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## Associations between self-reported carpal tunnel syndrome (CTS) and co-exposure to physical constraints and neurotoxic chemicals in male agricultural workers in France in 2010

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## Background

Musculoskeletal disorders (MSDs) are a significant health problem in the agricultural working population. According to recent data from the French Agricultural Health Insurance System (Mutualité sociale agricole – MSA), 93% of compensated occupational diseases were MSDs, including 38% of carpal tunnel syndrome (CTS).

CTS is an entrapment neuropathy of the median nerve at the wrist which produces paresthesia and weakness of the muscles of the hand.

Exposure to neurotoxic chemicals over a long period may lead to central or peripheral neuropathy. Combination with physical constraints, which are known risk factors for MSDs, may increase the risk of CTS.

**The aim of this study was to assess the associations between CTS and co-exposure to physical constraints of the wrist in the last 12 months and neurotoxic chemicals in the preceding 10 years in male agricultural workers.**

## Methods

### Study population

- Data were collected in 2010 by a self-administered questionnaire for the pilot phase in a COSET-MSA cohort implemented by the French Public Health Agency.
- People aged 18 to 65 years were randomly selected from the MSA database of 5 French administrative areas.
- For the study, we selected male agricultural workers who had worked for at least 12 months.



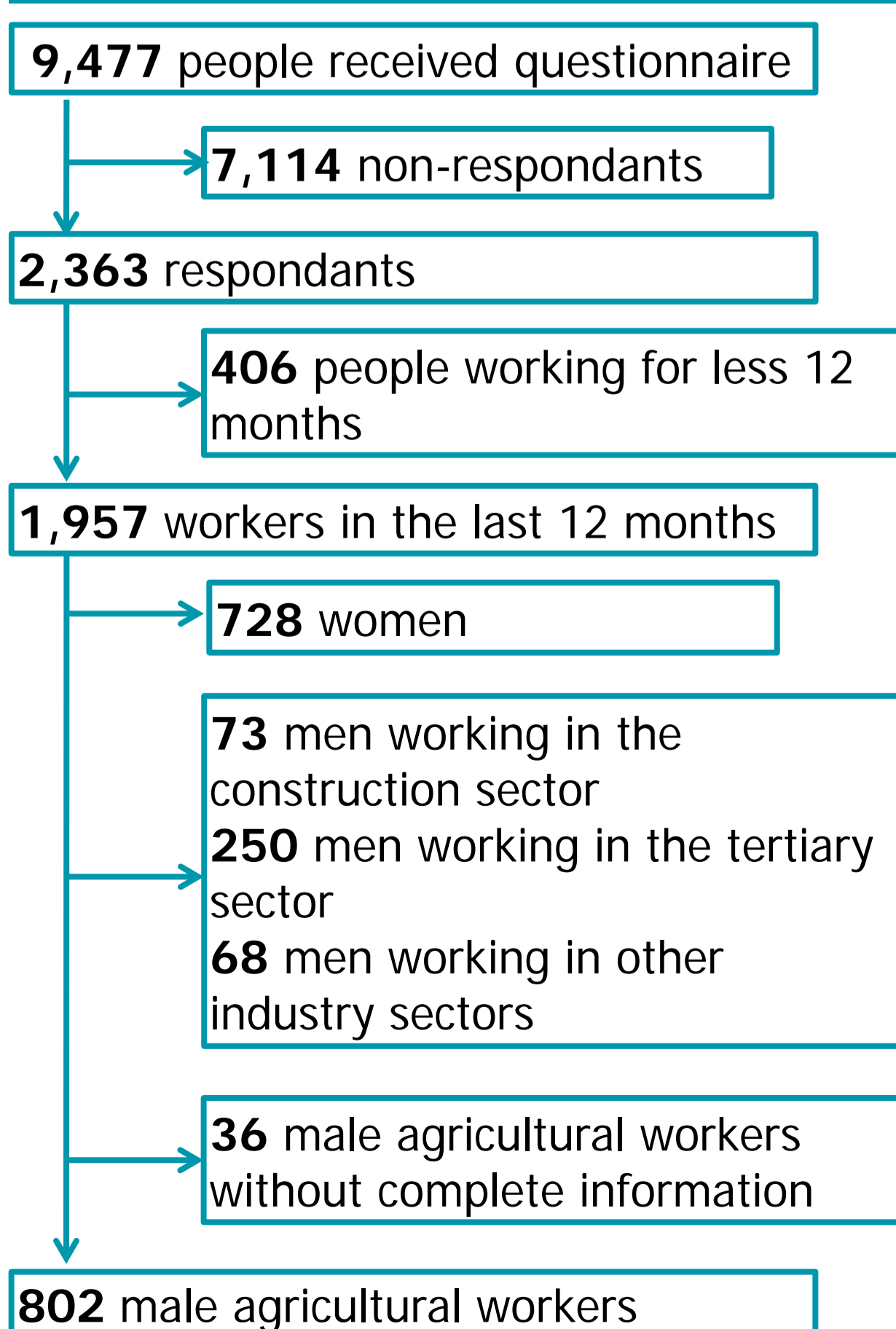
### Variables

- Self-reported CTS in the last 12 months
- 6 physical constraints of the wrist in the last 12 months: repetitiveness, use of vibrating hand-tools, manipulating loads (more than 4kg), twisting the wrist, holding objects in a pinch grip, pressing with the base of the palm
- 11 neurotoxic chemicals in the preceding 10 years: pesticides, petrol (solvent), white spirit, cellulosic thinner, other solvents, glue, paint, ink, trichloroethylene, paraffin oil, diesel
- 4 personal variables: age, obesity, alcohol consumption and smoking

### Statistical analysis

- Estimations of prevalence taking into account the sampling method and non-response.
- Chi-2 tests for weighted data were used to compare groups.
- Statistical associations between CTS and co-exposure were modelled using logistic regression, adjusted for personal factors.

## Results



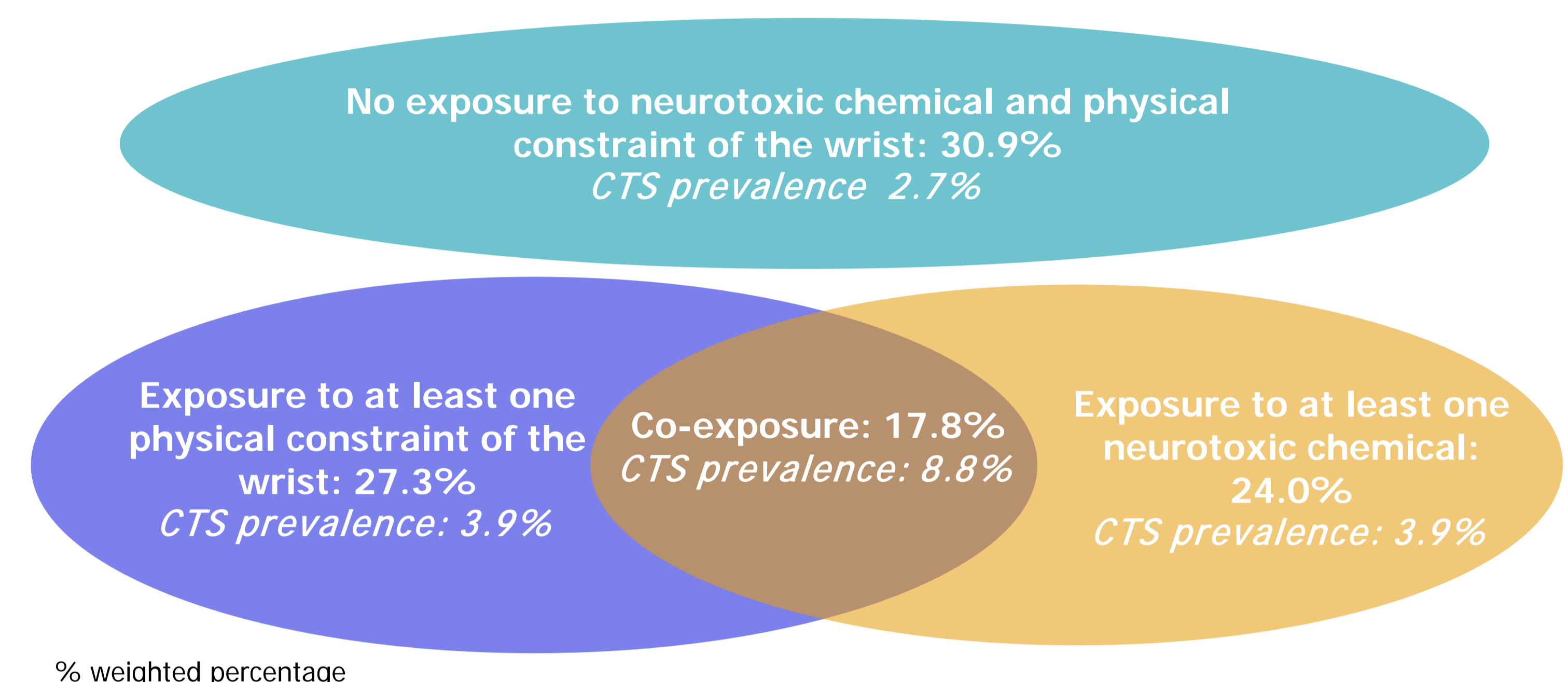
**Figure 1: Flow chart of participants**

### Study population

- 2,363 respondents (response rate 25%)
- 802 men working in agriculture, forestry and fishing sector (Figure 1)
  - 46.2% farmers
  - 30.1% agricultural blue collar workers (BCW)
  - 14.6% craftsmen, salesmen and managers; upper grade white-collar and professional workers; technicians, associate professionals; lower grade white-collar workers
  - 9.1% BCW (except agricultural BCW)

## Co-exposure to physical constraints and neurotoxic chemicals and CTS reported in the last 12 months

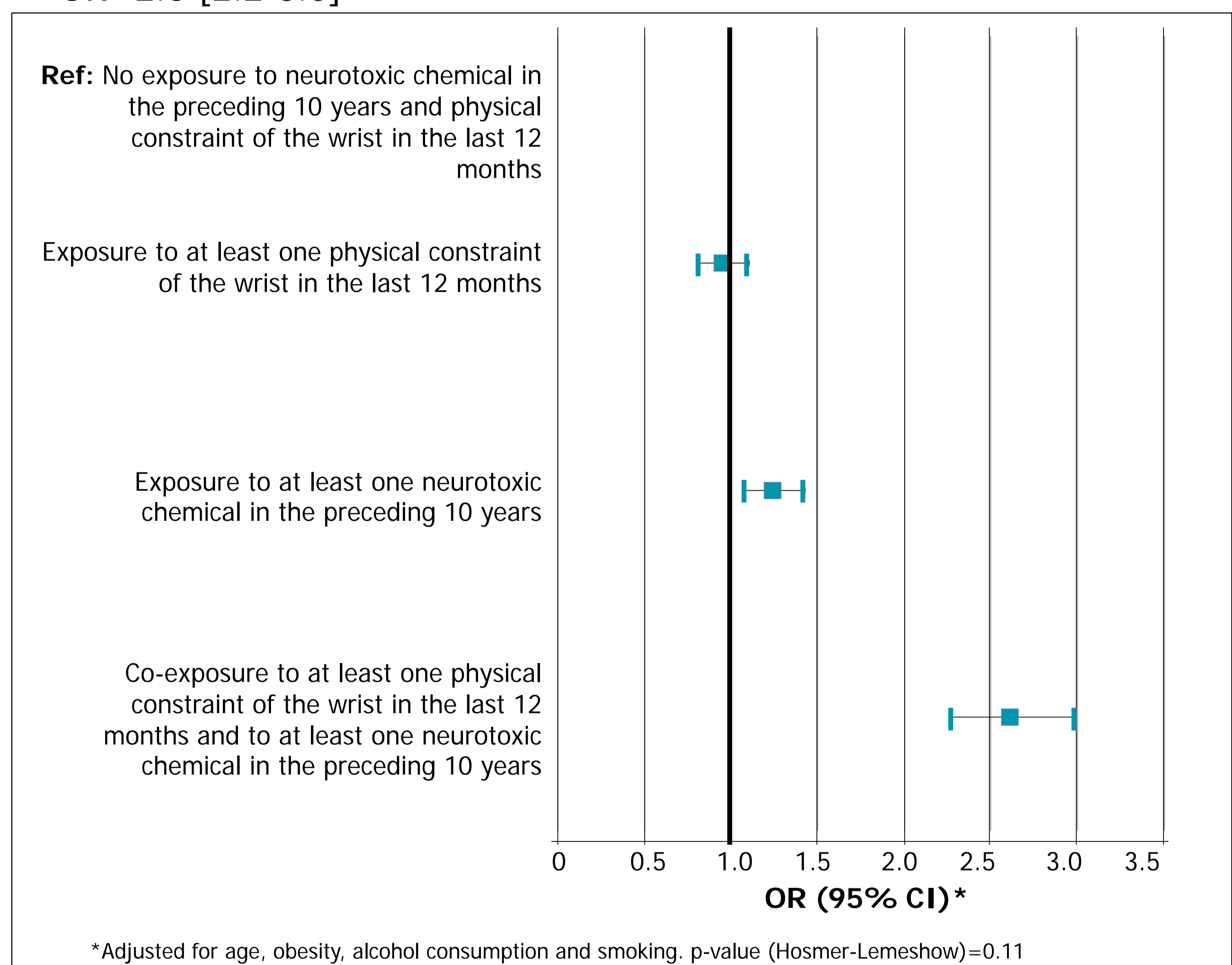
- 39 (4.4% [2.6-5.4]) male agricultural workers reported CTS
- The prevalence of CTS differed according to the four groups ( $p=0.04$ ).
- Prevalence was higher for co-exposed male agricultural workers (Figure 2)



% weighted percentage

**Figure 2: Exposure to neurotoxic chemicals and physical constraints and CTS prevalence for male agricultural workers**

- CTS and co-exposure to at least one physical constraint of the wrist and to at least one neurotoxic chemical were associated (Figure 3): OR=2.6 [2.2-3.0]



**Figure 3: Multivariate model of risk factors for CTS reported in the last 12 months for male agricultural workers**

## Discussion

- We found a significant association between self-reported CTS in the last 12 months and co-exposure to at least one physical constraint of the hand in the last 12 months and to at least one neurotoxic chemical in the preceding 10 years, after adjustment for personal risk factors.
- Limitations of this study
  - Cross-sectional study
  - Personal declaration of exposure to neurotoxic chemicals
- To improve this result, it will be necessary to study the effects of co-exposure according to the type of neuropathy (central or peripheral) caused by exposure to neurotoxic chemicals in the occurrence of CTS

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