



## Epidemiology of voluntary intoxications in Morocco from 1980 to 2014

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### Abstract

Voluntary intoxication is a real problem that continues to increase significantly in Morocco. The present work aims to describe the characteristics of patients intentionally intoxicated and to determine the risk factors that can influence the prognosis of patients. For this, we have done a retrospective study of voluntary intoxication between January 1980 to December 2014. The aim of this study was to determine the epidemiological profile, and the risk factors of all the poisoning cases reported to the Moroccan Anti-poisoning and Pharmaco-vigilance Center (MAPP). During the study period, 29 267 cases of voluntary poisonings and 764 deaths were declared to the MAPP. The number of recorded deaths varies from one year to the next, from one region to another. The correlation and relative risk study shows a strong relationship between life-threatening conditions and the majority of the variables studied.

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## 1. Introduction

The voluntary poisonings constitute a major public problem of health and society in developing countries. The risk factors connected to the voluntary poisonings are multiple and varied, we can quote among others social or school problems and psychiatric pathologies. In 2004, the World Health Organization (WHO) recorded 345 814 deaths by poisonings in the world, that is 5.4 deaths for 100 000 inhabitants [1]. In Bamako, at 2012 Diallo and al, found that 37 % of the poisonings were voluntary [2]. In Morocco, between 1980 and 2007 the voluntary poisonings represent 26.4 % of all the poisonings [3]. In the Center of poison in Quebec between 1989 and 2007, phone calls for poisoning of voluntary type represented 15.6 % of all the poisonings [4]. In 2006, the Center anti poisoning and of toxic vigilance in France recorded a 15.7 % frequency [5].

This study has objective to determine the epidemiological profile of the voluntary poisonings in Morocco from 1980 to 2014 and to determine the risk factors, which influence the prognosis for survival of the poisoned.

## 2. Material and Methods

The present work consists in a retrospective study over a period of 34 years. A descriptive analysis of a series of case of voluntary poisoning recorded in the CAPM between 1980 and 2014. The collection of the cases of poisonings makes by 4 systems of collection [6] All the data are registered under a complete structured shape " medical record toxicologique " which includes the information of the declarer, the demographic characteristics of the poisoned, the incriminated substance, the way of poisoning. The evaluation of the risk and the coverage are also documented. This study concerned all the cases of voluntary poisonings brought back to one of the sanitary structures of Morocco. Morocco is situated in the Northwest of Africa. It is bounded in the North by the Strait of Gibraltar and the Mediterranean Sea, in the South by Mauritania, in the East by Algeria and on the West by the Atlantic Ocean.

The Moroccan coast extends over 3 500 km. Its surface is 710 850 km<sup>2</sup>. It is administratively cut in 16 regions (Since 2016, there are only 12 regions). According to the general census of the population (RGPH, on 2014 [7]); Morocco counts 34 Millions inhabitants. The population density varies according to regions (www.hcp.ma / file) (figure1).

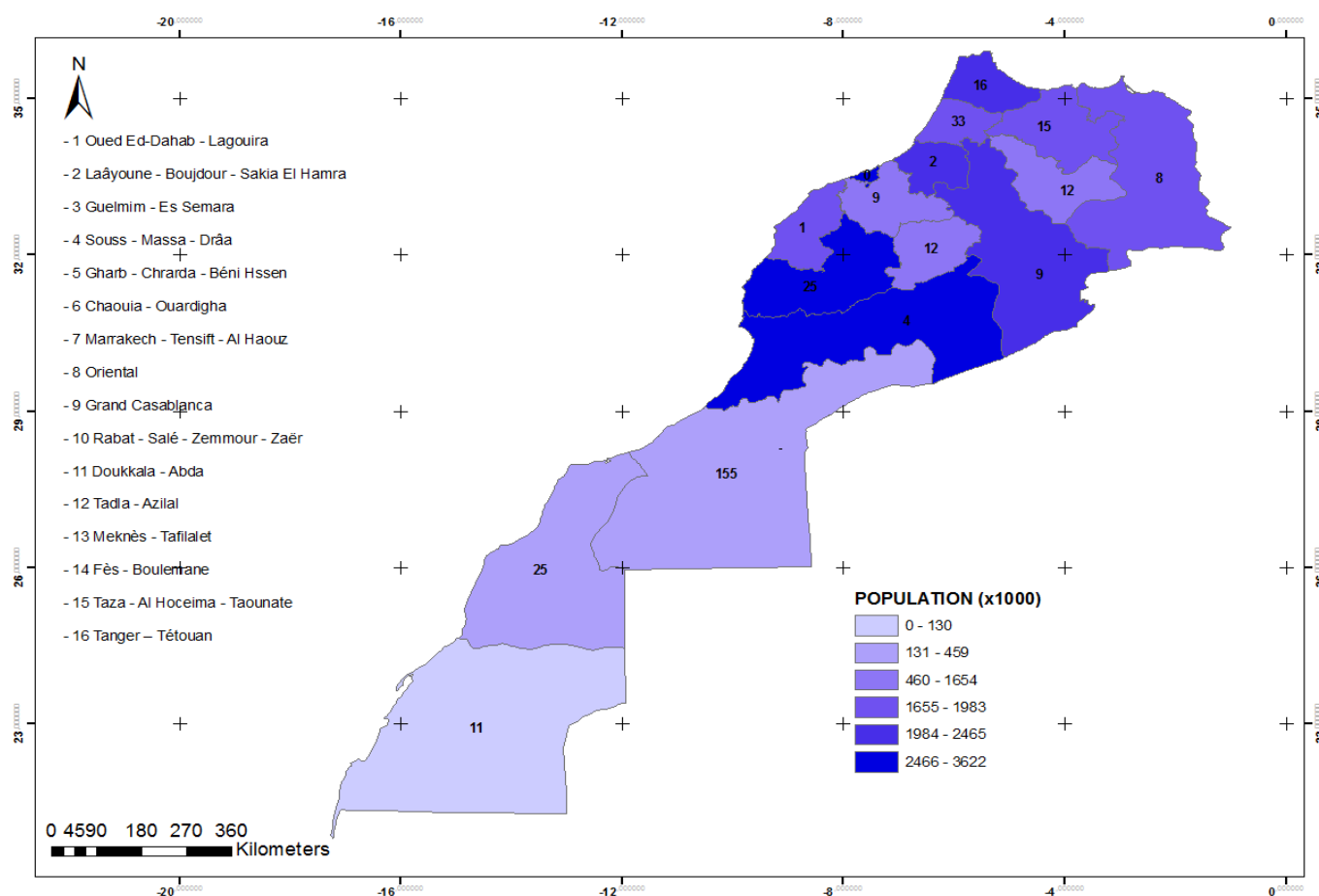


Figure 1: distribution of the Moroccan population according to administrative region (RGPH on 2004)

The statistical methodology is based on a descriptive analysis of the data, which allowed us to describe the voluntary poisonings, the studied variables concerning the epidemiological characteristics of the patients (age, sex, and origin), clinical characteristics (symptomatology, gradation) and characteristics of the used toxic product. The age was evaluated via the INTOX classification. Severity was evaluated using the poisoning score severity scale [8]: grade 0 (none), absence of sign or symptom; grade 1 (minor), symptoms slight, transient, and disappearing spontaneously; grade 2 (moderate), prolonged symptoms; grade 3 (severe), serious or life-threatening symptoms; grade 4 (fatal), death. [8].

### 3. Results and Discussion

#### 3-1 Characteristics of the intoxicated population

In Morocco, as many countries, the voluntary poisonings consist a major public problem of health and cause deaths every day by means of various products. In our study, we collected 29 267 cases of poisonings and 764 deaths over a period of 34ans going from 1980 to 2014 declared to the Center Anti Poison and of Pharmacovigilance of Morocco(MAPPC) from the diverse administrative regions.

After the data analysis and the calculation of specific lethality of the studied variables, we notice that the sex female is the most exposed to the risks of voluntary poisonings compared with the male, whereas the specific lethality to the sex male is raised with 3.95 % against 1.93 % for the sex female, The sex ratio was 1.94 in favour of female.

Concerning the age group, the adults and the teenagers present a high number of deaths and case of poisoning with 554 and 156 cases. The specific lethality is 10.34 % at the elderly. Concerning the stage of the gradations, the stage 4 corresponds to the fatal one and represents 764 deaths.

For the circumstances, we notice that the suicidal circumstances occupy a big place with 26 043 cases of poisoning and 699 deaths. Specific lethality of 4.42 % is observed for the criminal circumstances. The isolated

type of poisoning records 28 808 cases with 745 deaths by the same type of poisoning. The family of toxin the most used as product of poisoning taken voluntarily is medicine with 13 498 cases that is 47 % of all the used products, followed by some pesticides (8108 cases, 28.25 %). Table 1 and figure 1 display the results of the analysis according to the parameters related to the intoxicated population and also the specific lethality.

**Table I:** Distribution of the voluntary poisonings according to the characteristics of the patients and the poisoning (1980/ 2014)

Variable	N cases	Evolution			SL%
		Healing	Deaths	Unknown	
<b>Voluntary poisonings</b>	<b>(29 267)</b>	<b>(18 337)</b>	<b>(764)</b>	<b>(10 166)</b>	<b>2.61</b>
<b>Sex</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
<b>Female</b>	19097	12179	369	6549	1.93
<b>Male</b>	9798	5921	387	3490	3.95
<b>Unknown</b>	<b>372</b>	<b>237</b>	<b>8</b>	<b>127</b>	<b>2.15</b>
<b>Age</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
New born	2	0	0	2	0.00
Nourrison	18	13	1	4	5.56
Walking baby	131	84	2	45	1.53
infant	1557	1084	23	450	1.48
Teenagers	8270	5235	156	2879	1.89
Adults	18378	11417	554	6407	3.01
Elderly	58	26	6	26	10.34
<b>Gradation (PSS)</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
Grade 0	2836	2376	0	460	0.00
Grade 1	2790	2577	0	213	0.00
Grade 2	9823	7160	0	2663	0.00
Grade 3	2037	1245	0	792	0.00
Grade 4	764	0	764	0	100.00
<b>Total</b>	<b>29267</b>	<b>18337</b>	<b>764</b>	<b>10166</b>	<b>2.61</b>
<b>Circumstance</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
Abortion	169	101	3	65	1.78
Criminal	611	413	27	171	4.42
suicidal tendencies	26043	16087	699	9257	2.68
Drug addiction	2444	1736	35	673	1.43
<b>Total</b>	<b>29267</b>	<b>18337</b>	<b>764</b>	<b>10166</b>	<b>2.61</b>
<b>Type of intoxication</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
Collective	459	339	19	101	4.14
isolated	28808	17998	745	10065	2.59
<b>Total</b>	<b>29267</b>	<b>18337</b>	<b>764</b>	<b>10166</b>	<b>2.61</b>
<b>Product family</b>					
	<b>N cases</b>	<b>Healing</b>	<b>Deaths</b>	<b>Unknown</b>	<b>SL %</b>
Food	283	161	3	119	1.06
Animals	28	17	0	11	0.00

Foreign bodies	4	3	0	1	0.00
Cosmetics	222	159	1	62	0.45
Drugs	2088	1525	18	545	0.86
Medicine	13498	9292	64	4142	0.47
Heavy metals	1	1	0	0	0.00
Pesticides and farm produces	8108	4545	423	3140	5.22
Plants	623	368	16	239	2.57
Gaseous products	253	188	1	64	0.40
Industrial products	1492	844	50	598	3.35
Household products	1521	782	58	681	3.81
Mineral products	574	216	102	256	17.77
<b>Total</b>	<b>28695</b>	<b>18101</b>	<b>736</b>	<b>9858</b>	<b>2.56</b>

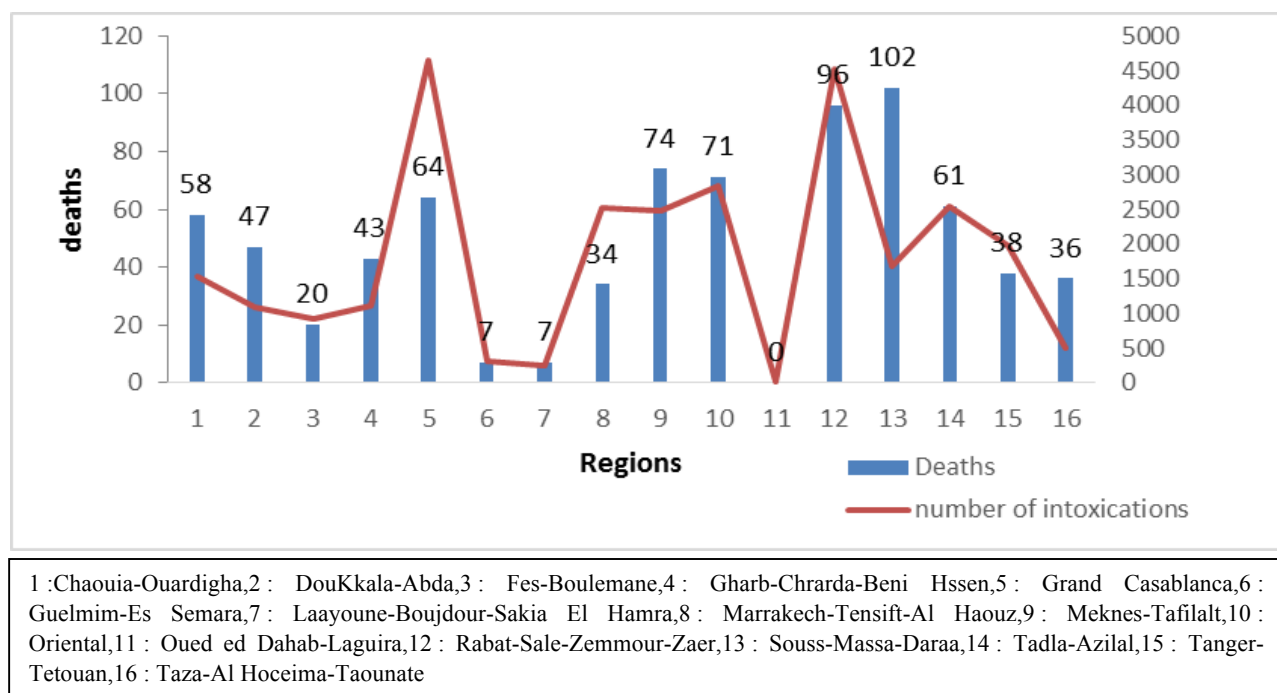
SL: Specific letality

The suicidal circumstances occupy a big place with 87.9 % of the statements. A study shows that the suicide constitutes the second cause of death of 15-30 years according to the data of CépiDc of the INSERM, and the suicide attempts one of the main causes of hospitalization of the young women at about 30 years except maternity (maternity hospital) [9].

The voluntary poisonings affect both sexes with a feminine ascendancy (65.25 %). This result is similar to those of Hami and al. in 2010 with 62 % [10] Attazagharti and al. in 2009 either 68% [11], as well as Mégarbane and al. [12]. This ascendancy is due to suicide attempts and abortion. On the other hand, the risk of death is more presented at the male sex.

The average of the number of voluntary poisoning was 860.79 cases, the global incidence was 97 for 100 000 inhabitants during the period of study, with an annual incidence of 2.88 for 100 000 annually, these profits remain relatively low compared with the rates of the western countries [13-14-15].

The age bracket the most exposed to the risks of voluntary poisonings is the one adults and teenagers, according to Ang & Huan in 2006, the suicidal attempts can be due to the academic failure, in the family conflicts or also in the social difficulties and the psychological troubles [16] suicide attempts involving most of the time teenagers were indicated by Jeffery and al [17] this joins the results of the literature [18-19].



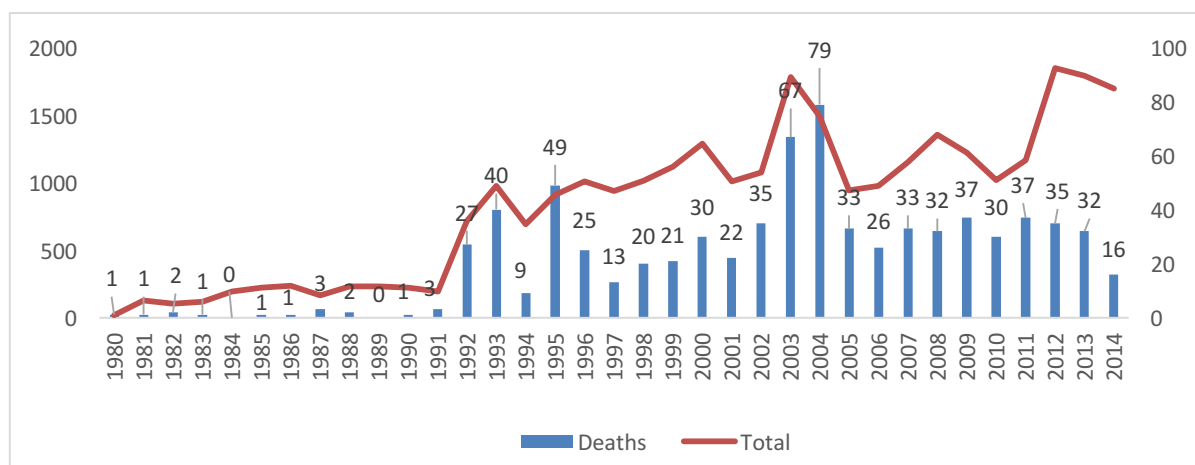
**Figure 1:** voluntary Evolution of the number of poisoning and deaths according to the administrative regions during the period of study (1980/2014) of the toxic substances

These results show that regions the most the exposed to the voluntary risks of poisoning are the region of Big Casablanca, Rabat Salé Zemmour Zair, the region of the oriental and Tadla Azilal. However a maximal number of death by a voluntary poisoning is recorded at the level of the region of Sousse Massa Deraa with 102 cases followed by Rabat Salé Zemmour Zaer (96 deaths) and the region of Meknes Tafilalt with 64 deaths. The calculation of specific lethality according to regions shows that the region of Taza Taounat Al Hoceima presents the highest specific lethality with 7.09 % followed by Souss Massa Daraa (6.08 %) and Doukkala Abda (2.19 %). Our study showed that medicine was the most incriminated in the poisonings with 46.12 % of the cases these is understandable by the ease of obtaining and consumption in our society through the illicit sale of medicine. In Morocco medicine constitutes the second cause of poisoning with 23 % among which about 52 % of the cases are voluntary [20], this problem was indicated by Saviuc and al (1999 ), the drug intoxication represents 13 % of the causes of suicide (among which 8 % at the men against 24 % at the women) and 90 % of suicide attempts [21], harmful medicine is the most used by the girls [22], the boys use more violent products than girls [23].

The voluntary poisonings are very observed at the level of the most populated regions and which(who) are considered as the big cities of the kingdom this was observed in several works [24-25-26] which bind suicide attempts with the pressures of big cities and stress which results from it.

The spatial distribution of voluntary poisoning and the deaths further to this voluntary poisoning, according to the administrative apportionment of Morocco during the period of study (on 1980 in 2014) is represented on (Figure2).

The distribution of the cases of voluntary poisonings according to the years shows a remarkable increase from the year 1992, which reaches a maximum in 2012 with 1849 cases, with peaks during the years 1993, 2000. However, a maximal value of death by a voluntary poisoning was registered in 2004 with 79 deaths. A decrease observed by the number of deaths after 2004 can be explained by the awareness campaigns of the population to the risks of the toxic products. The average number of deaths per year is 20.



**Figure 2:** Evolution of the number of voluntary poisonings and deaths during the period of study (1980 /2014)

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The annual evolution of voluntary poisoning has shown in our series an exceptional number of attempts. Emile Durkheim in 1870 explains the increase in the number of suicide attempts by the collective Renaissance of society, the evolution and the stress that accompanies [13-14-15].

### 3.2. Specific lethality and risk Factors related to the Progression of Suicidal Patients

The table II shows the results of the calculation of the specific lethality of each region in Morocco, the region of Taza-Al Hoceima-Taounate represent the highest percentage of SL with 7.09% which was followed by Souss-Massa-Daraa (6.08%), this is attributed to the availability of prohibited products on the domestic market through underground sales or smuggling.

**Table II:** distribution of the voluntary poisonings and the specific lethality according to the administrative regions of Morocco (1980/2014)

Region	Evolution			Total	SL%
	Unknown	Deaths	Healing		
Chaouia-Ouardigha	846	58	636	1540	3.77
DouKkala-Abda	238	47	811	1096	4.29
Fes-Boulemane	209	20	684	913	2.19
Gharb-Chrarda-Beni Hssen	328	43	745	1116	3.85
Grand Casablanca	2045	64	2535	4644	1.38
Guelmim-Es Semara	105	7	192	304	2.30
Laayoune-Boujdour-Sakia El Hamra	80	7	165	252	2.78
Marrakech-Tensift-Al Haouz	1350	34	1137	2521	1.35
Meknes-Tafilalt	520	74	1885	2479	2.99
Oriental	1047	71	1721	2839	2.50
Oued ed Dahab-Laguira	4	0	8	12	0.00
Rabat-Sale-Zemmour-Zaer	1115	96	3304	4515	2.13
Souss-Massa-Daraa	319	102	1256	1677	6.08
Tadla-Azilal	941	61	1547	2549	2.39
Tanger-Tetouan	744	38	1184	1966	1.93
Taza-Al Hoceima-Taounate	170	36	302	508	7.09
<b>Total</b>	10061	758	18112	28931	2.62

SL: Specific lethality

The relative risk calculation for adverse prognosis was performed by eliminating missing data for each of the variables studied. The calculation results are shown in Table III.

The Table III represent the relative risk concerning the sexe, age and origin.

The OR show that both sexes move towards death, concerning the groups of age groups, adults and the elderly people represent the highest risk of death 2 times more than other groups.

**Table III:** Risk Factors related to the Progression of Suicidal Patients (1980/2014)

Variables	Modalities	Healing	Deaths	<i>p</i> (c2)	OR	IC 95 %
Sex	Male	5764	369	0.000	0.478	0.412-0.554
	Female	12029	368			
Age	Child	1141	24	0.001	2.035	1.349-3.070
	Adult	16473	705			
Origin	Urban	12190	382	0.000	0.464	0.374-0.577
	Rural	1660	112			

\*Significant link (p=0.05) ; \*\* Very significant link (p=0.01) ; \*\*\* Highly significant link (p=0.001). OR : Odds Ratio ; IC 95 % : Confidence interval at 95 %.

Our study allowed us to draw up the epidemiological profile of voluntary poisoning in Morocco for a large period (from 1980 to 2014). The size of population studied allowed us to detect certain risk factors associated with this phenomenon more and more frequent in Morocco. The data of this work (29 267cases) are important to consider in public health, especially for the reduction of lethality. The majority of these poisonings are preventable and awareness campaigns remain the best preventive measure. Detailed analyzes could possibly be detailed for each product family and for each of the administrative regions of Morocco. This would make it possible to better understand the problem and launch campaigns in a specific way according to the region.

## Conclusions

In conclusion, voluntary intoxication presents a real scourge that affects public health, and in this study, we developed an epidemiological profile of this phenomenon. Nevertheless, this study has certain limitations, because it did not evaluate the impact of the socioeconomic and psychological factors that are important for understanding this type of poisoning. Voluntary intoxication is preventable by strengthening awareness-raising campaigns, education, and communication about this issue in all regions of Morocco.

## References

1. M. Peden, K. Oyegbite, S. J. Ozanne, A. Hyder, C. Branche, A.F. Rahman, *OMS* (2008) 123-44.
2. T. Diallo, H. Hami, A. Maïga, A. Mokhtari, A. Soulaymani, *Antropo*. 26 (2012) 11-8.
3. L. Ouammi, N. Rhalem, R. Aghandous, I. Semllali, M. Badri, G. Jalal, *Toxicol Maroc*. 1 (2009) 8-13.
4. G. Lebel, F. Tairou, L. Lefebvre, *Bulletin d'information en santé environnementale*. 20 (2009) 1-9.
5. A. Villa, A. Cochet, G. Guyodo, *Rev Prat*. 58 (2008) 825-31
6. H. Chaoui, A. Khattabi, N. Rhalem, I. Semlali, M. Idrissi, B. R. Soulaymani, *Toxicol Maroc*. 5 (2010) 10-3.
7. Royaume du Maroc.HCP, 2004.
8. H.E. Persson, G.K.Sjöberg, J.A. Haines, G.J. Pronczuk et al, *Toxicol Clin Toxicol*. 36 (1998) 205-13.
9. A. Philippe, *Rev prat*. 61 (2011) 175-183.
10. H. Hami, A. Soulaymani, L. Ouammi, A. Mokhtari, R. Soulaymani, *Arch Pediatr*. 17 (2010) 152-152.
11. N. Attazagharti, A. Soulaymani, L. Ouammi, A. Mokhtari, A. Soulaymani, *Antropo*. 9 (2009) 33.
12. B. Mégarbane, L. Donetti, T. Blanc, G. Chéron, F. Jacobs, *Groupe d'experts de la SRLF*. 42 (2006) 15:332.
13. E. Durkheim, Edition électronique réalisée par J-M. Tremblay. (2012) 102.
14. E. Durkheim, Edition électronique réalisée par J-M. Tremblay. (2012) 157.
15. E. Durkheim, Edition électronique réalisée par J-M. Tremblay. (2012) 80.
16. R.P. Ang, V.S. Huan, Relationship between Academic Stress and Suicidal Ideation: Testing for Depression as a Mediator Using Multiple Regression, *Child Psychiatry Hum Dev*. 37 (2006) 133–143 DOI 10.1007/s10578-006-0023-8
17. J.A. Bridge, T.R. Goldstein, *J Child Psychol Psychiatry*. 47 (2006) 372-94.
18. M.F. Heuzey, P. Isnard, A.M. Badoual, M. Dugas, *Arch Pediatr*. 2 (1995) 130-135.
19. M. Choquet, V. Granboulane, *Le Carnet Psy*. 85 (2003) 14 19.
20. N. Badrane, F. Abadi, L. Ouammi, B.R. Soulaymani, *Toxicol Maroc*. 7 (2010) 7-10.
21. P. Saviuc, R. Bedry, F. Flesch, *Médecine thérapeutique*, 5(1999) 45-8.
22. R. Harrington, Oxford : Med Publi- Company, 85 (2005) 85-88.
23. S. Salimi, S. Bouhdadi, A. Rachid, R. Atlas, F. Dehbi, *J de Pédiatr et de Puériculture*, 24 (2013) 6-10.
24. S. Mahir, A. Soulaymani, H. Hami, A. Mokhtari, D. Benali, L. Ouammi, M. Windy, R. Soulaymani, *Santé Publique*. 25 (2013) 343-350.
25. T. Diallo, H. Hami, A. Maïga, B. Coulibaly, D. Maïga, A. Mokhtari, R. Soulaymani, A. Soulaymani, *Santé Publique*. 25 (2013) 359 -366.
26. Z. Nabih, L. Amiar, Z. Abidli, M. Windy, A. Soulaymani, A. Mokhtari, R. Soulaymani Bencheikh, *Epidemiology and health*. 39 (2017) 1-7

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