



# Impact of the Tunisian Revolution on homicide and suicide rates in Tunisia

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## Abstract

**Objectives** To analyze the impact of the Tunisian Revolution on suicide and homicide patterns in Tunisia.

**Methods** It is a retrospective, cross-sectional study, including all the cases of homicides and suicides that occurred during an 8-year period (2007–2014) in Northern Tunisia. We compared data before and after the revolution.

**Results** After the revolution, the number of suicides rose 1.7 times, with a prevalence rising from 1.8 to 3.12 suicides per 100,000 persons per year. Homicides rose 1.3 times after the revolution. For both manner of death, victims were mostly males, aged between 20 and 39 years, living in urban areas. Hanging and self-immolation rose, respectively, 1.8 and 3 times after 2011. We observed suicide cases most frequently occurred in public places and in front of public administration after 2011. Homicide victims' profile and circumstances showed a single variation which is an increase in number of cases happening in rural areas.

**Conclusions** Our results proved a short-term impact of the transition period on homicides and suicides. Urgent preventive measures are needed especially to decrease the suicide rates.

**Keywords** Suicide · Homicide · Tunisian revolution · Media · Unemployment

## Introduction

The Tunisian Revolution also known as the Jasmine Revolution, initiated what was called later the “Arab spring”. It was the starting point of one of the most important political and social changes in the second decade of this century in the Arab region, with consequences perceived globally.

The popular demonstrations started after December 17th 2010, when Mohamed Bouazizi, a common Tunisian unemployed young man, self-immolated in a public place. This suicidal act was promoted as the symbol of the fights for social equity and a response to humiliation (Lim 2013). After January 14th 2011, date of the fall of the regime, Bouazizi was glorified and gained an important posthumous social prestige. His suicide was “over”-mediatized by national and international media as a synonym of freedom of speech (Zarghami 2012).

In the 4 years after 2011, Tunisia lived a transition phase marked by a democratization of the policies and institutions and more autonomy of the population. During this period, individuals and media acquired tangible freedom of speech. The media have been liberated from government control and started to speak freely about many forbidden subjects under the old regime such as suicide acts.

On the other hand, during this same period, rapid social changes were installed with a rise in the unemployment rates especially in rural areas with an unemployment rate rising from 13 % in 2010 to 15.2 % in 2015 (National Institute of Statistics 2015).

Several studies reported evidence of the rise of violent death especially suicides and homicides in similar historical events. Higher rates of suicides were observed after the 2008 global economic crisis in North and South American,

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European and Asian countries as well as Mauritius in Africa. Unemployment and economic difficulties were identified as being the main factors explaining this change of suicide pattern (Barr et al. 2012; Chang et al. 2013; Chan et al. 2014; Coope et al. 2014; Phillips and Nugent 2014; Branas et al. 2015; Fountoulakis et al. 2015; Rachiotis et al. 2015).

However, data related to homicide in similar circumstances are controversial. The majority of studies reported a rise in homicides rates after economic crisis and social rapid changes such as in Eastern Europe after the fall of the Soviet Union (Leon et al. 1997; Men et al. 2003). Similar observations were also reported in Latin America and Asia in the last years of the 1990s (Falagas et al. 2009), as well as in European countries after the 2008 global economic crisis (Horváth et al. 2012; Michas et al. 2013). Nevertheless, some studies analyzing the impact of the 1990s economic recession in Asia reported a rise of suicides associated to constant homicide rates (Kim et al. 2004; Afroz et al. 2012).

It has been widely assumed that both suicide and homicide rates increased after the revolution. Such hypothesis was supported for suicide cases by an imitation phenomenon triggered by the excessive media coverage of Bouazizi's self-immolation associated to economic difficulties that can also explain an eventual rise in homicide rates.

The aim of our study was to analyze the impact of the Tunisian Revolution on suicide and homicide patterns in Tunisia, in order to identify the persons at risk and to adapt specific preventive measures.

## Methods

### Study design and data collection

We conducted a retrospective, descriptive and cross-sectional study, over a period of 8 years (January 2007–December 2014). Our study was conducted in the Legal Medicine Department of the Charles Nicolle Hospital situated in Tunis the capital of Tunisia, which performs forensic autopsies (around 1700 per year) of corpses from almost all the northern part of Tunisia (10 out of 24 districts of Tunisia, about 42 % of the total population (4.6 million)) (National Institute of Statistics 2015). The prevalence of suicides and homicides was calculated by dividing the cases number by the absolute mean of inhabitants in these districts (national censuses conducted in 2004 and 2014) (National Institute of Statistics 2015). Urban and rural areas were considered following the classification of the national institute of statistics.

We included all the cases of suicide and common law homicide examined during the study period.

We have excluded the cases of death following a police assault during the revolution events as well as death occurring during terrorist attacks. These cases were considered secondary to exceptional events and do not respond to the same motives of common law homicides. Including these cases would bias the results and the conclusions.

Data were collected from medical and hospital records, the deceased relatives' commemoratives, police minutes and autopsy reports. Data related to marital status, the mental disease history and occupation were missing in 17.5 to 20 % of cases.

## Results

### Description of the population

During the study period, a total of 13,713 autopsies were performed in our department, comprising 904 suicides and 509 homicides.

The number of suicides rose 1.7 times after the revolution (26 %), with 63 % of cases (334 cases) occurring between 2011 and 2014 versus 37 % (570 cases) before 2011 ( $p < 0.001$ ). The prevalence of suicide among the general population of Northern Tunisia passed from 1.8 to 3.12 per 100,000 person per year.

Homicides rose only 1.3 times after the revolution with 57.9 % of the cases (296 cases) occurring after 2011. The prevalence of homicides among the general population of Northern Tunisia was 1.17 per 100,000 persons per year before 2011 and 1.61 per 100,000 persons per year after 2011.

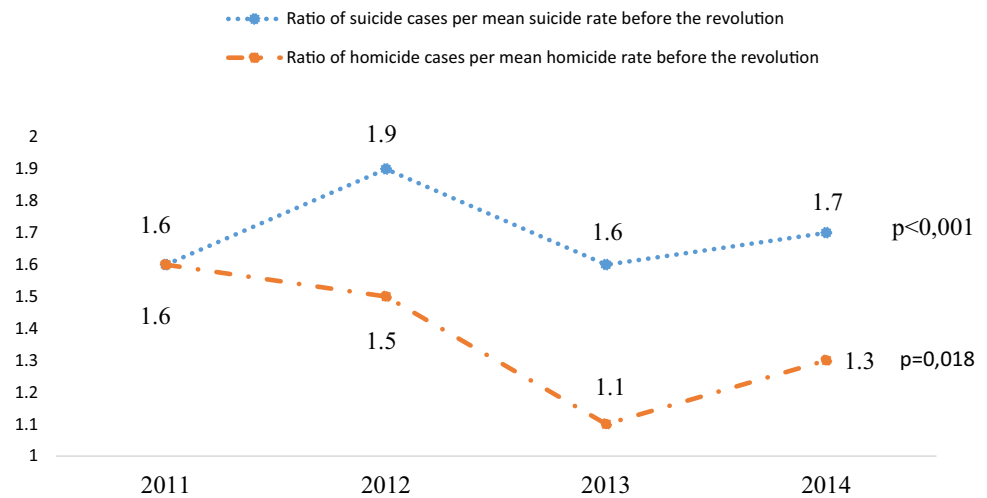
The distribution of the cases over the years showed a significant rise of suicides during the 2 years following the revolution, a slight drop between 2012 and 2013 and a second rise after 2013 ( $p < 0.001$ ). However, the same figure showed a significant rise of homicides during the first 2 years with a decline to more usual rates after 2012 ( $p = 0.018$ ) (Fig. 1).

Most of the victims were aged between 20 and 39 years (47.7 % of suicides and 51.3 % of homicides). However, in both cases, the number of victims aged between 20 and 29 years were frequently observed before 2011 after which, victims were mostly aged between 30 and 39 years (Table 1).

The sex ratio was 2.6 in suicides and 4.2 in homicides equally before and after 2011.

There was no variation in the distribution of marital status with victims most frequently single or married (51.6 % of suicides and 43.9 % of homicides).

**Fig. 1** Changes in suicide ratios and homicides ratios after Tunisian Revolution (Tunisia 2007–2014)



Medical and surgical history did not show any particular variation. However, a known history of mental disease among victims of suicide was most frequently observed after 2011 (40 % before the revolution versus 48 % after the revolution;  $p = 0.012$ ). Among suicide victims, schizophrenia and nervous depression were the most frequent mental disease observed (respectively, 40.3 and 25 %). There was no variation of mental disease history among homicide victims (18 % before 2011 versus 20 % after 2011;  $p = 0.541$ ).

Most of victims were unemployed or laborers (81.5 %). However, the number of unemployed rose significantly among suicide victims (53.1 % before 2011 versus 64.9 % after 2011;  $p = 0.027$ ).

We observed a significant rise in homicide victims from rural areas after the revolution (29.4 % before 2011 versus 37.4 % after 2011;  $p = 0.037$ ).

Among homicide victims, a history of imprisonment was most frequently observed before the revolution (56.6 % before 2011 versus 43.3 % after 2011;  $p = 0.006$ ).

In suicide cases, a history of suicide attempt was observed in 19.2 % of cases before the revolution and 21.1 % of cases after the revolution ( $p = 0.277$ ). The median number of suicide attempt was one (mean number  $1.72 \pm 1.34$ , maximum 10 to minimum 0). The mean number of attempts decreased significantly after 2011 ( $1.98 \pm 0.235$  attempt before 2011 versus  $1.45 \pm 0.10$  after;  $p = 0.034$ ). The frequency of suicide threats was similar before 2011 (18.9 %) and after (18.1 %) ( $p = 0.425$ ).

#### Circumstances of death

Homicides were perpetrated in public places or private houses (83.2 % of homicides) Sharp force and blunt trauma

were the most frequent homicide types observed (76.2 % of homicides) with no variation after 2011.

Most of the suicides were perpetrated in private houses before and after 2011. Yet, suicides occurring in public places or in front of public administrations (police station, mayors, courts, etc.) were most frequently observed after the revolution (respectively, 15 and 1.8 % before 2011 versus 22.2 and 3.8 % of cases after 2011;  $p = 0.05$ ).

Suicide methods varied also significantly after the revolution. Self-immolation cases tripled after 2011 with a persistent rise over the 4 years becoming the second suicide method instead of intoxication. Suicides by hanging were also multiplied by 1.8 times. Voluntary intoxication became the third suicide method in spite of a slight rise of the number of cases (73 cases before 2011 versus 84 cases after 2011) (Table 2).

The motives of the act remained unknown in 36.6 % of homicides and in 38.4 % of suicides. In most of suicide cases, the acts were motivated by a decompensation of a mental disease (28.9 %) followed by quarreling (15.6 %) and financial difficulties (7.6 %). A suicide note was found on site in five cases.

In homicide cases, before and after 2011, most of the assaults motives were quarreling (39.2 %).

#### Discussion

Our study highlighted a significant rise of homicide and suicide rates after the Tunisian Revolution. Suicides increased after 2011, with a drop between 2012 and 2013 and a second rise between 2013 and 2014. However, homicides increased during the two first years and returned to almost usual figures after 2012. Victims' profiles were similar before and after 2011, with most frequently a young

**Table 1** Distribution of homicide and suicide epidemiological data before and after the Tunisian Revolution (Tunisia 2007–2014)

	Homicide ( <i>n</i> = 509)				Suicide ( <i>n</i> = 904)			
	2007–2010	2011–2014	<i>n</i> *	<i>p</i>	2007–2010	2011–2014	<i>n</i> *	<i>p</i>
Prevalence**	1.17	1.61	–	–	1.8	3.12	–	–
Number of cases	213	296	–	–	334	570	–	–
Gender								
Male	81.7 %	80.4 %	509	0.38	81.8 %	80.3 %	904	0.18
Female	18.3 %	19.6 %			18.2 %	19.7 %		
Age								
<18	7.0 %	7.8 %	509	0.729	7.5 %	6.7 %	904	0.737
18–19	3.8 %	3 %			4.2 %	4.0 %		
<b>20–29</b>	<b>32.9 %</b>	<b>26 %</b>			<b>26.9 %</b>	<b>24.0 %</b>		
<b>30–39</b>	<b>19.7 %</b>	<b>23.6 %</b>			<b>19.8 %</b>	<b>24.2 %</b>		
40–49	13.1 %	13.9 %			18.3 %	16.3 %		
50–59	11.7 %	13.2 %			12.9 %	14.6 %		
60–65	2.8 %	4.4 %			3.3 %	4.0 %		
<65	8.9 %	8.1 %			7.2 %	6.1 %		
Marital status								
Single	60.7 %	53.3 %	335	0.245	55.7 %	49.6 %	746	0.402
Married	34.4 %	41.1 %			40.7 %	45.6 %		
widower	0.0 %	1.4 %			0.8 %	1.6 %		
Divorced	4.9 %	4.2 %			2.8 %	3.2 %		
Origin								
Urban	70.6 %	62.6 %	509	<b>0.037</b>	72.5 %	76.0 %	904	0.137
Rural	<b>29.4 %</b>	<b>37.4 %</b>			27.5 %	24.0 %		
Mental disease history								
Yes	81.8 %	80.3 %	436	0.541	<b>40.4 %</b>	<b>48.4 %</b>	904	<b>0.012</b>
No	18.2 %	19.7 %			59.6 %	51.6 %		
Occupation								
<b>Unemployed</b>	31.8 %	27.7 %	431	0.858	<b>53.1 %</b>	<b>64.9 %</b>	720	<b>0.027</b>
Laborer	51.4 %	52.3 %			20.1 %	18.1 %		
Pupil/Student	6.8 %	7.2 %			14.3 %	8.9 %		
Functionary	5.4 %	8.7 %			8.0 %	4.4 %		
Manager	1.4 %	0.5 %			1.3 %	1.6 %		
Retired	4.7 %	4.1 %			3.1 %	2.0 %		

\* Sample among whom the information was available

\*\* Prevalence: number of cases per 100,000 inhabitants per year

(20 to 39 years) male, unskilled or semi-skilled, with no physical or mental history and living in an urban area.

After the revolution, only a single variation was observed among homicide victims, and was represented by a higher number of assaults in rural areas. Suicide victims were more frequently unemployed and had a known history of mental disease. Suicidal acts occurred more frequently in public places and in front of public administrations and the number of self-immolation tripled.

Suicide increased by 26 % after the revolution. A similar increase was described in different countries after a

similar historical event represented by the 2008 economic crisis. Greece has seen a 35 % increase in the suicide rate between 2010 and 2012 and England has seen a 25.6 % increase each year between 2008 and 2010 (Barr et al. 2012; Rachiotis et al. 2015). In South Korea, the suicide rate rose from 29 to 33.8 per 100,000 people in 2009 (Chan et al. 2014). In the United States of America, the suicide rate increased between 2005 and 2010 from 11 to 12.4/100,000 inhabitants (Phillips and Nugent 2014). In a study on the impact of 2008's economic crisis in 54 countries (27 European countries, 18 countries in the Americas, 8 Asian

**Table 2** Distribution of homicide and suicide death circumstances before and after the Tunisian Revolution (Tunisia 2007–2014)

	Homicide ( <i>n</i> = 509)				Suicide ( <i>n</i> = 904)			
	2007–2010	2011–2014	<i>n</i> *	<i>p</i>	2007–2010	2011–2014	<i>n</i> *	<i>p</i>
<b>Place</b>								
Private house	37.8 %	38.7 %	431	0.906	63.1 %	62.3 %	879	<b>0.05</b>
<b>Public place</b>	<b>46.8 %</b>	<b>43.5 %</b>			<b>15.1 %</b>	<b>22.2 %</b>		
Isolated place	11.5 %	12.9 %			<b>13.5 %</b>	<b>7.6 %</b>		
Work place	3.8 %	4.8 %			5.5 %	2.9 %		
Administration	–	–			<b>1.8 %</b>	<b>3.8 %</b>		
Health institution	–	–			0.1 %	0.4 %		
School/college	–	–			0 %	0.4 %		
<b>Motive of suicide</b>								
Not specified					41.0 %	37.1 %	908	0.912
Decompensation of a mental disease					27.7 %	29.8 %		
<b>Conflict with the intimate partner</b>								
Familial conflict ***					8.1 %	7.4 %		
Financial difficulties					5.7 %	6.0 %		
Situation favoring suicide					6.0 %	8.6 %		
Interpersonal conflict**					4.5 %	4.0 %		
<b>Conflict with the state representative</b>								
School failure					3.0 %	1.6 %		
Professional conflict					1.2 %	3.5 %		
School failure					1.8 %	0.4 %		
Professional conflict					0.9 %	1.6 %		
<b>Motive of homicide</b>								
Not specified	40.4 %	32.8 %	509	0.623				
Interpersonal conflict**	39.4 %	40.2 %						
Familial conflict ***	7.0 %	8.1 %						
Robbery	6.1 %	9.5 %						
Conflict with the intimate partner	6.1 %	9.1 %						
Sexual crime	0.9 %	0.3 %						
<b>Method of suicide</b>								
Hanging					39.8 %	43.0 %	904	<10 <sup>-3</sup>
Toxic ingestion					<b>21.9 %</b>	<b>14.7 %</b>		
Self-immolation					<b>12.0 %</b>	<b>23.5 %</b>		
Drowning					12.0 %	7.0 %		
Fall from height					7.8 %	6.7 %		
Train trauma					2.4 %	1.1 %		
Sharp force					1.5 %	2.1 %		
Firearm					2.1 %	1.1 %		
Complex suicide					0.6 %	0.9 %		
<b>Type of homicide</b>								
Sharp force	51.2 %	49.7 %	509	0.125				
Blunt trauma	26.8 %	23.6 %						
Multiple weapons	6.1 %	11.9 %						
Mechanical asphyxia	6.1 %	2.4 %						
Burning	3.8 %	6.1 %						
Road traffic trauma	2.3 %	1.4 %						
Firearm	1.4 %	2.4 %						
Defenestration	0.5 %	1.7 %						
Drowning	0.5 %	0.3 %						

\* Sample among whom the information was available

\*\* Interpersonal conflict: conflicts with persons other than family members or intimate partner

\*\*\* Familial conflict: conflict with family members other than intimate partner

countries and 1 African country) (Chang et al. 2013), it was described 5000 additional suicides in 2009 compared to 2007 in the countries studied.

This rise in suicide rates observed between 2011 and 2012 can be explained by an imitation phenomenon or copycat effect. Copycat effect or “Werther effect” was described in reference to the character of Goethe’s book in the 18th century, in which Werther was a fictional character who committed suicide after a disappointing love affair. It had been responsible for several suicides mimetic in different countries (Stack 2003).

In our study, this effect is visible by the fact that self-immolation as used by Bouazizi tripled after his suicidal act. Copycat effect can initiate mass (temporal) cluster creating an increase of the number of similar suicides over the time, during generally 4–12 weeks after the first one, as well as a spatial cluster creating a wave of increase of such suicides among the local, national and sometimes international population (Mesoudi 2009; Fu and Chan 2013). Copycat effect can be caused either with celebrities and fictional characters or with less famous persons sharing high similarities with a vulnerable population. The primordial condition is an intensive mediatization of the suicidal act (Stack 2000, 2005; Mesoudi 2009; Fu and Chan 2013). This can explain the increase of copycat effect after the invention of television, as audiovisual coverage of suicides spread the information and reached out quicker and to more people than journal articles or books (Stack 2000).

Mohamed Bouazizi’s profile was similar to a big proportion of unemployed young men living in non-costal and rural areas. He gained a very high social prestige after his suicidal act and even more after the revolution occurred. He was stated as one of the world most influent persons for the year 2011 (Zarghami 2012). His suicidal act was intensively mediatized as the symbol of freedom of speech on national and international television stations as well as online news platforms and social media. In fact, the use of social network to share the Bouazizi suicide, is believed to be the trigger of the international wave of similar acts especially in same-context Arab countries over the months following January 2011. One can assume that channeling information on suicidal acts exacerbate the copycat effect and maintain a mass cluster of suicides as it remained stored and accessible for longer periods.

The suicide rates kept rising after the three first months following the Bouazizi suicide. This can be explained by the unusual and recurrent media’s coverage of suicide, normalizing suicide cases and trivializing this kind of information. The role of media in rising suicide rates have been proven also by giving a model for vulnerable population especially children and young adults (Bushman and

Geen 1990; Gould 2001; Stack 2005; Tousignant et al. 2005; Cheng et al. 2007).

Between 2012 and 2013, the suicide rates dropped and then rose to levels as high as just after the revolution. This second peak of frequency can be explained by the economic difficulties perceived in Tunisia. Several authors gave evidence of the increase of essentially suicides and also homicides during and after transition phases marked with economic recession (Leon et al. 1997; Kim et al. 2004; Falagas et al. 2009; Afroz et al. 2012; Barr et al. 2012; Horváth et al. 2012; Michas et al. 2013; Chan et al. 2014; Coope et al. 2014; Phillips and Nugent 2014; Branas et al. 2015; Fountoulakis et al. 2015; Rachiotis et al. 2015).

In our study as well as in the literature, this uprising was more tangible among young men at working-age. In fact, the lack of financial and social resources and job insecurities is known to be a source of stress for individuals. The consequences are a higher risk of suicide as well as an aggressive behavior leading to homicides (Gavrilova et al. 2000; Sverke et al. 2002; Men et al. 2003; Kim et al. 2004; Falagas et al. 2009; Afroz et al. 2012; Barr et al. 2012; Horváth et al. 2012; Michas et al. 2013; Chan et al. 2014; Phillips and Nugent 2014; Fountoulakis et al. 2015; Nordt et al. 2015; Rachiotis et al. 2015).

In Tunisia, homicide rates increased by 16 % during the first 2 years after the revolution. Homicide rates rose in other countries after similar historical events. In Russia after the fall of the Soviet Union, homicide rates were 2–3 times higher in 1994 compared to 1984 (Leon et al. 1997; Men et al. 2003; Falagas et al. 2009). Greece has seen a 27.6 % increase of homicides among men after the 2008 global economic crisis with a homicide rate among the general population passing between 2007 and 2011 from 1.18 to 1.7 homicide per 100,000 persons per year (Michas et al. 2013).

This rise of homicide rates is most probably in relation with the economic difficulties and unemployment as a direct consequence. This can explain the dominance of cases occurring more among males in rural places. These areas are marked with a higher unemployment rate among males comparing to urban areas (National Institute of Statistics 2015). It was demonstrated that macro-level socioeconomic determinants, including unemployment, social inequity, as well as political systems and social models marked with a fall of the national gross domestic product impact directly on homicide rates (Gavrilova et al. 2000; Pridemore 2006; Pridemore and Kim 2007; Horváth et al. 2012; Lee et al. 2014a, b).

The impact of job insecurity on criminality is more tangible in countries having economic difficulties or where the economic aspects tend to be more important than the cultural and social ones (Messner and Richard 1997;

Messner et al. 2010). A study conducted after the 2008 global economic crisis, showed a higher homicide rates in Eastern European countries compared to Western European ones. This observation was partially imputed to a lesser social welfare support in these countries (McCall and Brauer 2014).

The rise of homicide rates after the Tunisian Revolution can also be partially explained by a period of non-compliance with laws and police as well as a number of prisoners escaping jail leading to aggressive and vengeance acts.

Our study would give a deeper analysis of the impact of the revolution on aggressive behaviors if we were able to include both suicide attempts and non-mortal assaults. Unfortunately, such statistics are almost impossible to collect in the absence of a national suicide repository and a national report on violence in Tunisia.

We strongly believe that our results could be generalized to a national level, as our sample included all the cases occurred in the northern part of Tunisia (42 % of the Tunisian population) and spread across urban and rural areas.

According to our results, some urgent preventive measures should be applied to reduce the rate of suicide. First, the written and audiovisual media have to adhere to the guidelines of the World Health Organization on how to manage the coverage of suicides such as avoiding language which sensationalizes or normalizes suicide and avoiding repetitive and detailed coverage of suicidal acts especially those of celebrities (World Health Organization 2008). This preventive measure was actually undertaken by the independent high authority for audiovisual communication (HAICA) and the Tunisian ministry of health in October 2015.

Another recommendation for media is to focus more on the coverage of positive coping in adverse circumstances and suicidal ideations as it has protective effects (Niederkrotenthaler et al. 2010).

In addition, local communities should work more on empowering youth associations especially those offering informal education for children and young adults, in order to focus on increasing youth capacities in the field of life skills, coping capacities and distress skills. Ideally, these skills could be school-based as they showed obvious results in youth suicide prevention (Gould et al. 2003). Youth associations could also work on the social and economic entrepreneurs in order to increase the chances of getting a job for unemployed young adults according to their local context. Physicians also play a key role by detecting persons at high risk of committing suicide especially in schools and workplaces. These same preventive measures could also be applied to prevent risky and violent behaviors that could reduce homicides rates.

In the long term, improving the national economy, working on a better social welfare and reducing the unemployment rate would be associated with a decrease of both homicide and suicide rates.

In conclusion, our study gives, to the best of our knowledge, the first results of the impact of the Jasmine Revolution on homicide and suicide rates in Tunisia. We highlighted a significant increase of suicide rates over the 4 years between 2011 and 2014 with a slight drop between 2012 and 2013 and an increase of homicide rates during the two first years after 2011. The essential new trend was the occurrence of three times more self-immolation and the predominance of suicidal acts in public places and in front of public administrations. Urgent preventive measures are needed, centered on the role of media and in empowering young adults.

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**Compliance with ethical standards**

**Conflict of interest** None.

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