

# Moroccan Taxi Drivers Sleepiness Using Epworth Scale: A Cross-sectional Survey

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**Abstract:** Many international studies found that fatigue can be a probable major cause of truck driver accidents. The primary goal of the current study was to assess the relation between sleep disorders and accidents by using Epworth sleepiness scale. In this cross-sectional study, 300 urban and rural taxi drivers from Fez, Morocco were enrolled from January to May 2013. All participants were male and their mean age was  $42.51 \pm 10.81$  (range 18-74) years. Their experience in driving was  $8.34 \pm 3.56$  years on average; which had no significant relationship with their crash history and was not found a confounding factor in this series. The mean duration of sleep was  $6.78 \pm 1.47$  h per day. The mean rate of accident was  $2.78 \pm 1.12$  per year. The mean Epworth index was  $13.23 \pm 5.59$ . The simple linear regression showed a significant correlation between the Epworth sleepiness scale and education ( $P = 0.030$ ), age ( $P = 0.017$ ), marital status ( $P = 0.011$ ), coffee consumption ( $P = 0.006$ ), and water pipe (chicha) use ( $P = 0.01$ ), but there was no significant correlation with history of crash in past years. The multivariate analysis (multiple linear regressions) found a significant association between Epworth scale and age ( $P = 0.024$ ), coffee consumption ( $P = 0.023$ ) and water pipe use ( $P = 0.027$ ). In Morocco where road accidents are very frequent and number of serious injuries and death is very high. This is considered as one of the major public health problems and hence public health officials, legislators and the police should collaborate in multidisciplinary approach to have effective preventives measures. This study can be the start of many debates about the most efficient preventive measure to ameliorate professional drivers' work condition and to reduce road accident and hence save thousands of lives from the "traffic war" in Morocco.

**Key words:** Fatigue, Epworth scale, taxi drivers, Morocco.

## 1. Introduction

The World Health Organization estimates that by 2020 road traffic injuries will represent the third major cause of disability adjusted years of life lost worldwide [1]. Every year, road accidents cause more to 1.2 million deaths and 50 million injuries worldwide. This highlights the importance of this problem as a public health problem. In Morocco, according to statistics of the Ministry of equipment, transport and logistics, the number of accidents has reached 35.769 between January and June 2015. The official statistics reported 4.364 serious injuries and 46.401 slightly injured [2]. The causes are multiples and we can cite the poor quality of roads, violation of

traffic laws, not wearing a seat belt, driving while alcohol impaired but also errors due to lack of concentration that can linked to a problem of excessive sleepiness among drivers [3].

A bad quality of night sleep can perturb many of our cognitive functions like psychomotor skills, memory and decision making, and hence it can cause accidents [4-7]. Many international studies found that fatigue can be a probable major cause of truck driver accidents (about 20% to more than 50%) [8-10]. A U.S study conducted by Mitler et al. [11] who found a mean duration of sleep of 4.78 h in five-day period. Some reports found that sleep problems can even be more important than the classic causes like alcohol or drug-related incidents in all forms of transportation [12].

Despite the importance of quality of sleep in drivers, to our knowledge, until today very few local studies

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focused on this issue. The primary goal of the current study was to assess the relation between sleep disorders and accidents by using Epworth sleepiness scale.

## 2. Materiel and Methods

This was a cross-sectional study, 300 urban and rural taxi drivers from Fez, Morocco were enrolled from January to May 2013. All interviews were performed by two trained investigators. First all items on the questionnaire were explained to and discussed with the participants, and their questions were answered as their filled out the forms. This study has been presented to the local ethics committee of University Hospital Hassan II of Fez who agreed it. Questionnaires have been assigned a unique number and at any time during the analysis of the study no person had been cited.

The questionnaire includes socio-demographic data, medical problems, such as diabetes, cardiovascular problems or pulmonary disorders, addiction including tobacco, water pipe, alcohol or drug, sleep habits and different kind of stress. All drivers under study also completed forms to evaluate their insomnia index using ESS (Epworth sleepiness scale). The ESS, first described by Johns in 1991 [13], consists of eight questions and yields a score of 0 to 24. It is easy to administer and is currently the most widely used subjective test for sleepiness [14-17]. Manifest sleepiness can be considered from three perspectives: behavioral sign of sleepiness, inability to volitionally remain awake, and performance deficit on psychomotor or cognitive task.

## 3. Results

All participants were male and their mean age was  $42.51 \pm 10.81$  (range 18-74) years. In terms of marital status, 45 (15.0%) were single, 255 (84.7%) were married, and 1 (0.3%) was divorced and no one widowed. The mean BMI of the drivers was  $26.81 \pm 4.31$  kg/m<sup>2</sup>. The self-report of associated diseases indicated heart disease in 4 (1.3%), COPD in 1 (0.3%), diabetes in 18 (6.0%), other disease in 17 (15.6%). In

their history of drug abuse 97 (32.1%) used tobacco, 15 (5.0%) had alcohol abuse with mean duration of alcohol abuse  $1.4 \pm 4.1$  (range 0-31) and 25 (8.3%) had a history of drug abuse. Our study population reported coffee and tea consumption respectively 230 (76.2%) and 224 (74.2%). Finally, 100 (33.2%) drivers had regular physical activity.

Their experience in driving was  $8.34 \pm 3.56$  years on average; which had no significant relationship with their crash history and was not found a confounding factor in this series. Seven (2.3%) drivers were used to work by night, 172 (57.1%) were used to work during the day and 122 (40.5%) worked both during the day and by night.

The mean duration of sleep was  $6.78 \pm 1.47$  h per day. The mean rate of accident was  $2.78 \pm 1.12$  per year. Distributions of responses to the Epworth sleepiness scale are summarized in Table 1. The mean Epworth index was  $13.23 \pm 5.59$ . The simple linear regression showed a significant correlation between the Epworth sleepiness scale and education ( $P = 0.030$ ), age ( $P = 0.017$ ), marital status ( $P = 0.011$ ), coffee consumption ( $P = 0.006$ ), and water pipe (chicha) use ( $P = 0.01$ ), but there was no significant correlation with history of crash in past years (Table 2). The multivariate analysis (multiple linear regressions) found a significant association between Epworth scale and age ( $P = 0.024$ ), coffee consumption ( $P = 0.023$ ) and water pipe use ( $P = 0.027$ ) (Table 3).

## 4. Discussion

The effects of bad quality of sleep on daily activities are well-known [18]. But the increased risk of accident as a consequence of bad sleep quality is a topic under research and particularly in occupational epidemiology among professional drivers [19-24].

We found in our study that the association between coffee consumption was statistically significant and Epworth sleepiness scale. Up to now, higher dosages of caffeine (150-250 mg, comparable to two to three cups of regular coffee) have been shown to be

**Table 1** Descriptive data of the taxi drivers.

	Fequency (%)	Mean $\pm$ S.D
Age in years (n = 300)		48.2 $\pm$ 10.8
Driving experience in years (n = 300)		8.3 $\pm$ 3.5
Working time (n = 300)		
Daily	172 (57.1%)	
By night	7 (2.3%)	
Both	122 (40.5%)	
Have you ever had an accident (n = 300)		
Yes	143 (47.5%)	
No	158 (52.5%)	
Deviation (n = 300)		
Yes	115 (38.2%)	
No	186 (61.8%)	
Sleeping behind the wheel		
Yes	119 (39.5%)	
No	182 (60.5%)	
Marital status (n = 300)		
Single	45 (15.0%)	
Married	255 (84.7%)	
Divorced	1 (0.3%)	
Widowed	0 (0.0%)	
BMI(Kg/m <sup>2</sup> ) (n = 294)		26.8 $\pm$ 4.3
Heart disease (n = 300)	4 (1.4%)	
COPD (n = 250)	1 (0.4%)	
Diabetes (n = 300)	18 (6.0%)	
Other diseases (n = 109)	17 (15.6%)	
Tobacco use (n = 300)	97 (32.2%)	
Alcohol abuse (n = 300)	15 (5.0%)	
Drug abuse (n = 300)	25 (8.3%)	
Coffee consumption (n = 300)	230 (76.2%)	
Tea consumption (n = 300)	224 (74.2%)	
Regular physical activity (n = 300)	100 (33.2%)	

**Table 2** Epworth sleepiness scale.

	0	1	2	3
Sitting and studying	75 (25.1%)	43 (14.3%)	75 (25.1%)	82 (27.4%)
Watching television	43 (14.3%)	46 (15.4%)	108 (36%)	84 (28%)
Sitting immotile in a public place	38 (12.6%)	51 (17.1%)	87 (29.1%)	18 (32%)
Sitting immotile as a passenger in a car	36 (12%)	39 (13.1%)	75 (25.1%)	120 (40%)
Lying down to rest	29 (9.7%)	60 (20%)	45 (11.4%)	153 (51%)
Sitting and speaking	165 (55%)	39 (13%)	56 (18.3%)	10 (3.4%)
Sitting after having lunch	17 (5.7%)	36 (12%)	89 (29.7%)	125 (41.7%)
In a car after stopping in traffic jam	141 (47.4%)	82 (27.4%)	43 (14.3%)	7 (2.3%)

**Table 3** Epworth sleepiness scale and associated factors (Simple Linear Regression).

	$\beta$	IC (95%)	P
Education	0.056	[1.05; 3.08]	0.030
Marital status	-1.43	[-3.78; -0.42]	0.011
Coffee consumption	-1.58	[-4.24; -0.71]	0.006
Age	0.138	[0.02; 0.15]	0.017

**Table 4** Epworth sleepiness scale and associated factors (Multiple Linear Regression).

	$\beta$	Adjusted IC (95%)	P
Coffee consumption	-0.13	[-3.84; -2.81]	0.023
Age	0.130	[0.01; 0.15]	0.024

effective in counteracting sleep restriction (< 5 h spent in bed) when driving in the early morning and in the early afternoon. The results were at the same line with more than two third of our study population (all professional drivers) consuming coffee. In this study we found that aging increase Epworth sleepiness scales scores. This confirms previous results of many studies which showed that aging is associated with an Epworth score higher than 10 [25].

When evaluating the relationship between sleep problems and car accidents, it can be difficult to quantify the role of different suspected factors. In this survey we tried to cover many reasons from daily life habits to many associated and known frequent diseases but we did not find many associations at the final results, probably this can be related to the lack of power in our study and when increasing the number of participant by including other Moroccan regions we can find more significant associations. All participants in this study were male, so inter-gender comparisons were not possible. This is because women are not engaged in this occupation in Morocco. And the other limits of our study are the classic limits of cross-sectional studies like the difficulty to make causal inference. However this study was very important that can be considered as pioneering study which gave us a quick picture of the situation in Morocco. Promoting “sleep hygiene” by campaign, educational sessions should be developed as effective policy to prevent accident and diminish the number of crashes [26]. Actually, it has been shown that stop driving and sleeps or let someone else drive when feeling sleepy can have a major impact in accidents prevention [25, 27]. Prevention programs should also include building or improving rest areas. In addition, legislative or regulatory initiatives should also be discussed [28].

In Morocco where road accidents are very frequent and number of serious injuries and death is very high. This is considered as one of the major public health problems and hence public health officials, legislators and the police should collaborate in multidisciplinary approach to have effective preventives measures.

## 5. Ethics Guidelines

### Risks

- Physical: none
- Social: Minimal
- Legal: Minimal
- Economic: Minimal

### Confidentiality

- Questionnaires were anonymous
- Data was protected in a 3 closed room
- Access to data is possible only for the researchers team

### Consent Process

- Informed consent was made in Moroccan Arabic
- Informed consent was distributed to all participants who will agree to join voluntarily the survey
- An oral Informed consent was taken from each participant after full explanations of the objective of the study and their right as participant (withdraw, confidentiality, privacy ...)
- Approval was taken from the local IRB of the University Hospital of Fès

## 6. Competing Interests

We the authors or our institution has no conflicts of interest which includes financial and personal relationships.

## 7. Authors Contribution

Nadia BENAICHA: Conducting the survey,

statistical analysis, writing the article

Abdessalam DIARA: Statistical analysis

Oussmane SY: Statistical analysis

Oussmane Désiré DIAKITE: Statistical analysis

Adil NAJDI: Conducting and supervising the survey, reviewing the article

Mohamed Amine BERRAHO: Writing the protocol, writing the questionnaire, reviewing the Consent Form, reviewing the article

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## Consent to Publish

Not applicable.

## Availability of Data and Materials

Data will not be shared: Having collected the data, our team wants to be the one to analyze it and to benefit from it. Other article about some other aspects of this study will be published. Once, all papers published, we can share our database.

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