating a comparable framework of investigation: *i.e.,* North America, Western Europe, Middle East & North Africa (Appendix A shows the sample of countries). The preliminary statistical analysis is performed with descriptive statistics and bar graphs that represent arithmetic mean (or number of cases) of variables under study on *y*-axis and the geocultural zones above mentioned on *x*-axis. The main statistical analysis of this study compares the arithmetic means of some variables (*i.e.,* annual population growth rates 1975-2002 ⁄ 2002-2015 and total number of fatalities for terrorist incidents from 2002 to 2014) between selected cultural zones. In particular, the Independent Samples *T* Test (a parametric test) compares the arithmetic mean of variables just mentioned between two independent cultural zones (Middle East *vs.* North America or Western Europe) in order to determine whether there is statistical evidence that these arithmetic means are significantly different.

Table 1. *Variables, description and their sources*

Demographic indicators (United Nations Development Programme data, *cf.,* Norris, 2015):	
- Annual population growth rate 1975-2002 and 2002-2015	
- Total fertility rate per woman 1970-1975 and 2000-2005	
- Population ages 0-14 (% of total) 2006 (World Bank, 2008)	
Economic indicator (World Bank, 2008):	
- Gross Domestic Product (GDP) per capita, Purchasing Power Parity (PPP) 2006 international $	
- Income Gini coefficient 2002y: Measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.	
Sociopolitical indicators:	
- Human Development Index –HDI– (years 1990 and 2005) based on United Nations Development Programme data (*cf.,* Norris, 2015)	• The HDI is a composite index that measures the average achievement of human development: a long and healthy life (life expectancy at birth), the education (mean of years of schooling for adults aged 25 years) and the standard of living dimension based on gross national income per capita (UNDP, 2016).
- Freedom House Index of democratization standardized 2000 (Norris, 2015)	• It assigns ratings of political rights and civil liberties for each independent nation (electoral process, political pluralism and participation, and government functioning).
- Religious fractionalization 2002 based on Alesina *et al.* (2003) data (*cf.,* Norris, 2015)	• This index defined by Alesina *et al.,* (2003) uses the term "fractionalization" to represent the religious plurality of countries. Alesina *et al.,* (2003, pp. 158ff) compute the fractionalization as one minus Herfindahl index of religious group shares, and find that two randomly selected individuals from a population belong to different groups. The formula is: $FRACT_j = 1 - \sum_{i=1}^{N} s_{ij}^2$ where s_{ij} is the share of group *i* (i =1…N) in country *j*. It indicates a measure of fragmentation (heterogeneity) based on a broader classification of religious groups.
- Predominant religion across countries based on Central Intelligence Agency (CIA) Data (*cf.,* Norris, 2015)	• Predominant religion is computed by the number of current adherents based on a combination of census reports and population surveys that consider historically predominant religious cultures, those who actively 'practice' a particular religion, etc.
- Kaufmann political stability 2006 (*cf.,* Norris, 2015)	• 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.
Indicators of terrorist incidents for 2002-2014 period (Global Terrorism Database, START, 2015):	
- Number of total confirmed fatalities for the incident. This number includes all victims and attackers who died as a direct result of the incident	
- Number of confirmed non-fatal injuries to both perpetrators and victims	
- Number of terrorist incidents	

The null hypothesis (H_0) and alternative hypothesis (H_1) of the Independent Samples *T* test are given by:

H_0: $\mu_1 = \mu_2$ (*i.e.,* the arithmetic mean of the variable in the Middle East is equal to the arithmetic mean of the variable in North America or Western Europe)

H_1: $\mu_1 \neq \mu_2$ (*i.e.,* the arithmetic mean of the variable in the Middle East is *NOT* equal to the arithmetic mean of the variable in North America or Western Europe)

The expectation is to reject the H_0 in order to support the hypothesisstated above that the source of terrorism can be also explained by high growth rates of population. Statistical analyses are performed by using the Statistics Software SPSS® version 15.0.

5. Results

Understanding *where* terrorism happens can provide vital information to explaining *why* it happens. In particular, terrorism cannot be understood without having accurate knowledge of the environmental determinants (e.g., demographic, economic, geographic and social factors of areas) in which it occurs. First of all, terrorism here is considered a specific type of crime that leads to violence in society (Rice, 2009); a proxy of this violent crime is represented by number of fatalities and non-fatal injuries for incidents of terrorist attacks. Figure 1 and 2 show that Middle East has the highest number of confirmed fatalities and non-fatal injuries for terrorist incidents over 2002-2014 (Global Terrorism Database, START, 2015; *cf.* Haushofer *et al.,* 2010).

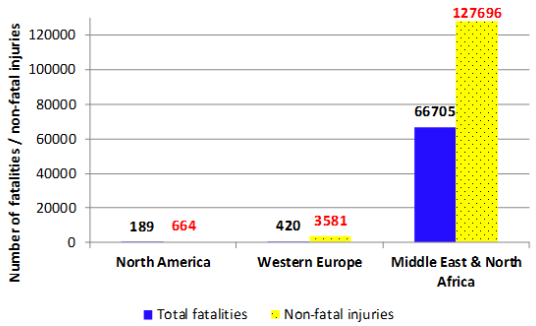

Figure 1. *Number of confirmed fatalities and non-fatal injuries for terrorist incidents across selected cultural zones over 2002-2014. Source: Global Terrorism Database (START, 2015).*

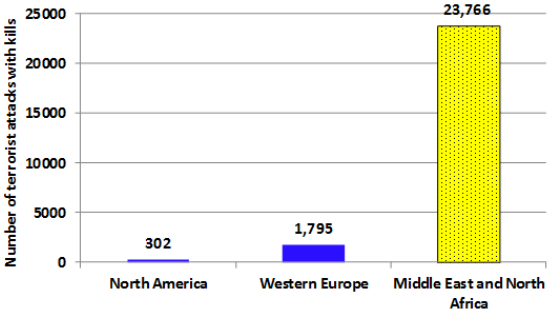

Figure 2. *Number of terrorist incidents with fatalities and non-fatal injuries across selected geoeconomic zones over 2002-2014. Source: Global Terrorism Database (START, 2015).*

The following statistical analyses may clarify the manifold demographic and socioeconomic factors behind the terrorism, whereas the discussion may explain the linkages of how specific geoeconomic factors cause and sustain terrorism over time.

5.1. Demographic dynamics and structure of population

Figure 3 shows the annual population growth rate in 1975-2002 and in 2002-2015 period considering three macro-regions: North America, Western Europe and Middle East. The cultural zones of Western countries had an average annual population growth rate of about 1.13% over 1975-2002 (1.37% in North America and 0.89% in Western Europe, respectively) *vs.* Middle East that had 3.1% (*i.e.,* +274% higher!). The period 2002-2015 confirms that Western countries had a low average annual population growth rate of about 0.76 per cent *vs.* Middle East with 1.98 per cent (+260 per cent higher!). Figure 4 supports the previous results considering the total fertility rate per woman over 1970-1975 and 2000-2005. The time lag of about 30 years represents the transition of one generation of people. In particular, from 1970 to 1975, data show that Western cultural zones had an average total fertility rate of about 3.4 per cent *vs.* Middle East cultural zone that had 6.2 per cent (+182 per cent higher), whereas over 2000-2005 the proportion is of about 1.94% *vs.* 3.14%, respectively (*i.e.,* +161 per cent higher in the Middle East cultural zone). Fargues (2000) showed that total fertility rate in Israel is under 3, while that of Palestinians in the Gaza strip is over 7. The effect of this trend on population ages 0-14 (per cent of total) is that Western Europe in 2006 had 16.66 per cent of young people (% of total), North America had 22.75 per cent, whereas Middle East had the highest value, 30.33 per cent of total. These results indicate a wide population structure of young in the geoeconomic region of the Middle East.

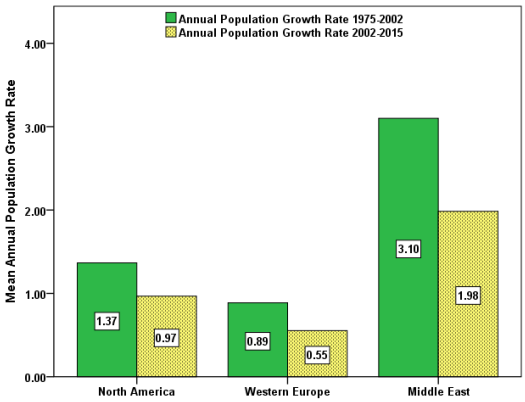

Figure 3. *Population growth rate from 1975 to 2015 per cultural zones*

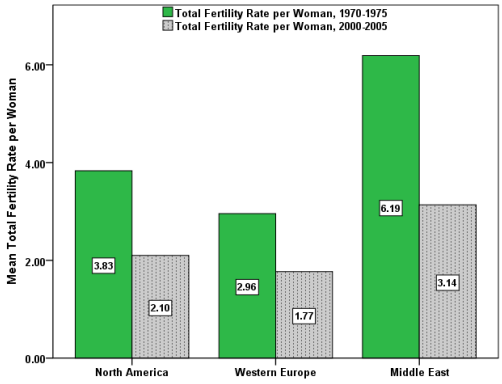

Figure 4. *Total fertility rate per cultural zones*

5.2. Socioeconomic factors

The socioeconomic factors of the geoeconomic areas under study are as follows. Freedom house index of democratization (2000) and Human Development Index – HDI- (in 1975 and 2005, *i.e.* after a generation of people) of the Middle East is lower than Western cultural zones (Table 2). In short, the Middle East area has high growth rates of population in a social environment with low democratization

and HDI that induce weak institutions, rules of law and economic governance. These problematic socioeconomic factors can negatively affect the patterns of economic growth over time. In fact, Table 2 shows that GDP per capita PPP 2006y of the Middle East was $2,748, whereas the average value in Western cultural zones was about $24,543 (+893% higher!). In addition, results also show that the Middle East has a high inequality distribution of the income among individuals (about 40 with a low standard deviation) and very low political stability (negative value –0.64) in comparison to Western geoeconomic zone (*see*, Tab. 2). Finally, the analysis of the predominant religion in the Middle East, with a dummy variable (0= not predominant; 1=predominant), shows that this geoeconomic and cultural zone has, of course, a predominant of Islam. An indicator connected to predominant religion is the religious fractionalization. Alesina *et al.* (2003, pp. 158, 173, 175) argue that: "religious fractionalization tends to be higher in more tolerant and free societies", and "The index of religious fractionalization bears a relationship to controlling corruption, preventing bureaucratic delays, tax compliance, transfers, infrastructure quality, lower illiteracy, school attainment, democracy, and political rights observed religious fragmentation is larger in more tolerant countries". The Middle East has also low religious fractionalization (*i.e.,* 0.26). These problematic factors can set the stage for terrorism over the long run. In fact, Ackoff & Rovin (2003) claim that inequality of the distribution of wealth, low opportunities for development and quality of life contribute to "the frustration and alienation that give rise to terrorism" (cf., Coccia, 2017e). A study for the Heritage Foundation in 2002 also argues that countries prone to terrorism are the least advantaged economically (Ackoff & Rovin, 2003, p. 146). To sum up, this statistical evidence seems to show that a high annual average of population growth (and a population structure of young) combined with problematic socioeconomic factors, especially poverty, low democratization, HDI and political stability may be *critical contribution factor of terrorism* (*cf.* Enrlich & Liu, 2002).

Table 2. *Descriptive statistics of some indicators across geoeconomic and cultural zones*

	North America	Western Europe	Middle East
Freedom House Stand. scale 100pts 2000y[(1)]	92.82 (12.37)	96.58 (4.37)	34.57 (18.48)
Human Development Index[(1)] (HDI) 1975y	0.80 (0.10)	0.81 (0.05)	0.58 (0.13)
Human Development Index[(1)] (HDI) 2005y	0.91 (0.07)	0.94 (0.02)	0.78 (0.10)
GDP per capita PPP in U$ 2006y[(2)]	$23,371 ($16,001.86)	$25,715 ($11,104.06)	$2,748 ($2.004.13)
Gini coefficient 2002y[(1)]	41.80 (10.84)	31.58 (2.91)	39.44 (2.26)
Kaufmann political stability[(1)] 2006y	0.28 (0.67)	0.89 (0.40)	–0.64 (1.02)
Religious fractionalization [(1)]2002y	0.57 (0.34)	0.35 (0.20)	0.26 (0.24)
Predominant Islam[(1)]*	0	0	1

***Source* (1):** Norris (2015); **(2):** World Bank (2008). *Note*: First number below the geoeconomic areas is the arithmetic mean; Standard Deviation (SD) is in round parenthesis. *Dummy: 1=predominant; 0=not predominant.

5.3. Comparison of arithmetic mean across cultural zones

Tables 2-3 show basic information (arithmetic mean and SD) about the geoeconomic areas under study. In general, Middle East has an arithmetic mean of annual population growth rate and number of fatalities from terrorist attacks higher than other geocultural zones (Figs 1-2 and Tab. 3). The statistical analysis of Independent Samples Test shows that the arithmetic mean of the annual population growth rate (1975-2002 and 2002-2014 period) for the Middle East *vs.* other geocultural zones is significantly different (the *t*-test for Equality of Means in Tab. 3 hasa $p<0.05$). The output of the *t*-test for Equality of Means, considering the variable of average number of fatalities from terrorist attacks, has$p< 0.01$, and then the statistical analysis here concludes that the average number of Fatalities from terrorist attacks of the Middle East *vs.* other geocultural areas is significantly different (*see* last rows of the Tab. 3). Overall then, the statistical evidence here seems in general to show the systematic differences of arithmetic mean between geoeconomic areas, and in particular, a significant high growth rates of population and number of fatalities for terrorism incidents in the Middle East in comparison to Western Europe and North America. These significant differences can be due to

systematic factors described here and summarized for the Middle East in figure 6. Overall, then, these results are consistent with the hypothesis stated above about the effect of high population growth on the source and evolution of terrorism.

Table 3. *Independent Samples Test of the Middle East vs. other cultural zones*

			Levene's Test for Equality of Variances		T-test for Equality of Means		
Annual population growth rate 1975-2002							*Sig.*
	Mean (SD)		*F*	*Sig.*	*t*	*df*	*(2-tailed)*
Middle East	3.1 (1.28)	Equal variances assumed	4.38	0.04	6.66	36	0.01
Western Europe	0.8 (0.8)	Equal variances not assumed			6.66	30.06	0.01
Middle East	3.1 (1.28)	Equal variances assumed	1.31	0.27	2.27	20	0.03
North America	1.4 (0.55)	Equal variances not assumed			4.00	6.37	0.01
Annual population growth rate 2002-2015							*Sig.*
	Mean (SD)		*F*	*Sig.*	*t*	*df*	*(2-tailed)*
Middle East	1.98 (0.73)	Equal variances assumed	0.67	0.42	5.88	32	0.01
Western Europe	0.55 (0.66)	Equal variances not assumed			5.95	31.34	0.01
Middle East	1.98 (0.73)	Equal variances assumed	2.90	0.10	2.34	20	0.03
North America	0.97 (0.25)	Equal variances not assumed			4.57	9.15	0.01
Total Number of Fatalities from terrorist attacks 2002-2014							*Sig.*
	Mean (SD)		*F*	*Sig.*	*t*	*df*	*(2-tailed)*
Middle East, NA[(a)]	2.81 (13.97)	Equal variances assumed	83.30	0.00	7.79	25559	0.01
Western Europe[(b)]	0.23 (3.07)	Equal variances not assumed			22.17	9937.47	0.01
Middle East, NA[(a)]	2.81 (13.97)	Equal variances assumed	9.404	0.002	2.71	24066	0.01
North America [(c)]	0.63 (2.57)	Equal variances not assumed			12.58	568.79	0.01

Note: Standard Deviation (SD) is in round parenthesis; NA is North Africa. (a)= N. 23 766; (b)= N. 1795; (c)= N. 302.

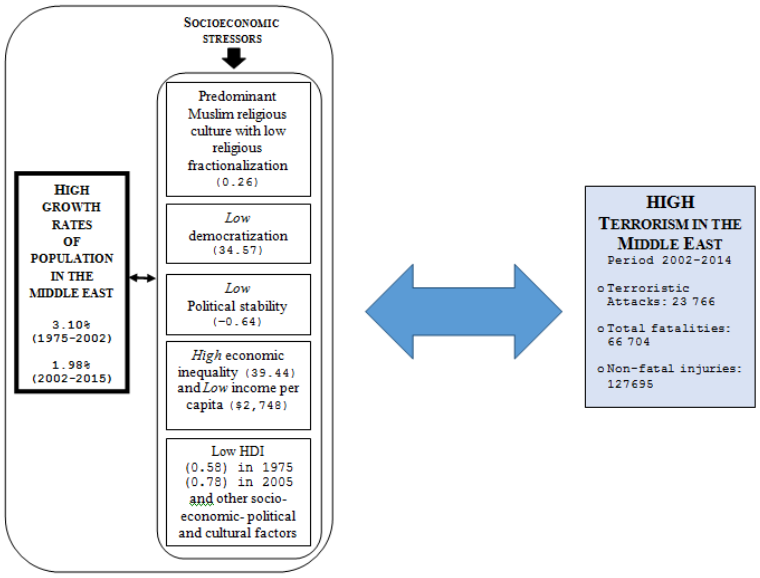

Figure 6. *Demographic and socioeconomic factors that set the stage for terrorism over the long run, ceteris paribus.Note: HDI=Human Development Index; Economic inequality is measured with Gini coefficient 2002y.*

6. Discussion

High growth rates of population as a precondition that sets the stage for terrorism over the long run

The statistical analysis shows that high growth rates of population in the Middle East can generate socioeconomic problems in society, but *why* and *how* high growth rates of population can originate terrorism in the Middle East?

We now move on to discuss and explain the relation between high growth rates of population in the Middle East and source of terrorism, trying, as far as possible, to clarify the problems mentioned.

High growth rates of population as an environmental stressor that induces violent crime and terrorism

Rice (2009) argues that: "similarities between terrorism and crime are … evident", then the socio-psychological research of crimes is well positioned to

frame environmental stressors that can support terrorism's psychological space (*cf.*, LaFree & Dugan, 2009). In general, high density of population has often been investigated as an environmental stressor since it is predicted to have a significant negative influence on social relations and psychological health (Baum & Paulus, 1991). Large numbers of people may lead to social overload and threaten regulation of human interaction (Altman, 1975; Baum & Koman, 1976; Desor, 1972; Laird, 1973; Baum *et al.,* 1982; Schulz-Gambard *et al.,* 1988; Valins & Baum, 1973). Animal studies also demonstrate large negative effects of high density in limited space (Christian, 1961; Calhoun, 1962; Thiessen & Rodgers, 1961). In particular, crime is strongly associated to disorganized and distressed areas with high population density, levels of economic deprivation and ethnic heterogeneity (*cf.* Christens & Speer, 2005; Cahill & Mulligan, 2003). Many studies indicate that a higher population density and a lower level of household income are associated with increased residential crime (Cahill & Mulligan, 2003). The positive correlation between higher population density and crime can be explained with the theory of association between density and poverty (Curtis, 1975). Especially, these environmental stressors, because of unfavorable socio-economic-demographic conditions in built or natural locations, can generate cultural deviance, behavioural and psychological health problems (Lepore *et al.,* 1991; Regoeczi, 2003). Sociological studies also consider the perspective that high density of population and crowding produce deteriorated human functioning that can lead to crime (Altman, 1978). Studies also reveal that frustration generated by high levels of population density will stimulate aggression in individuals (Mackintosh, *et al.,* 1975; Regoeczi, 2003). As a matter of fact, frustration seems to increase in response to decreasing environmental resources and space due to high population density (Altman, 1975; Baldassare, 1979; Verbrugge & Taylor, 1980). Hence, high density of population can generate areas with high levels of environmental aversion, which are conducive to high rates of crime (Cahill & Mulligan, 2003).

In addition, high growth rates of population modify the demographic structure of nations, increasing the younger age categories, which induce a psychological, cultural, social and economic change of nations. The age composition of populations, combined with poverty and other socio-economic factors, is in general a neglected factor for several terroristic studies (cf., Ehrlich & Liu, 2002). The nations (or areas) with young population can have high human resources and low economic resources (such as capital). These high growth rates of population increase the pressure on socioeconomic systems and out-migration of young people[1]. In fact, the increasing young individuals in the Middle East and/or enclaves in Western countries, combined with poverty, can be unable to achieve valuated goals and this is a source of frustration. This "blockage of goal-seeking behavior" (Agnew, 1985, *passim*), combined with intergroup hostility and in-group identity factors, may lead to radicalization path and fundamentalism of many young. These environments that are aversive and painful in specific areas of the Middle East can support violence and terrorism as a result (*cf.* van Bergen *et al.,* 2015). Ehrlich & Liu (2002, p. 187) argue 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". Moreover, many terrorists today are young, well-educated, and middle class in background also of advanced countries (Butler, 2015). These students or young professionals may be

1 These younger age categories in poor nations also support migration flows towards mature nations, such as the current trends from Middle East & Africa to Western Europe. This population dynamics may generate social problems in host countries in the presence of an enclave of immigrants and descents that makes assimilation less likely to occur (*cf.* Barreira da Silva Rocha, 2013). This factor can generate in the long run an import terrorism, such as the enclave of Muslim population in suburbs of Brussels that were the headquarters of terrorists responsible of attacks at Paris - 13 November 2015 -and Brussels - 22 March 2016.

disillusioned with the prospects of changing society and see little chance of access to the system despite their privileged status (Crenshaw, 1981).

In general, the prevalence of young population in poor socioeconomic environments can induce collective and/or personal deprivation that, in the presence of in-group identity factors, is conducive to frustrated, angry and violent individuals (*cf.* van Bergen *et al.,* 2015). This social process can turn to interethnic tensions, religious fundamentalism and terroristic activity as a result both in the Middle East and in selected areas of Western world (*cf.* Schaafsma & Williams, 2012; Choma *et al.,* 2016). In short, high growth rates of population are basic to reinforce, in aversive environments with intergroup hostility, the common identities (based on similar religious and cultural traditions) and fundamentalist drive (*cf.* van Bergen *et al.,* 2015). Choma *et al.* (2016) confirm that religious identification and intergroup disgust sensitivity may lead to relevant interfaith prejudices.

Hence, high population density and poor socioeconomic conditions of specific areas create environmental stressors and aversion that can induce violent crime and terrorism (Christens & Speer, 2005; Regoeczi, 2003; Cahill & Mulligan, 2003; Rice, 2009; LaFree & Dugan, 2009). In particular, the presence of problematic environments and in-group identity factors among people may drag the increasing young individuals into a collective/individual deviance and in turn to the terrorism, which is a "special type of fundamentalism" (Ackoff & Rovin, 2003). In fact, the aversive environments are the source of social frustration and anger that may radicalize cultural tradition of many young individuals and induce to violence/terrorism (Rice, 2009). These psychological and social processes of cultural deviance, in the Middle East and/or Wester countries with enclaves of immigrants and descents, seem to be primarily due to high growth rates of population in aversive environments.

Overall, then, the statistical evidence and discussion of this study seem in general to be consistent with the hypothesis that the source of terrorism can be explained by the high growth rates of population in the Middle East cultural zone, combined with socioeconomic poverty, political instability, economic inequality and in-group identity, that generate environmental aversion, frustration and violence as a result.

7. Conclusion

Terrorism and crime are alike (Rice, 2009) and affected by demographic, socioeconomic and environmental features of particular locations (Cozens, 2008; National Institute of Justice, 1996). The scientific research shows that manifold factors affect the terrorism (Crenshaw, 1981; Enders *et al.,* 2016; Coggins, 2015; Schaafsma & Williams, 2012). On the basis of the argument presented in this paper, we can therefore conclude that one of principal sources of terrorism and its evolution over time is due to high growth rates of population in the Middle East, combined with poverty, political instability and in-group identity, *ceteris paribus.* As a matter of fact, the support/defense of religion is an illusory cause of terrorism, because religion is not an environmental stressor *per se,* whereas a basic determinant of terrorism may be a critical demographic mass that, in certain environments with problematic socioeconomic factors, leads to disrupt the stability of societies/communities, frustration, anger, radicalization paths and terrorism as a result (*cf.* Butler, 2015). The findings here can clarify, as far as possible, some important features of the origin and evolution of terrorism, such as:

(1) The conceptual framework assigns a central role to high growth rate of population and structure of population, which is a causal factor neglected by certain of the dominant approaches to explain the general causes of terrorism;

(2) The conceptual framework here is also able to explain how and why terrorism thrives in certain environments by linking demographic factors to environmental aversion of regions. In particular, the terrorism can be due to high

growth rates of population that can generate cultural deviance, frustration and anger of young individuals;

(4) Societies with low growth rates of population, high standard of living, quality of life and multiple opportunities for advancement of young generations are not likely to produce terrorism.

(5) One future scenario, based on this study, might be that current trend of high growth rates of population in selected societies (and communities) can continue to feed terrorism and terroristic threat for many years to come.

Since terrorism arises out of an inability to cope effectively with aversive environments, there is a clear need to focus on a long-run strategy of diplomacy and carefully economic aid for a conflict dissolution of this critical problem in society: "means to redesign either the society that has the problem or its environment in such way as to eliminate the problems or the conditions that caused it" (Ackoff & Rovin, 2003)[2] Currently, the war against terrorism has short-term objectives, such as to reduce the incidence of terrorism by deterrence policy, imposing sanctions on actual and presumptive terrorist countries, cut off their financing, etc. Ackoff & Rovin (2003) argue that: "containment and isolation of terrorists have not been particularly effective because they do not weaken the terrorists' beliefs …sanctions imposed on such societies do not reduce their resolve". The preventive actions[3]– to neutralize or incapacitate terrorists in the presence of effective and/or potential threats – also raise serious issues. Other counter-terrorism strategies remove regimes that sponsor terrorists and/or apply military actions. However, "military means to preempt the terrorists or root them out can reduce, but not eliminate, the terrorist threat. Indeed, it may actually increase it by radicalizing many young and destabilizing moderate secular Muslim governments" (Linstone, 2003). In effect, these strategies may actually induce terrorism and trigger the criminal activity of non-state organizations of terrorism (*cf.* Editorials Nature, 2015)[4].

Considering the problematic demographic and socioeconomic factors of the Middle East discussed here, a policy of conflict resolution to reduce the terrorism from nations that are its principal sources requires a program of economic aid to eliminate inequality of quality of life, standard of living, and opportunities in society (*cf.* Ehrlich & Liu, 2002; Ackoff & Rovin, 2003; Frey *et al.,* 2003; Coccia, 2012d). The aim is to provide education and economic opportunity for the young population to contrast the anti-modernization advocated by the fundamentalists (*cf.* Krieger & Meierrieks, 2010). This political economy can support wealth, wellbeing and goal-seeking behavior of people in populated regions and can reduce environmental aversion and, likely, one of principal sources of terrorism (*cf.*, Agnew, 1985, Rice, 2009). Hence, the rising economic prosperity of certain environments would effectively counter the fundamentalist drive and, in the long

[2] For Ackoff & Rovin (2003, p. 9, original Italics and emphasis) "problems can be treated in four different ways - absolution, resolution, solution and dissolution -and these form a hierarchy, meaning that each is less effective, in general, than the one that follows it. *Absolution* means to ignore a problem and hope it will solve itself...*Resolution* means to employ behaviour used in similar situations, adapted if necessary, so as to obtain an outcome that is good enough … it is the approach to problems most commonly used by those who govern and those who manage public processes....*Solution*, means to discover or create behaviour that yield the best, or approximately the best, possible outcome, one that "optimizes." Problem solving usually involves research, often using experimentation, quantitative analysis, and uncommon sense. Moreover, solutions generally do not exist in isolation from other problems. Solutions obtained to problems isolated from the other problems with which they interact generally produce one or more new problems ...*Dissolution* [see above in the text].

3 Preventive action differs from pre-emptive action: the latter is a response to a clearly impending strike, whereas the former is a response to an attack feared at some time in the future (e.g., pinpoint military strikes, isolation of crazy states by diplomatic action, support of moderate religious opposition groups and Muslim communities for the purpose of counter-radicalization and counter-terrorism, *cf.* Linstone, 2003).

4 For instance, Haushofer *et al.,* (2010) argue that: "Israeli military actions against Palestinians lead to escalation rather than incapacitation".

run, may help to lower the fertility rates and related causes of terrorism in society. In fact, Krieger & Meierrieks (2010, p. 902) confirm that social policies ameliorate poor short-run and long-run socioeconomic conditions of population (e.g., unemployment, poverty, inequality, and dissatisfaction), and indirectly reduce terrorism. In short, domestic, transnational and international terrorism may also be fought by higher social spending in developmental programs and more generous welfare regimes in aversive environments with high growth rates of population and socioeconomic problems. As a matter of fact, these developmental programs, to support education and economic opportunity in selected societies, can help to raise economic prosperity and human development. The socio-economic progress and high wellbeing may help both to lower short-run sources of collective deviance and frustration in society, and to lower fertility rates, inequality and poverty that set the long-run stage for terrorism.

Terrorism is expected to increase in the future, though investment in R&D and research labs, technology transfer, improved enforcement technologies and possible rising economic growth. Possible reasons can be also due to other factors such as the possible increase of income inequality, population growth, public debt, recessions and economic turmoil, migration flows, global warming, socioeconomic tensions in geo-economic areas, etc. (cf., Coccia, 2004, 2005, 2005a, 2006, 2007, 2008, 2008a, 2008b, 2008c, 2009, 2009c, 2009d, 2010, 2010a, 2010b, 2010c, 2010d, 2011, 2012d, 2013a, 2014b, 2014c, 2014d, 2014e, 2015a, 2015b, 2016, 2016a, 2016b, 2016c, 2017, 2017a)[5].

Overall, then, terrorism is due to manifold and complex factors, mainly linked to the question of what human beings truly need and how they seek to address and satisfy real needs. The findings of the study here, although they are contest-dependent over time and space, can clarify whenever possible, one of principal sources of terrorism and its evolution worldwide. This study does not focus on causes of specific attacks of individual terrorists in Western countries that can be due to personal frustration, imitative behavior and other socioeconomic – psychological factors that deserve to be investigated in other studies. Moreover, the study here to analysis did not permit some intervening variables that may have been useful in providing a deeper and richer explanation of these social phenomena of interests. To exploring the general implications of this study, future research should explore (and measure) how the frustration and alienation of high levels of population density and other socioeconomic factors in specific societies/communities stimulate cultural deviance, radicalization paths and terrorism both in Eastern and in Western countries.

To conclude, the results of this study are of course tentative, since we know that several factors causing terrorism are often not equal over time and space. This study here focuses on specific demographic root causes of terrorism that are clearly important but not sufficient to understand the comprehensive reasons for and the general implications of international terrorism in modern society.

Appendix: Countries

North America: Canada, Mexico, United States.

Western Europe: Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Vatican City, Germany.

[5] Cf. also Calabrese *et al.,* 2005; Cariola & Coccia, 2004; Cavallo *et al.,* 2014, 2014a, 2015; Coccia, 2001, 2003, 2004, 2005, 2005a, 2005b, 2005c, 2006, 2006a, 2007, 2008, 2008a, 2008b, 2009, 2009a, 2010, 2010a, 2010b, 2010c, 2010d, 2010e, 2011, 2012, 2012a, 2012b, 2012c, 2012d, 2013, 2013a, 2014, 2014a, 2014b, 2014c, 2014d, 2014e, 2014f, 2014g, 2015, 2015a, 2015b, 2015c, 2015d, 2016, 2016a, 2016b, 2016c, 2017, 2017a, 2017b, 2017c, 2017d, 2018, Coccia & Bozeman, 2016; Coccia & Finardi, 2012, 2013; Coccia & Wang, 2015, 2016; Coccia & Cadario, 2014; Coccia *et al.,* 2015, 2012, Coccia & Rolfo, 2000, 2002, 2009, 2012, 2007, 2010, 2010, 2013; Coccia & Wang, 2015, 2016; Rolfo & Coccia, 2005.

Middle East & North Africa: Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, North Yemen, Qatar, Saudi Arabia, South Yemen, Syria, Tunisia, Turkey, United Arab Emirates, Gaza Strip, Western Sahara, Yemen.

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