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Towards a strategy to fight against accidents at work: status of the site and search for risk factors

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Abstract
Workplace accidents are common among workers in all public private or sectors. The objectives of this study are to describe the profile of these work-related accidents between 2001 and 2016 in the Gharb region and to specify the accountability of certain factors such as gender and the type of sector. This is a survey of 1384 workers who have been involved in a work accident, of which 88.87% (n = 1230) are male and 11.13% (n = 154) are female. The results confirm that sex and the type of work sector are two major factors in determining the severity and therefore the fate of the victim. The accident rate varies according to the years and the average annual rate is increasing during the fifteen years of study. The causes of accidents vary by sector however negligence, stress and weather conditions could be considered as major factors.
Thus, the results of this study could be taken into account in the case of the development of certain strategies of struggle to reduce the scale of this phenomenon.

Keywords: work injury, incidence, sex, work area, magnitude

1. Introduction
In Morocco, Article 3 of the 1963 Dahir referred to as an accident at work as, "an accident whatever the cause may have been caused by the fact or on the occasion of work (...)". The precise text that this qualification must be retained even "in cases of force majeure or if the working conditions have set in motion or aggravated the effects of the forces of nature".
In Morocco, the situation of health and safety at work remains very worrying. An average of 43,153 work-related accidents those are reported each year [1, 2]. In this country, according to Gattioui (2017) [3] according to the Insurance and Social Welfare Supervisory Authority (ISWSA) (2006) [4] the number of workers who died as a result of work accidents is estimated at 3,000 per year and this for the period 2005-2014. Similarly, in the world, every year the occupational risk is estimated to increase because of the rapid industrialization of certain developed countries [5].
According to this assessment, the risk of an occupational disease would be the greatest danger to workers today at their place of work [6]. In fact, these diseases kill 1.7 million people a year, giving a report of four deaths caused by an occupational disease for a death caused by an accident [7]. As Juglaret (2012) [8] pointed out, all these consequences prove the need for an effective prevention policy. However, in order to achieve the objectives assigned to it and significantly reduce the frequency and severity of occupational accidents, prevention must be based on a good identification of the factors that caused them to occur.
The main objective of this study is to establish a descriptive profile of the state of occupational accidents during the period from 2001 to 2016 in Morocco.

2. Materials and Methods
The study we conducted is done on 1384 employees in the public and / or private sector. These cases are identified by the Ministry's authorities in the Gharb region (Fig.1) between 2001 and 2011. After filtration in Excel, we transferred the data to an SPSS support (trial version) and then coded each variable. These variables are socio-demographic and in relation to the accident (place of exercise, state of gravity,...). The matrix is subjected to a set of descriptive and / or differential statistical analysis such as: independence chi-square test, correlation...).

Fig 1: Geographic map of the Gharb region [9]

3. Results and Discussion
3.1 Socio-demographic characteristics of victims of work-related accidents seen between 2001 and 2016
The study we conducted is carried out on 1384 accidents of which 88.87% (n = 1230) are male and 11.13% (n = 154) are female. Thus, numerically, men are more affected than women (for more than 85% of casualties) even if we observe a constant increase in the female accident curve since 2001. In

addition, this figure may be explained by the fact that the sectors where is most at risk are traditionally occupied by men (construction, metallurgy, etc) [10]. The temporal evolution of the number of work accidents during the study period is illustrated in the Figure (2). This projection shows that the number of declarations is increasing from year-to-year variation, with a positive correlation coefficient of +0.71. But, in the space of these years, this frequency in the year 2011 (n = 394) and in the year 2014 (n = 452), and these accidents may also be due to overconfidence and reduced vigilance due to a certain routine (monotony).) in the course of the work [11]. We can add the non-declaration of workplace accidents of the younger workers (under 30). This phenomenon of under-declaration can be generated by the lack of stability in employment (temporary employment, fixed-term contract), more present among this population of young workers. In the same way, this situation could be explained by the fact that the companies are in total harmony with the instructions which constitutes the base of the work put in place by the authorities responsible for these industrial sectors.

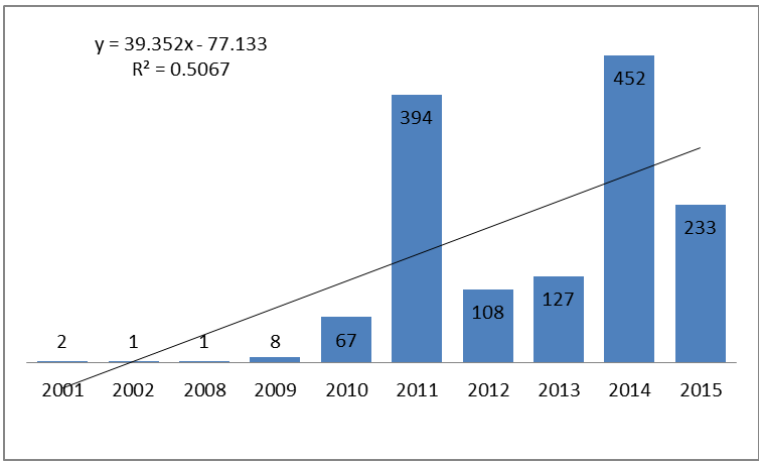

Fig 2: Annual time evolution of the number of work accidents from 2001 to 2015.

The distribution of reported work accidents by months and by seasons of the year is shown in Figure (3). The statements were very important during the winter, with 411 statements, followed by spring with a frequency of 378 accidents and at a low rate during the summer with 278 cases. Moreover, this evolution proved to be significantly decreasing for the season variation and thus for the month variation, with respectively -0.76 and -0.62. This phenomenon could be related to seasonal changes in activity and / or changes in the working conditions of certain sectors of work. We mention the construction sector where the winter and spring rains facilitate slips or falls of workers, and the high temperatures of the summer contribute to the stress of these workers [2].

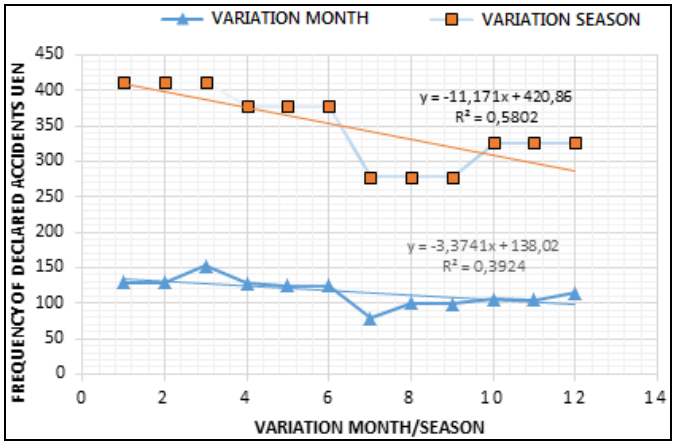

Fig 3: Monthly change in the number of work accidents from 2001 to 2015

The distribution of reported work-related accidents by sector illustrated (Fig.4) shows that the industry sector was the most incriminated with a total of 787 accidents, which represents 57% of reported cases, followed by building sector with a total of 182 cases (12.9%). However, it was noted that almost all sectors are affected including the agriculture sector (n = 29 cases), the trade sector (n = 48 cases). This pattern of accident frequency distribution by sector may be different in other countries. In Malysia, for example, the transport sector has the highest incidence of fatal injuries (35.1 / 100 000), followed by agriculture (30.5 / 100 000) and construction (19.3 / 100,000) [12].

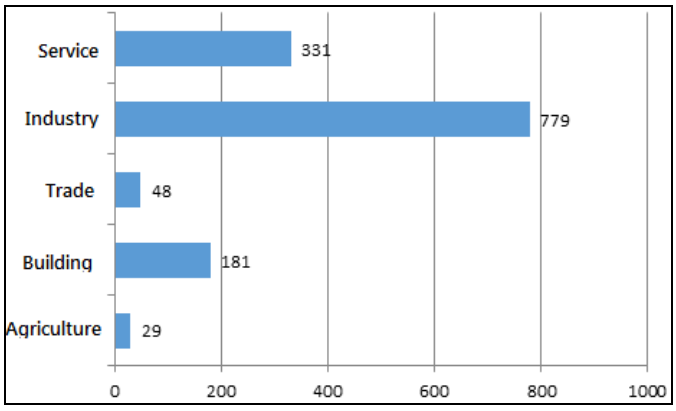

Fig 4: Distribution of Work Accidents by the Sector Practice

Moreover, the causes of these industrial accidents are numerous which alls, burns, shocks caused by machines,.... As

has been reported by Baghdadi *et al*. (2017) [1], the causes of accidents are diverse and depend on the nature of the sector activity. They can be handling accidents, burns, electric shock, a machine, an engine, a tool, a pull and a path... Similarly, the bad weather conditions surrounding the worker, and other factors leading to stress, could be favorable conditions for an accident at work.

It should be noted that the frequency and severity of these accidents and the seriousness of their consequences can be avoided by developing prevention systems, in particular by developing the identification of the hazards specific to each type of work, and the control of the risks involved, occupational exposures and by increasing the effectiveness of the working conditions, and encouraging companies to get involved health at work. It should be noted that heat and stress are among the main factors of this negligence [2, 13] and that a study conducted in Iran on an electricity distribution company has shown that in 75% of the cases the negligence was the cause of the fatal accidents. However, according to Saari in (Encyclopaedia of Safety and Health at Work) [14], safety, lack of theoretical basis, cannot yet be considered a science, the causes of accidents are very complex and must be understood if the we want to improve prevention.

3.2 Consequences of declared work accidents

This importance of the number and severity of workplace accidents is confirmed in a large majority of industries. In fact, the results of this study show that 2% (n = 28 cases) died as a result of a work accident, 13.9% (n = 196) were partially disabled and 43.3% suffered total paralysis. However, the chi-square independence test shows a strong link between the severity of the accident at work and the sectors concerned (Chi-square = 134.82, p <0.000). In addition, the building and industrial sectors recorded the highest death rates with a rate of 35.71% for each sector. In addition, accident victims in the industry sector more than 50% of whom were totally incapacitated. These results are different from those noted in other countries. In France for example, in 2004, for employees in the private sector, statistics show 1.4 million occupational accidents occurred and recognized, including nearly 700,000 resulted in a work stoppage of at least one day. Of these, 50,000 resulted in the payment of compensation for the effects that persist after the accident (permanent partial disability recognized), with 626 registered and compensated deaths [4].

Table 1: Distribution of Victims by Severity Level and Sector of Practice

	Degree of gravity					Total
	deaths	IPP	IT	Without	Result	
Other	0	1	0	0	0	1
Agriculture	1	10	11	0	7	29
BTP (Building and Public Works)	10	50	80	7	35	182
Trade	2	2	20	0	24	48
Industry	10	71	332	6	367	786
Service	5	62	167	0	126	360
Total	28	196	610	13	559	1406

At the beginning of this work we made two hypotheses, is it possible to classify the sex and the work sector of the real risk factors. For the effect of sex on the occurrence of accidents, according to international data, women are less at risk of accidents than men. However, our results show that even though the number of women who have suffered a work-related accident is lower than that of men, the rate of women who have suffered an accident compared to that of women in employment is higher than that of men with an accident in relation to the number of men in activity. In the study area, women are therefore more exposed to the risk of work accidents than men.

The results also show that the impact of the activity sector on the occurrence of occupational accidents is very highly significant. Workers in certain industries are much more exposed to the risk of accidents. Thus our study reveals that the sectors at risk are: industry, agriculture, and building. Our results are in extreme compatibility with those noted in Côte d'Ivoire [15].

4. Conclusion

All sectors are affected by accidents of work but to varying degrees. During the study period, the number of statements is increasing year-to-year variation. Sex and the type of the sector of the work are two major factors in determining the gravity and therefore the fate of the victim. Within each year the frequency of work accidents is not the same.

The evolution of the annual rate of work accidents has been significantly increasing. This rate also varies with the seasons. This latter phenomenon could be related to seasonal changes in activity and / or changes in the working conditions of certain the sectors of work. The causes of accidents are diverse and depend on the nature of the sector. Similarly, the poor weather conditions surrounding the worker, and other factors leading to stress, could be favorable conditions for an accident at work.

The results further confirm that sex is a major factor in determining the severity and therefore the fate of the victim.

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