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# HEALTH ASSESSMENT OF EMPLOYEES WITH OCCUPATIONALLY EXPOSURE TO IRRITATING GASES AND VAPORS

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## ABSTRACT
The study is based on occupational history and functional respiratory exploration in a number of 892 workers from a chemical fertilizer factory with occupational exposure to irritant gases and vapors. Analyzing the relationship between exposure to pollutants and the occurrence of changes in respiratory parameters we show that there is no a direct relationship between them.
Also, smoking does not influence decisively the modifies in spirometry values to workers exposed to occupational respiratory pollutants, in the context of the existence of different degrees of pulmonary obstruction in a significant proportion of the study group, being due to many factors, comprising both employment component as regular component.

**Key words**: irritating gases and vapors, spirometry, occupational history, exposure.

## INTRODUCTION
Although we expect that in a chemical factory with occupational exposure to gases and irritating vapors to exist according between exposure to these pollutants and changes in spirometry parameters our study shows that this does not happen, although there is some degree of obstruction the group of workers. Professional history and spirometry as methods for monitoring the health of employees exposed to respiratory pollutants are the cornerstone for accurate and early diagnosis of occupational or work-related diseases in this environment and allow us to take the best technical, organizational and medical measures.

## MATERIAL AND METHOD
The study group comprised in 892 employees from a chemical fertilizer factory, including both workers exposed to irritant gases and vapors and not exposed. Were carried out occupational history and lung function test at the workplace.

## RESULTS AND DISCUSSIONS
The study group was represented in the vast majority of men, taking into account the specific work, as we can observe in figure no. 1.

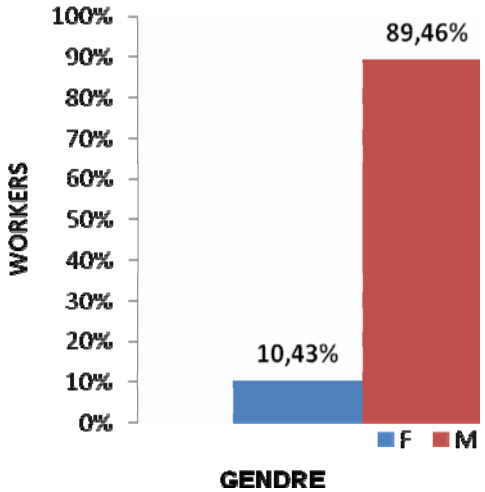


Figure 1. Repartition by gendre of the study groupe

Analyzing statistical data we show that patients age was between 19 and 65 years, with the following stratification:

Figure 2. Distribution of study group by age

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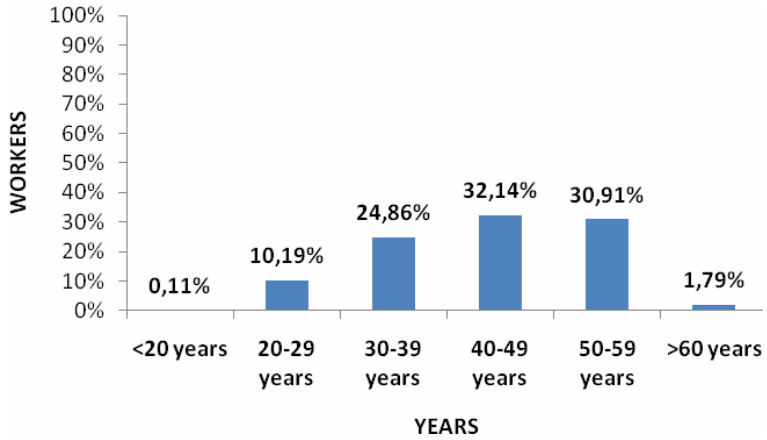


Figure 2. Distribution of study group by age

Regarding the total professional age we have found many workers, respectively 727, with a very long professional age period, over 15 years, as it is showed in the figure no. 2.

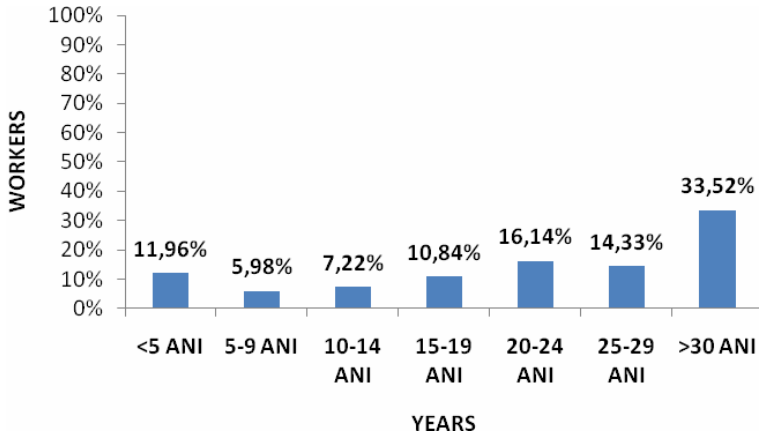


Figure 2. Distribution of study group by total professional period

Analyzing the period at current job we have found that approximately 1/3 of workers have less years at your current job, one third have a long period and one third have an very long experience at the current job as it results from figure no. 3:

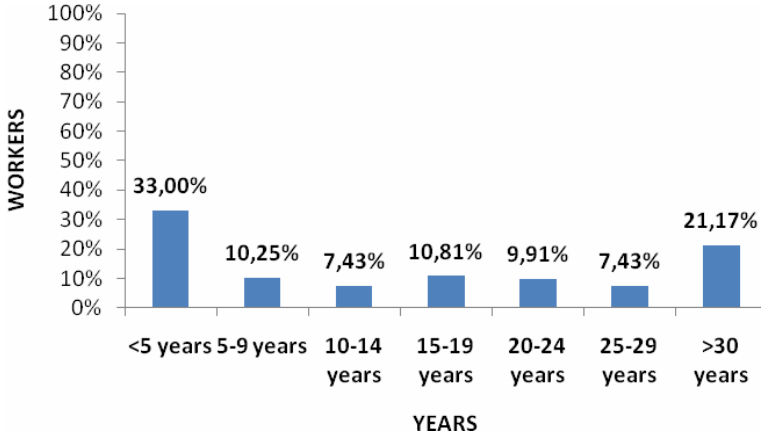


Figure 3. Distribution of study group by period at current job

Regarding to occupational respiratory pollutants we have found their presence in almost all workers, respectively 846 (94.84%) – figure 4.

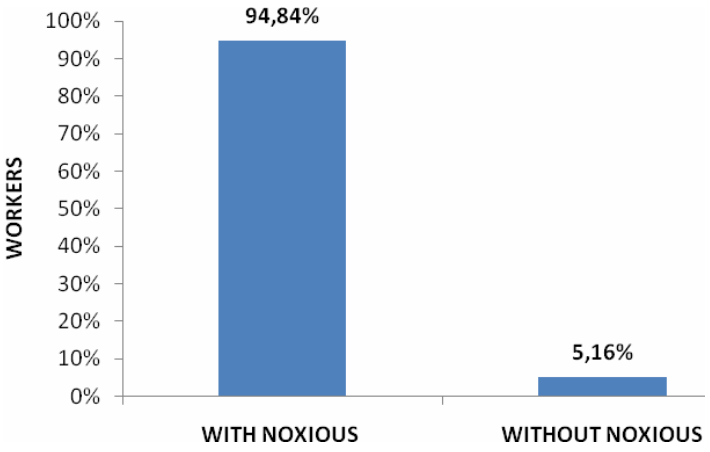


Figure 4. Incidence of exposure to occupational respiratory noxious

Regarding to the length of exposure to respiratory pollutants it can be observe that most of the workers have a log period of exposure (figure 5).

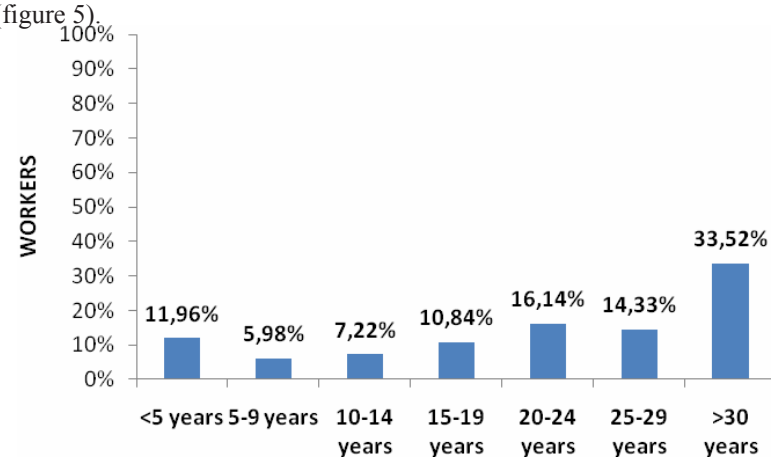


Figure 5. Length of exposure to noxious

Although the number of employees is very high and pollutants are present almost everywhere, we demonstrate that the number of occupational diseases reported is very low, ie 1.35% (figure 6).

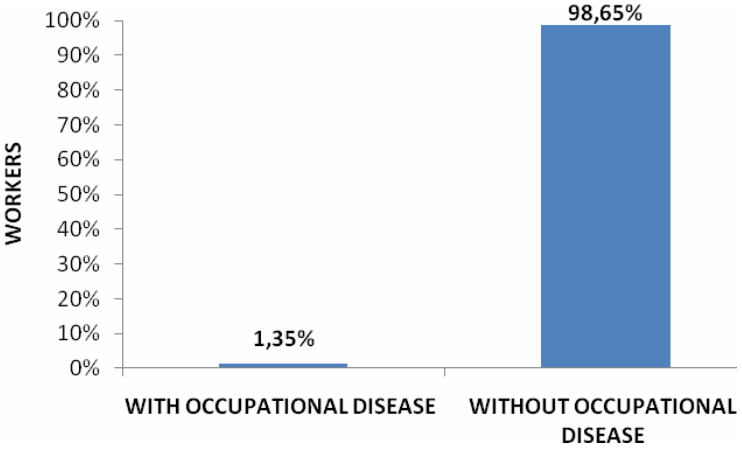


Figure 6. The incidence of occupational diseases

The incidence of occupational accidents shows that 3.03% of employees have suffered such an accident to date (figure 7).

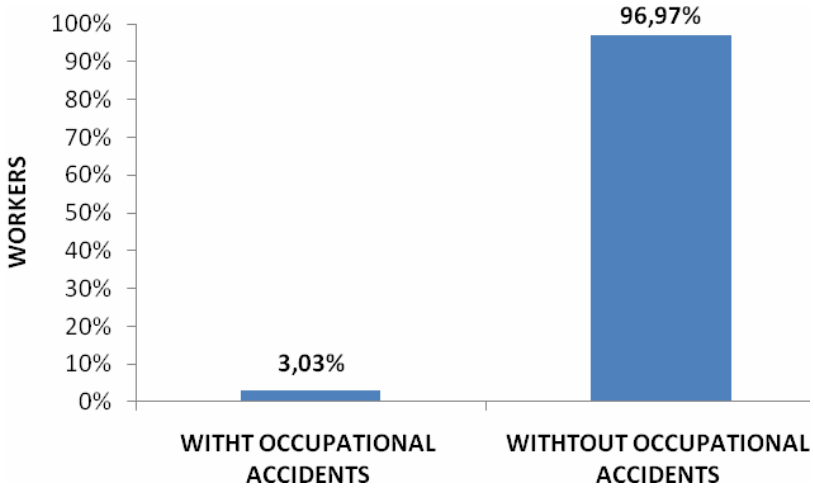


Figure 7. Incidence of occupational accidents

Also, a very small number of workers have symptoms that appear at work (figure 8).

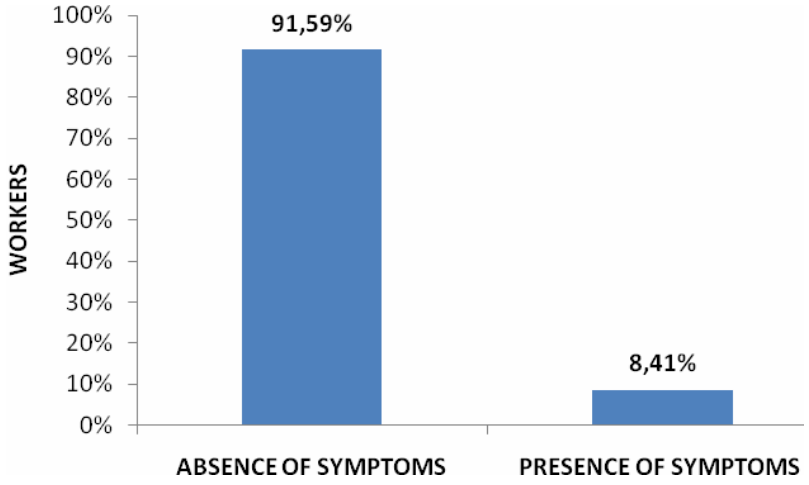


Figure 8. Incidence of symptoms at work

The FVC analysis shows that just over half of the workers have normal values, ie 80% (50.79%), but a significant percentage of workers, 38.76 have very low levels (below 40%) of the parameter (figure 9).

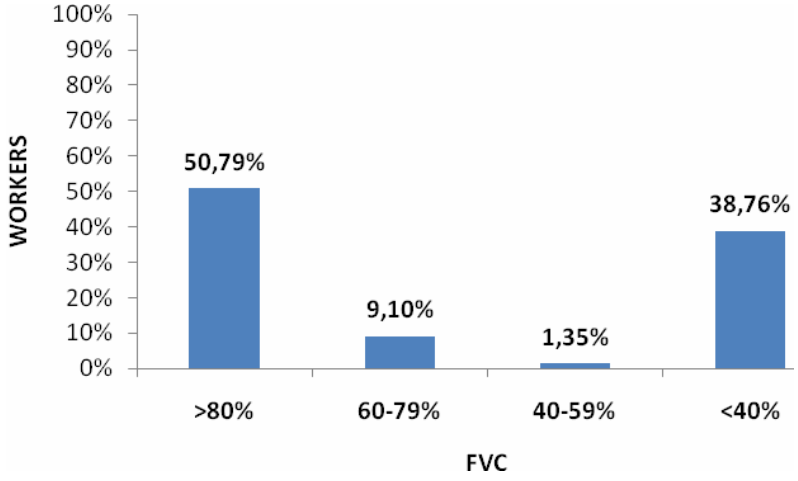


Figure 9. FVC analysis in the study group



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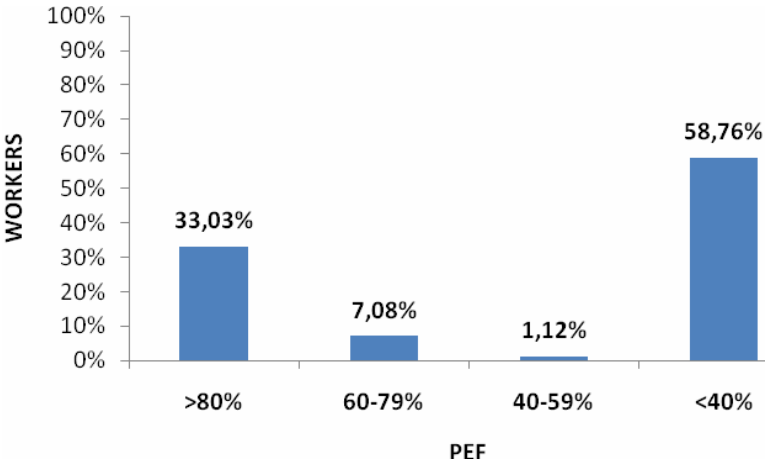


Figure 10. FPEF analysis in the study group

Regarding the large airways obstruction, as evidenced by FEV1 analysis we have found that 57.08% have a very low FEV1, below 40% (figure 11).

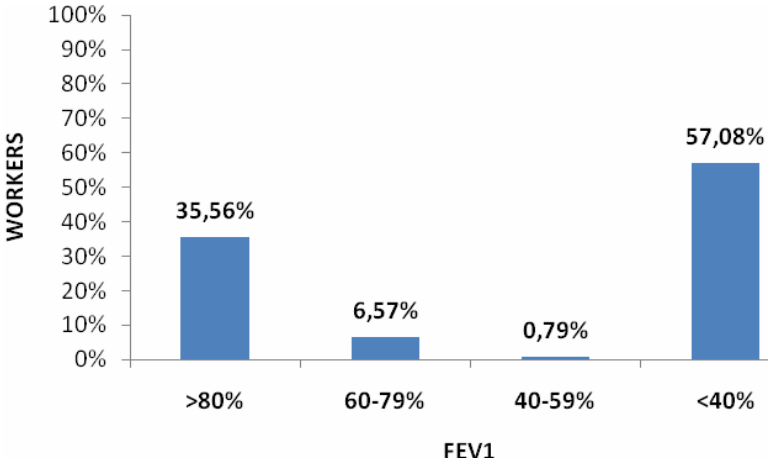


Figure 11. FEV1 analysis in the study group

FEV1/FVC analysis shows that a significant percent, 81.77% of workers had normal values of this parameter (figure 12).

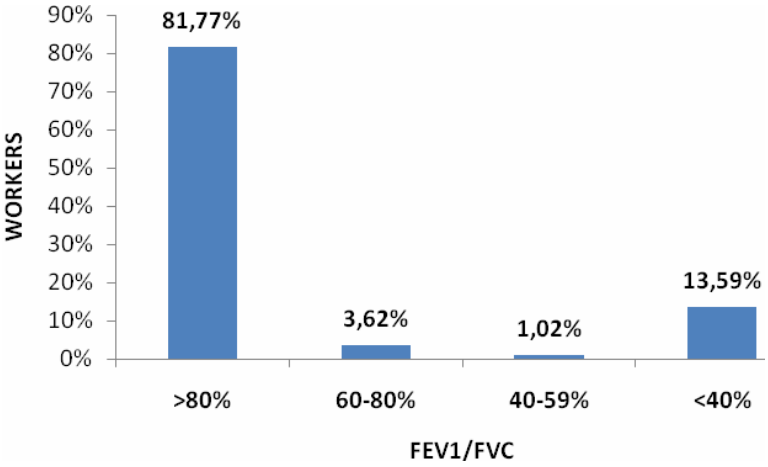


Figure 12. FEV1/FVC analysis in the study group

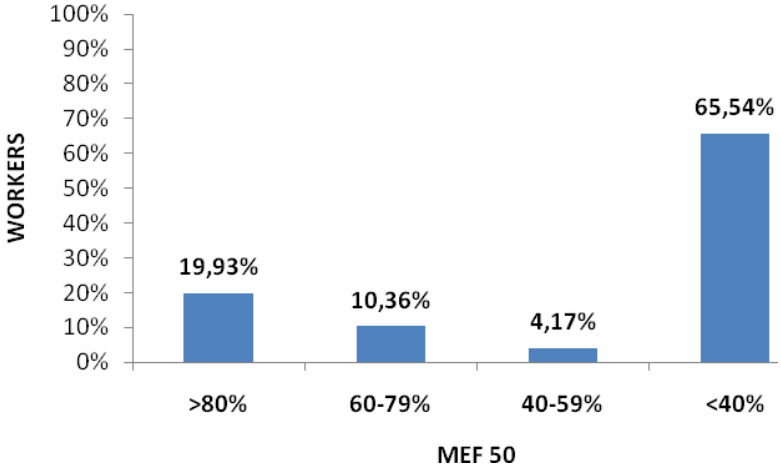


Figure 13. MEF 50 analysis in the study group

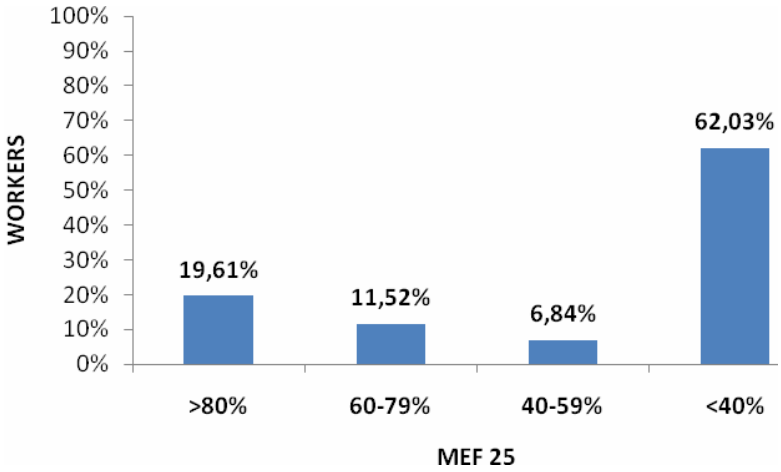


Figure 14. MEF 25 analysis in the study group

Severe obstruction of the small airways is confirmed in 67.83% of workers in MMEF 25-75 analysis (figure 15).

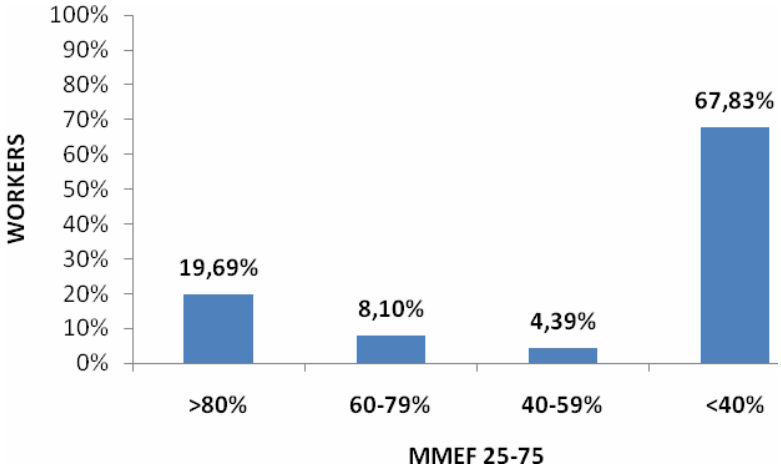


Figure 15. MMEF 25-75 analysis in the study group

The tobacco consumption shows that only 39.24% of workers are non-smokers (figure 16).



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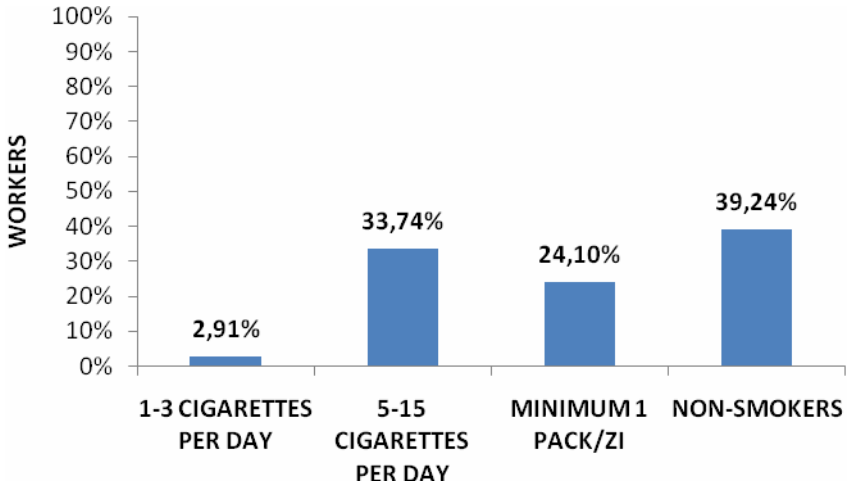


Figure 16. The incidence of smoking

Analyzing the parameters obtained by spirometry in non-smoking workers we have found the following values (table I):

**Table I. Spirometry values in nonsmoker workers**

| SPIROMETRY VALUES IN NON-SMOKERS | VC | FVC | FEV 1 | FEV/VC | PEF | MEF 50 | MEF 25 | MMEF 25-75 |
|---|---|---|---|---|---|---|---|---|
| **>80%** | 71,10% | 91,14% | 94,81% | 86,30% | 93,43% | 86,29% | 80,92% | 88,29% |
| **60-79%** | 25,72% | 8,00% | 4,32% | 13,41% | 5,14% | 10,29% | 12,14% | 8,00% |
| **40-59%** | 2,60% | 0,86% | 0,86% | 0,29% | 0,86% | 2,86% | 5,20% | 2,57% |
| **<40%** | 0,58% | 0,00% | 0,00% | 0,00% | 0,57% | 0,57% | 1,73% | 1,14% |
| **Total** | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% |

Analyzing the same parameters in smokers, the following values was found (table II):

**Table II. Spirometry values in smoker workers**

| SPIROMETRY VALUES IN SMOKERS | VC | FVC | FEV 1 | FEV/VC | PEF | MEF 50 | MEF 25 | MMEF 25-75 |
|---|---|---|---|---|---|---|---|---|
| **>80%** | 69,04% | 86,73% | 89,47% | 80,87% | 89,24% | 80,75% | 76,62% | 83,40% |
| **60-79%** | 27,77% | 11,21% | 8,83% | 17,23% | 9,09% | 11,03% | 12,17% | 8,77% |
| **40-59%** | 3,00% | 1,68% | 1,13% | 1,70% | 1,48% | 5,23% | 7,98% | 6,16% |
| **<40%** | 0,19% | 0,37% | 0,56% | 0,19% | 0,19% | 2,99% | 3,23% | 1,68% |
| **Total** | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% |

Comparing FVC in non-smokers and smokers we have found no significant differences (figure 17)

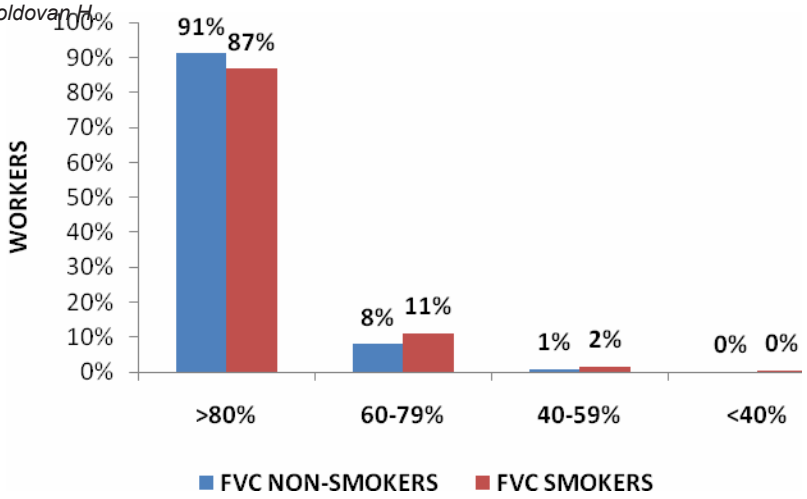


Figure 17. FVC analysis in smoker and nonsmoker workers

The same is observed from the analysis of FEV1 (figure 18):

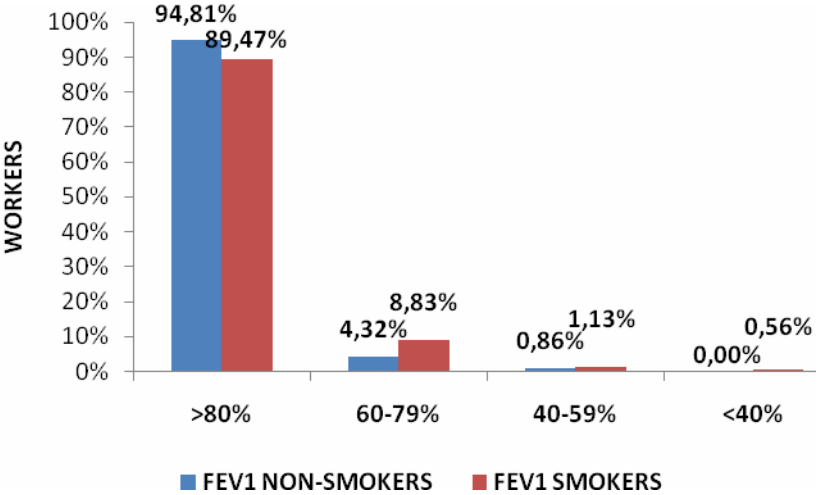


Figure 18. FEV1 analysis in smoker and nonsmoker workers

It notes the same fact from FEV1/FVC, PEF and MMEF 25-75 analysis (figure 19, figure 20 and figure 21)

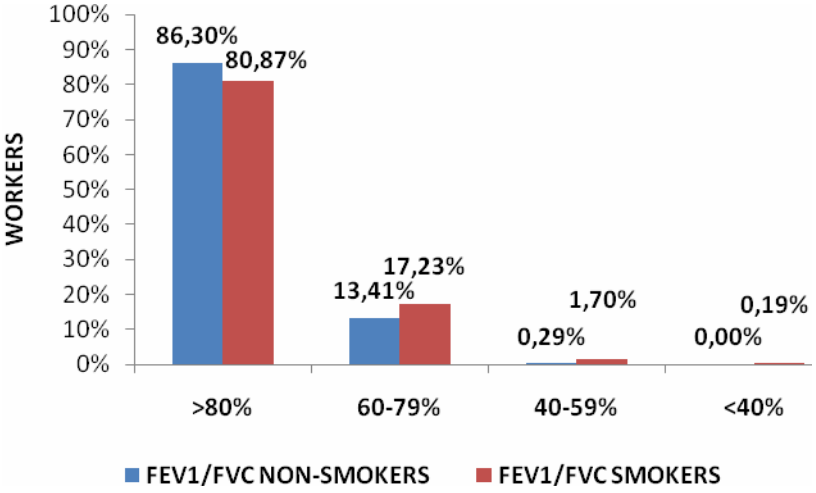


Figure 19. FEV1/FVC analysis in smoker and nonsmoker workers



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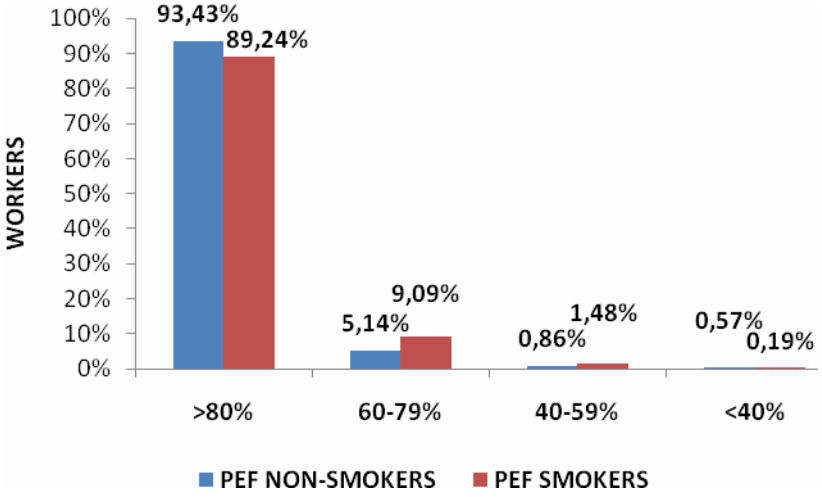


Figure 20. PEF analysis in smoker and nonsmoker workers

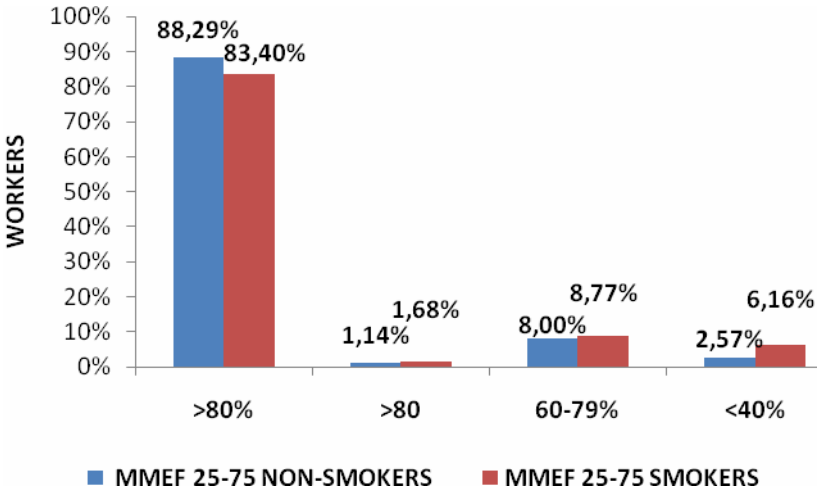


Figure 21. MMEF 25-75 analysis in smoker and nonsmoker workers

Were have analyzed separately spirometry values obtained from workers not exposed to occupational respiratory pollutants, obtaining the following values (table III):

**Table III. Spirometry values in workers unexposed to respiratory pollutants**

| SPIROMETRY VALUES IN UNEXPOSED WORKERS | VC | FVC | FEV 1 | FEV/VC | PEF | MEF 50 | MEF 25 | MMEF 25-75 |
|---|---|---|---|---|---|---|---|---|
| **>80%** | 57,81% | 89,23% | 93,75% | 85,71% | 96,92% | 89,23% | 81,54% | 90,77% |
| **60-79%** | 34,38% | 9,23% | 6,25% | 14,29% | 3,08% | 6,15% | 10,77% | 4,62% |
| **40-59%** | 6,25% | 1,54% | 0,00% | 0,00% | 0,00% | 4,62% | 6,15% | 4,62% |
| **<40%** | 1,56% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 1,54% | 0,00% |
| **Total** | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% |

Analyzing the same paramatri to workers who have exposure to occupational respiratory pollutants the spirometry shows the following parameter values (table IV):

**Table IV. Spirometry values in workers exposed to respiratory pollutants**

| SPIROMETRY VALUES IN EXPOSED WORKERS | Values VC | FVC | FEV 1 | FEV/VC | PEF | MEF 50 | MEF 25 | MMEF 25-75 |
|---|---|---|---|---|---|---|---|---|
| **>80%** | 70,88% | 88,52% | 91,52% | 82,90% | 90,52% | 82,66% | 78,07% | 85,12% |
| **60-79%** | 26,41% | 9,89% | 7,00% | 15,74% | 7,90% | 11,11% | 12,39% | 8,78% |
| **40-59%** | 2,58% | 1,34% | 1,11% | 1,24% | 1,34% | 4,15% | 6,82% | 4,63% |
| **<40%** | 0,12% | 0,24% | 0,37% | 0,12% | 0,24% | 2,08% | 2,73% | 1,46% |
| **Total** | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% | 100,00% |

Comparing the most important spirometry parameters (FVC, FEV1, FEV1/FVC, PEF, MMEF 25-75) in patients with exposure and those without respiratory exposure to pollutants in the workplace it is showed that there are no significant differences in these parameters (figure 22, figure 23, figure 24, figure25 and figure 26):

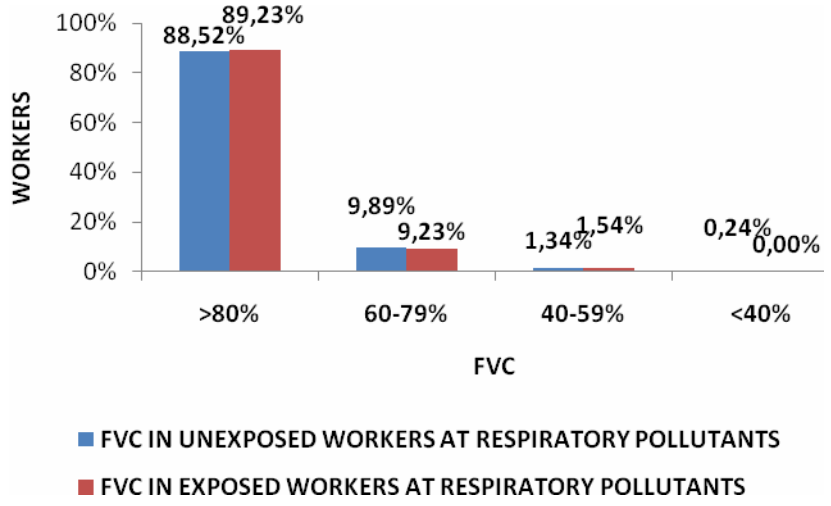


Figure 22. FVC analysis in workers exposed to respiratory pollutants

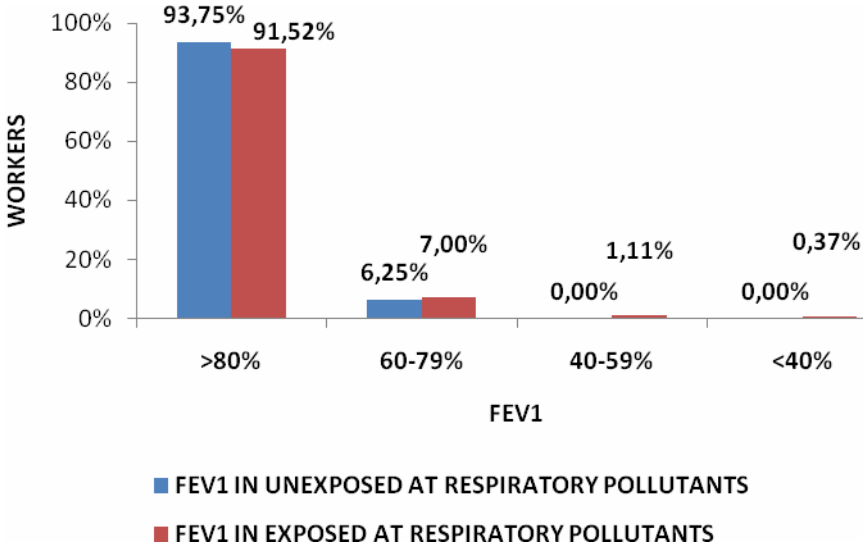


Figure 23. FEV1 analysis in workers exposed to respiratory pollutants

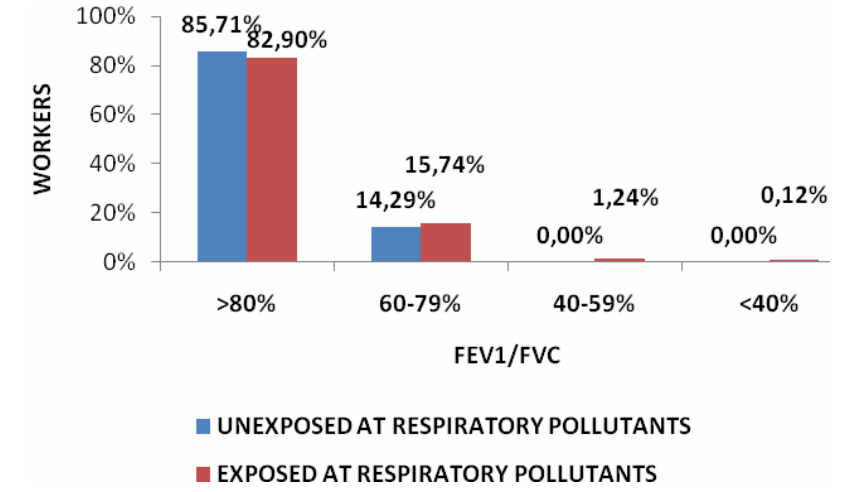


Figure 24. FEV1/FVC analysis in workers exposed to respiratory pollutants

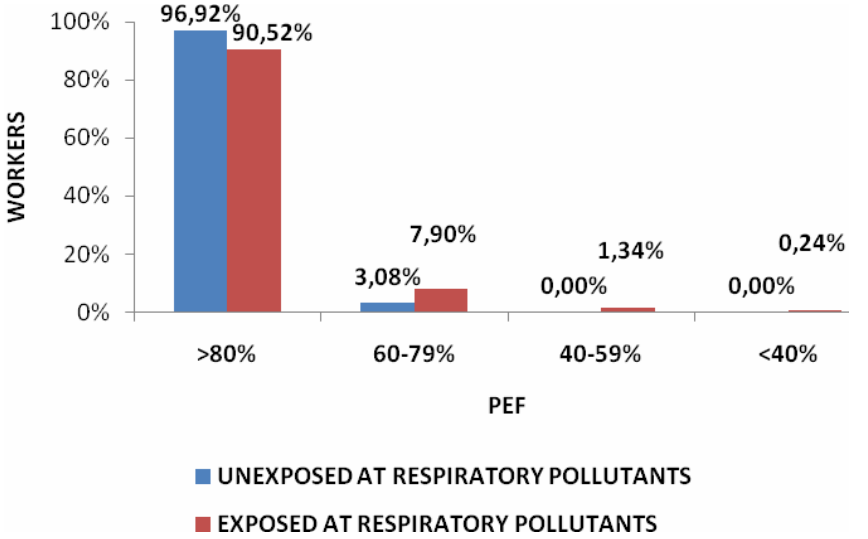


Figure 25. PEF analysis in workers exposed to respiratory pollutants

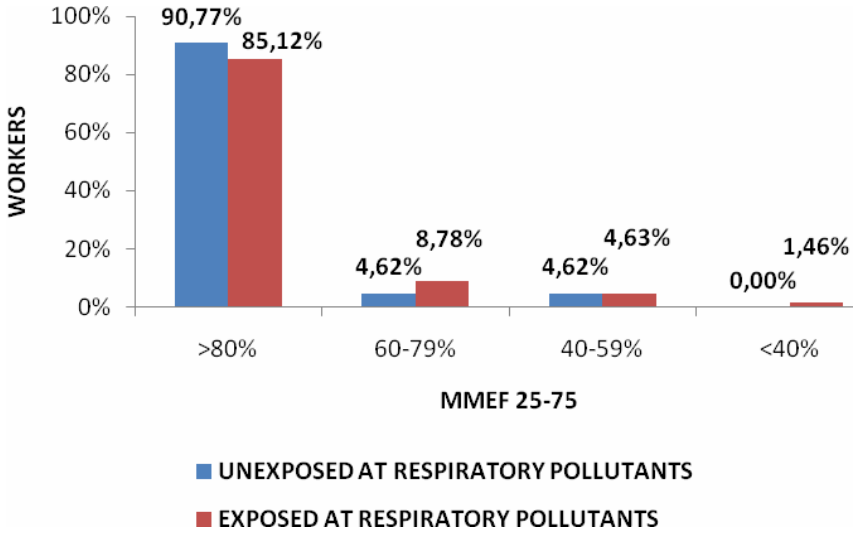


Figure 26. MMEF 25-75 analysis in workers exposed to respiratory pollutants

## CONCLUSIONS

The vast majority of workers have a great experience at the present workplace and thus high exposure to irritant gases and vapors.

The workers exposed to irritant gases and vapors in the study group have varying degrees of lung obstruction.

The lung restriction is present just in a few cases.

Obstruction can not be directly related to either smoking or the presence or absence of respiratorz pollutants.

It is demonstrate that the small airways obstruction is more often that large airway s obstruction .

The cause of airways obstruction is multifactorial, occupational respiratory pollutants, smoking and other factors being involved.

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