

# EVALUATION OF ORGANOCHLORINE PESTICIDES BLOOD PLASMA LEVELS IN ENDEMIC DISEASE CONTROL AGENTS IN RIO DE JANEIRO STATE

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## 1. INTRODUCCION:

Organochlorine pesticides, already banned in most of countries because their biomagnification properties in trophic chains and also deleterious health effects, such as neurotoxicity, carcinogenicity and endocrine disruption, are still considered a public health concern in Brazil. Endemic Disease Control Workers or Vector Control Workers (VCW) were exposed chronically for decades to these substances, and because there is no safe threshold limits for carcinogenesis and endocrine disruption mechanisms, it has been necessary to quantify persistent amounts of organochlorine pesticides in these workers' bodies and deleterious effects associated with them. This study evaluated levels of organochlorine pesticides and other clinical and exposure biomarkers, aiming to characterize clinical-toxicological profile of these workers.

## 2. OBJECTIVE:

The main objective of this work was to quantify organochlorine pesticides levels in VCW of Rio de Janeiro State.

## 3. METODOLOGY:

Blood plasma samples from 127 vector control workers in Rio de Janeiro State were analyzed. In order to carry out part of toxicological analyses, analytical method used was based on 26 organochlorine pesticides quantification by solid phase extraction with C18 cartridge and cleanup with a florisil cartridge, and identification and quantification was done by gas chromatography coupled to triple quadrupole mass spectrometer, with equivalent column to 5% phenyl methylpolysiloxane, with acquisition mode by selective reaction monitoring. Data collection was carried out remotely through a questionnaire in Google Forms application, answered by the workers themselves between the years 2020 and 2022. The questionnaire included questions about sociodemographic and economic aspects, frequency of exposure, agrotoxics used, history of symptoms and illnesses, among others.

Statistical analyzes were performed using the statistical program Statistical Package for Social Science (SPSS) for Windows version 26.0 (IBM®).

## 4. RESULTS:

Total ion chromatograms and fullscan mass spectrum that were verified for each agrotoxic, as well as their transitions in SRM (selective reaction monitoring), are exemplified in figures 1, 2 and 3 for organochlorines  $\beta$ -HCH and p,p'-DDE.

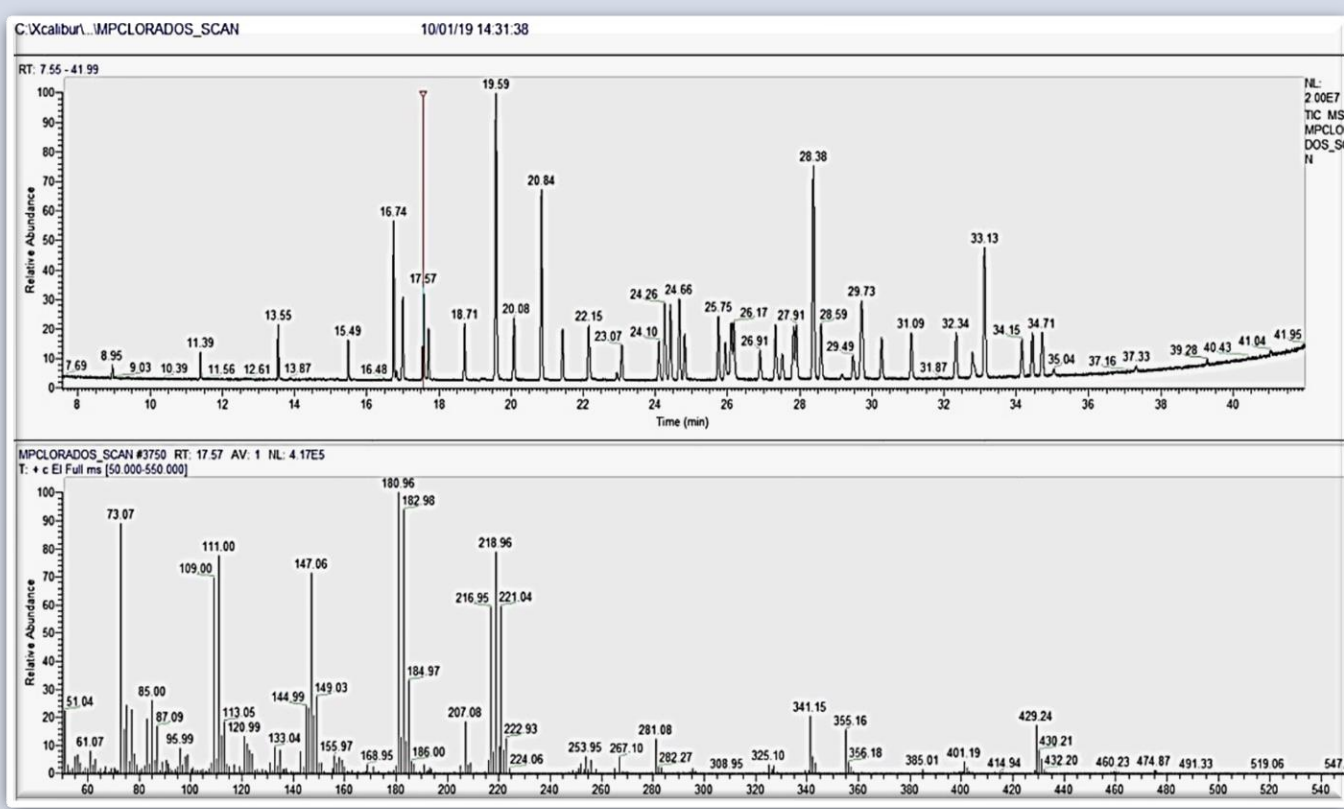


Figure 1 – Total ion chromatography and fullscan mass spectrum of  $\beta$ -HCH.

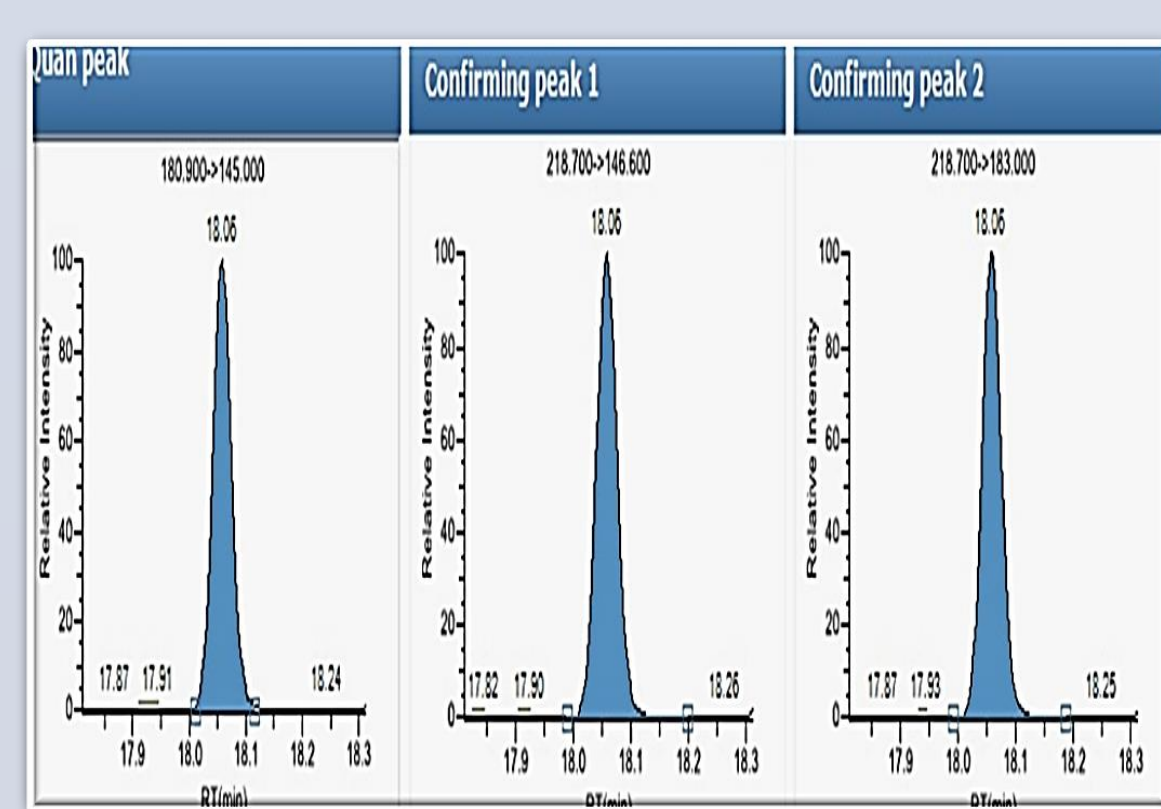


Figure 2 – SRM with the quantification and two qualification transitions.

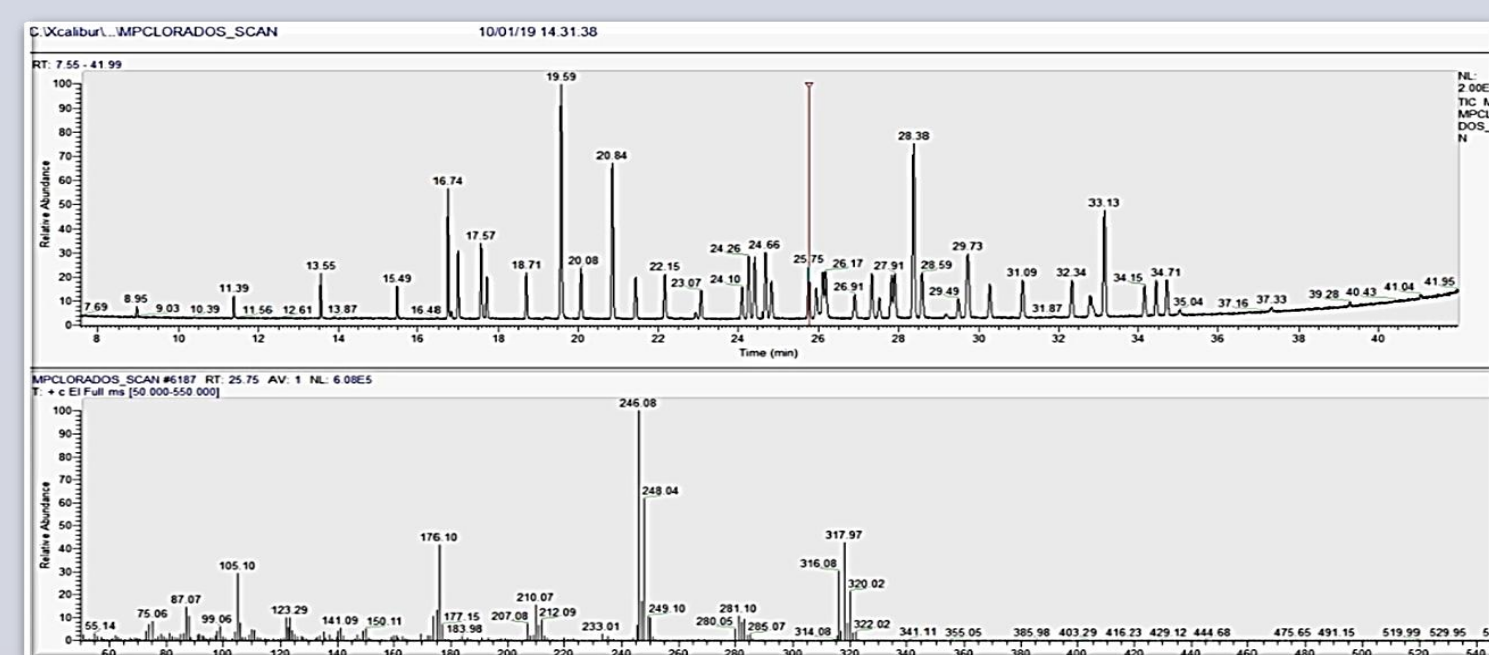


Figure 3 – Total ion chromatography and fullscan mass spectrum of p,p'-DDE.

Table 1 shows the limits of detection (LOD) and quantification (LOQ) for detected organochlorines, in ng mL<sup>-1</sup>.

Table 1: Quantification and detection limits, in ng mL<sup>-1</sup>.

Organochlorines	Limits of Quantification (LOQ)	Limits of Detection (LOD)
4,4'-DDE	0,205	0,068
4,4'-DDT	0,145	0,048
$\beta$ -HCH	0,053	0,017

Results indicated that 49% of VCW presented 4,4'-DDE residues, ranged from 0.19 to 2.61 ng mL<sup>-1</sup>. In addition, 17% of samples showed 4,4'-DDT (0.16 to 0.20 ng mL<sup>-1</sup>) and 12% showed  $\beta$ -HCH (0.09 to 0.28 ng mL<sup>-1</sup>), which were expressed in Figure 4.

Evaluation of organochlorines in plasma of Vector Control Workers in Rio de Janeiro State

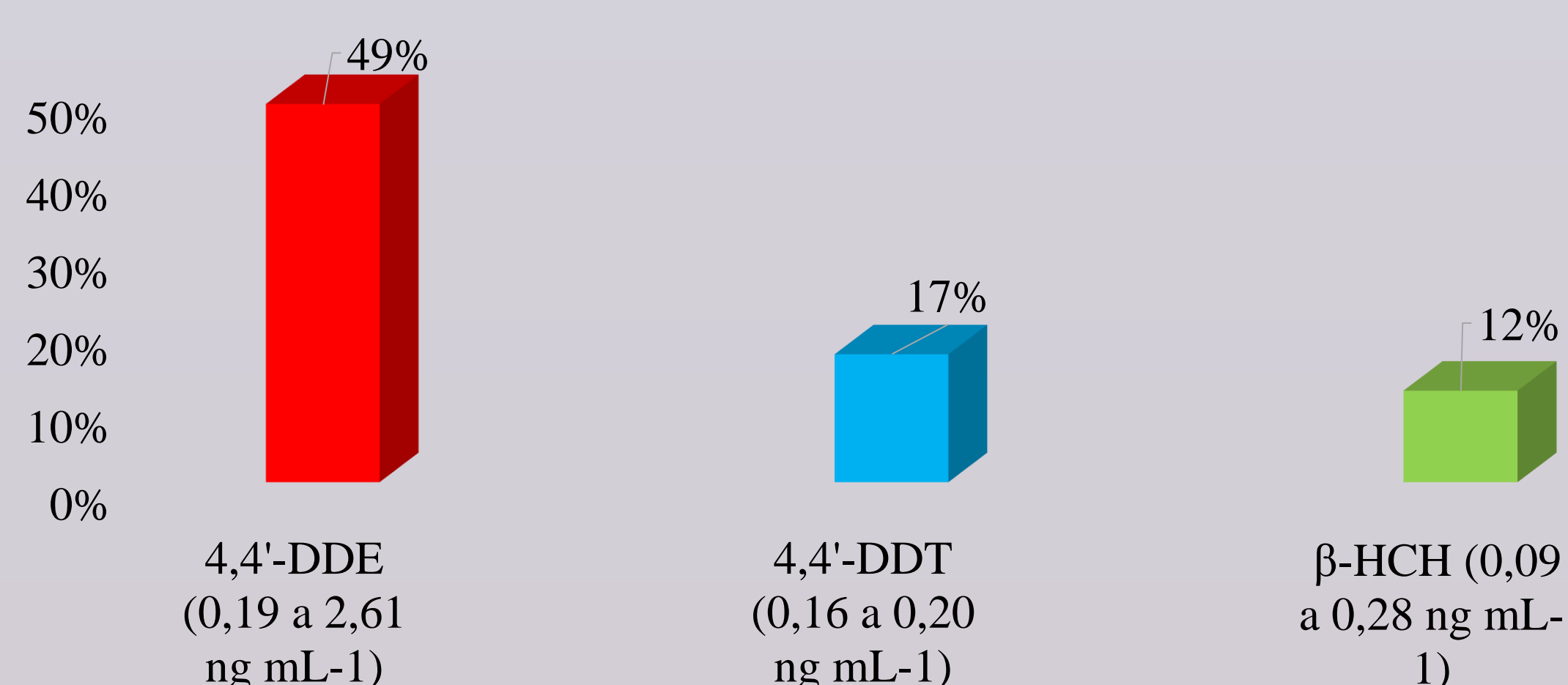


Figure 4 - Organochlorine plasma levels of Vector Control Workers

Most VCW are men (77%) from metropolitan region of Rio de Janeiro (80%), with complete secondary education (65%) and family income above 5 minimum wage (44%). The mean age is 57.5 years (standard deviation = 6.9 years), ranging from 22 to 73 years. About 97% are civil servants of Ministry of Health, and the mean with contact with pesticides in their routine activities as VCW is 21,8 years (standard deviation = 6.0 years).

Approximately 77% mentioned that they had skin contact with pesticides at work, while 81% reported experiencing symptoms of acute intoxication after contact with these chemicals, as reported in Figure 5.

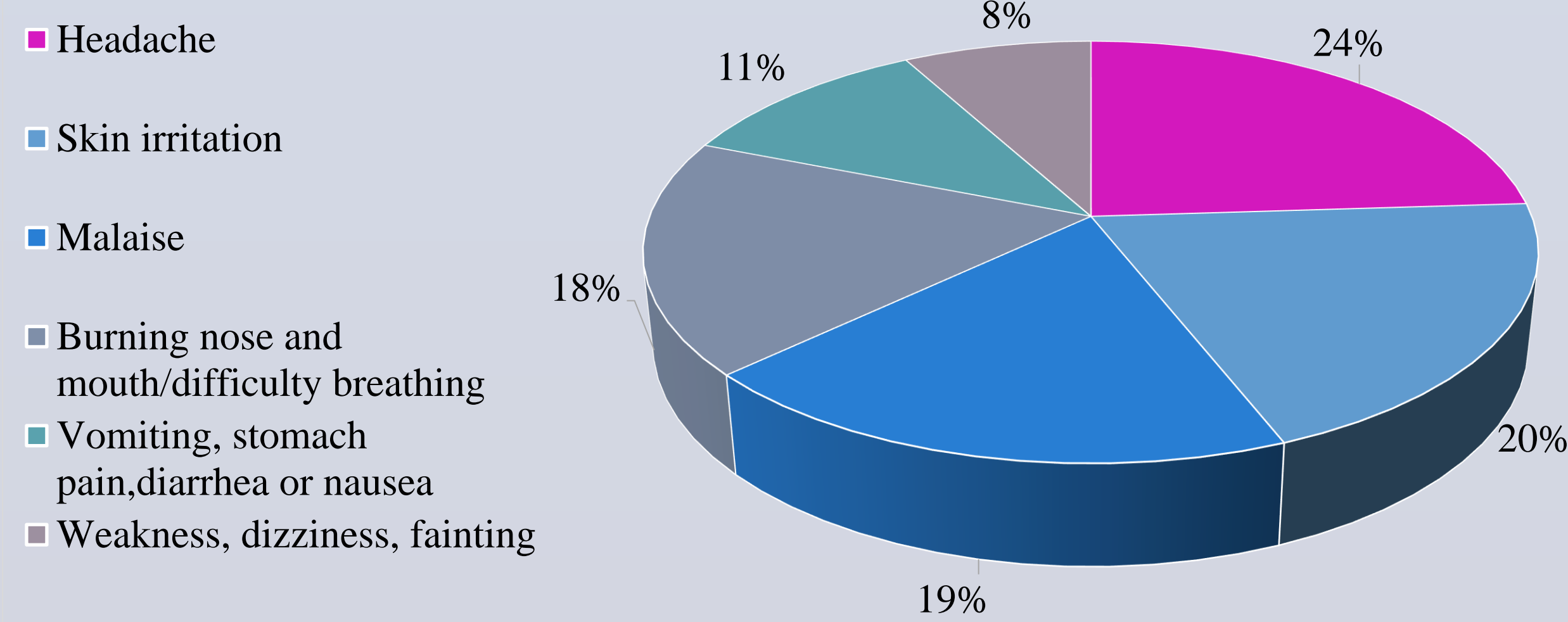


Figure 5 – Main symptoms reported after intoxication.

Approximately 87% reported having diagnosed chronic diseases, as showed in Figure 6.

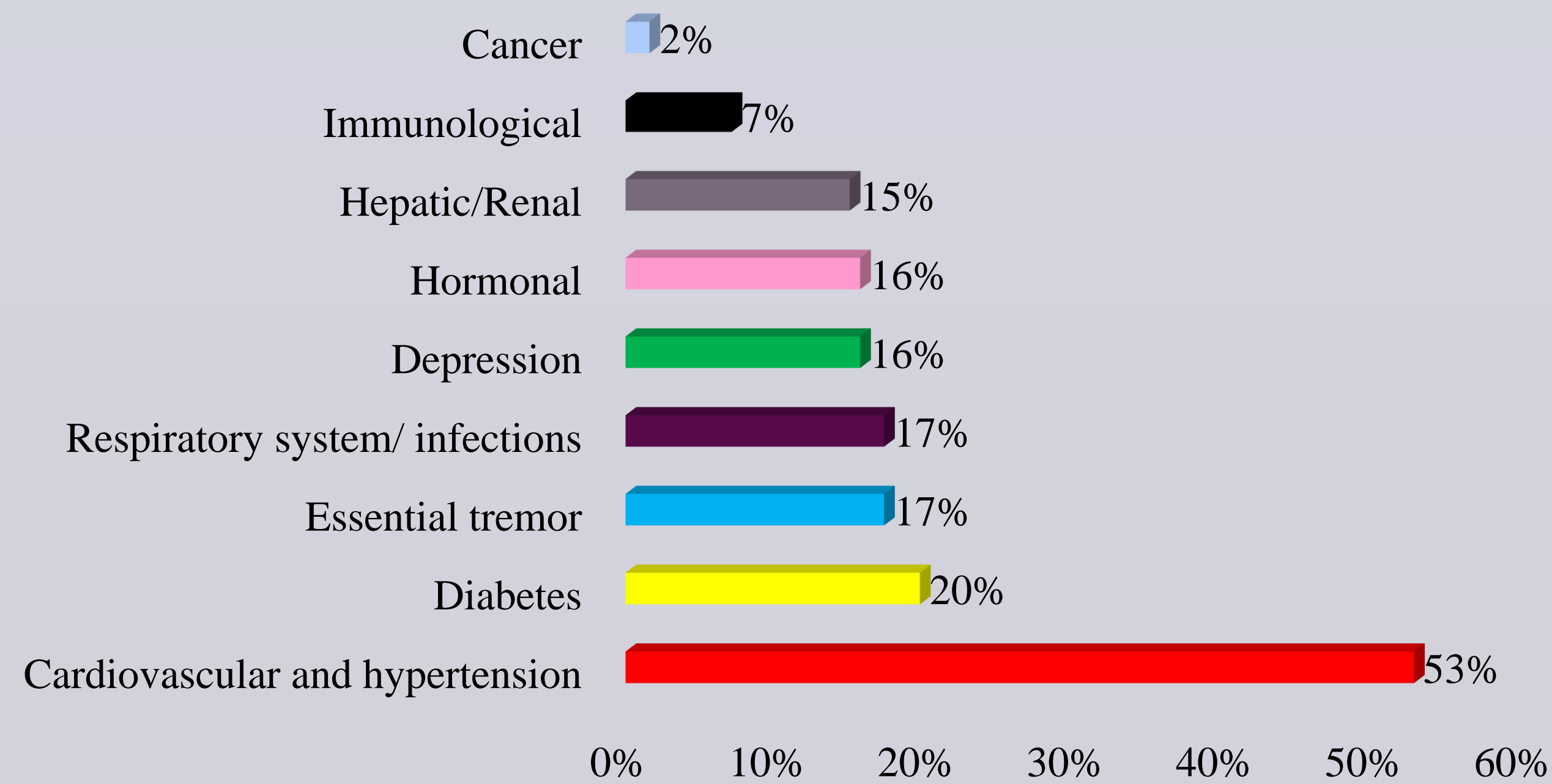


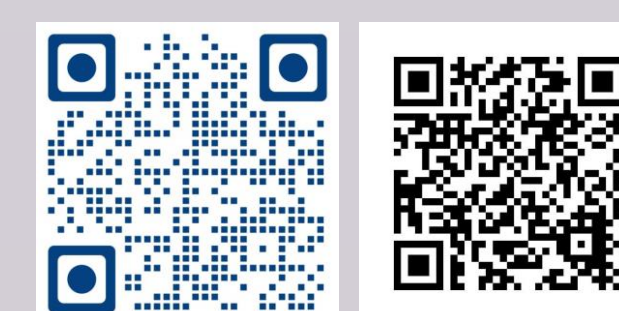
Figure 6 – Most self-reported diseases of VCW.

## 5. CONCLUSION:

This study can provide information for Vector Control Workers from Ministry of Health, which should offer satisfactory monitoring of these workers. Many of them have neurological clinical signs and mean age of death is lower than general population. This model of chemical substances harmful to human health used for vector control is the center of discussion for changing public policies for these workers.

6. ACKNOWLEDGMENTS: Fiocruz, Ministry of Health and Environment/ENSP

## 7. REFERENCES:



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