Burden of work-related cancer in France

Émilie Counil 1,2,3 & Annie Thébaud-Mony 1

1 GISCOP93, University Paris 13, Bobigny, France
2 EHESP, Department of epidemiology and biostatistics, Paris, France
3 IRIS (UMR 8156-997), Bobigny, France

EASHW Workshop on Carcinogens and Work-related Cancers
3-4 September, 2012 - Berlin, Germany
Materials and methods

1. Carcinogenic exposures at work: past and present

2. Compensated cases of cancer

3. The social burden of work-related cancers
### Main sources of data

<table>
<thead>
<tr>
<th>Information on:</th>
<th>Type of source:</th>
<th>Time window:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional sources</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensated cases of cancer (« OCs »)</td>
<td>Yearly statistics of work related injuries and ODs (National health insurance CNAM-TS, AT-MP)</td>
<td>Since 1985 (partial) Since 1995 (complete)</td>
</tr>
<tr>
<td><strong>The GISCOP permanent study</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposures and compensation process</td>
<td>An original interventional research carried out in patients suffering (respiratory) cancer in a Paris’ suburb</td>
<td>1930-2011 (exposures) 2002-2011 (compensation)</td>
</tr>
</tbody>
</table>
1. Carcinogenic exposures at work: Past and present

Number of exposed workers in 2003, France (SUMER)

2 370 000 exposed (13.5% workers)

3 596 100 exposures (prior week)

« Comparison » with CAREX (1990-94)

- At least 74 carcinogenic agents
- 4 938 000 exposed (22.7% of the active population)

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin
GISCOP93, University Paris 13, France
1. Carcinogenic exposures at work: Past and present

Number of exposed workers in 1990-93, France (CAREX)

4,937,345 exposed on > 74 agents (all IARC 1-2A in 1995)
Including:
• 1,523,308 solar radiation
• 1,162,464 passive tobacco smoke

IARC group  
1 108  
2A 64  
2B 271

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin  
GISCOP93, University Paris 13, France
# 1. Carcinogenic exposures at work: Past and present

## Job and sector trends (SUMER 2003)

<table>
<thead>
<tr>
<th>Category of workers (17.5 millions workers)</th>
<th>Proportion (%)</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exposed</td>
<td>No CPE</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13.5</td>
<td>42.3</td>
</tr>
<tr>
<td>Skilled BCW</td>
<td>30.9</td>
<td></td>
</tr>
<tr>
<td>Unskilled BCW</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>Intermediary jobs</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>34.9</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>21.2</td>
<td></td>
</tr>
<tr>
<td>Installation, maintenance, repair</td>
<td>43.3</td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>28.1</td>
<td></td>
</tr>
<tr>
<td>Handling, storage, transportation</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>Apprentice</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>Temporary workers</td>
<td>14.9</td>
<td></td>
</tr>
<tr>
<td>Under permanent contrat</td>
<td>13.8</td>
<td>42.5</td>
</tr>
</tbody>
</table>

### Comparison SUMER 1994-2003 (15.5 millions workers):

- +1% exposed
- More exposures by worker (but better Q)
- +3% short exposures (43% vs. 40%)
- Similar distribution of scores
- -8% without CPE (47% vs. 39%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mineral oils</th>
<th>Asbestos</th>
<th>Wood dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>4.4%</td>
<td>0.8%</td>
<td>1.6%</td>
</tr>
<tr>
<td>2003</td>
<td>4.1%</td>
<td>0.6%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
The GISCOP study

Seine-Saint-Denis is a French department located in the north-east suburb of Paris.

Excess in cancer mortality rate:
- between 1991-1999 (from 10 to 30% compared to the Paris suburbs average)¹
- between 2000-2007 the gap is narrowing (from 5 to 12%)²

Former intensive industrial region

Blue-collar workers

Sources:
Map: http://www.ide.fr
¹Pépin 2007, Atlas de mortalité par cancer en IdF, ORS IdF
²Pépin & Chatignoux 2012, Atlas de mortalité par cancer en IdF, ORS IdF
1. Carcinogenic exposures at work: Past and present

The GISCOP study

Retrospective assessment:
- interview (job history) + collective expertise (exposures)

Prospective follow-up of notification of OD

- **Permanent** survey in 3 Seine-Saint-Denis hospitals since March 2002
- **Incident cases** diagnosed in patients living in Seine-Saint-Denis
- **Cancer** sites known for their links with occupational carcinogens

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin
GISCOP93, University Paris 13, France
1. Carcinogenic exposures at work: Past and present

Multiple exposures in the GISCOP study

- Jobs held by men, blue collar workers, craftmen and intermediary professionals, jobs in construction, car and metallurgy industry, and printing sectors most exposed and multi-exposed

- Based on 1017 job histories

- Asbestos (28.7% of exposed jobs), silica (16.7%), PAH (14.1%), benzene (9.9%), chlorinated solvents (9.1%) and welding fumes (7.6%) are the carcinogens the most found in patients’ jobs over the lifecourse

- No exposure 44% (n= 2678)
- One exposure 19% (n= 1162)
- Two exposure or more 37% (n= 2255)

Source: GISCOP study
01/03/2002-31/12/2011

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin
GISCOP93, University Paris 13, France
Invisible exposures

1. Sectors under (or not!) studied:
   - Maintenance and repair, functions which contribute directly to the production, ex: industrial maintenance (nuclear power, metallurgy, oil & chemical industry, car repairs)
   - Construction workplaces, which combine lots of activities (demolition, renovation, construction & reconstruction) and different types of profession (builders, plumbers, electricians...)
   - Cleaning & waste management (ex: cleaning of offices, hospitals or planes, radioactive decontamination, chemical waste management)

- Sub-contracting & contingent work
- Sexual division of occupational hazards
- Clusters of exposed workers
The French compensation system of ODs

1919: Occupational disease (OD) compensation Act
- a list of 113 OD tables, of which 22 recognized some type of cancer
- Presumption of occupational origin: « is presumed of being an OD any disease which is included in a OD table for a worker or ex-worker who has been exposed to occupational conditions & hazards specified in this table »

1993: The complementary system
- Regional committees for OD compensation (CRRMP)
- A direct (and essential) link between the disease and working conditions

Cancer related to an OD Table

But: one or several criteria are not met:
- Time-limit/duration of work/type of work
- The “direct link” between disease and work?

Out-table work related cancer

Not listed in a table and permanent partial disability (25%) cases
- The « essential and direct link » between disease and work?
### Occupational cancer in OD tables

Only 22 of the 113 **tables** of the Social Security Act\[1\] allow recognition of **cancer** cases as occupational diseases.

<table>
<thead>
<tr>
<th>Carcinogen</th>
<th>Affected Organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (benzene)</td>
<td>leukaemia</td>
</tr>
<tr>
<td>6 (ionis. rad.)</td>
<td>leukaemia, lung, osseous sarcoma</td>
</tr>
<tr>
<td>10ter (chrome 6)</td>
<td>lung, paranasal cavities</td>
</tr>
<tr>
<td>15ter (aromatic amines)</td>
<td>bladder</td>
</tr>
<tr>
<td>16bis (coal, PAH)</td>
<td>skin, lung, bladder</td>
</tr>
<tr>
<td>20 (arsenic)</td>
<td>skin, hepatic angiosarcoma</td>
</tr>
<tr>
<td>20bis &amp; 20ter (arsenic)</td>
<td>lung, mesothelioma</td>
</tr>
<tr>
<td>25 (silica)</td>
<td>lung, mesothelioma</td>
</tr>
<tr>
<td>30bis (asbestos)</td>
<td>skin, primitive carcinoma</td>
</tr>
<tr>
<td>37ter (nickel)</td>
<td>lung, ethmoïd and face sinus</td>
</tr>
<tr>
<td>45 (hepatitis viruses)</td>
<td>liver</td>
</tr>
<tr>
<td>47 (wood dust)</td>
<td>ethmoïd and face sinuses</td>
</tr>
<tr>
<td>52 (chloride of vinyl monomer)</td>
<td>hepatic angiosarcoma</td>
</tr>
<tr>
<td>85 (nitrosamines)</td>
<td>brain glioblastoma</td>
</tr>
<tr>
<td>43bis (formaldehyde)</td>
<td>nasopharynx</td>
</tr>
</tbody>
</table>

\[1\] They must be related to mentioned carcinogens and works. Available on: [http://www.legifrance.gouv.fr](http://www.legifrance.gouv.fr)
2. Compensated cases of cancer

Evolution of compensated cases in France 1985-2010

- All OCs
- Asbestos related tables
- Other tables & CRRMP

Source: Caisse nationale d’assurance maladie des travailleurs salariés (CNAM-TS)


1,686 compensated cancer cases in 2010

86% of compensated cancer cases

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin
GISCOP93, University Paris 13, France
### Attributable cases in France - Men (1995, 1999)

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Nb of cases</th>
<th>Low AF</th>
<th>High AF</th>
<th>Lower estimate</th>
<th>Higher estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung cancer</td>
<td>Incidence</td>
<td>18 713</td>
<td>13%</td>
<td>2 433</td>
<td>5 427</td>
</tr>
<tr>
<td></td>
<td>Deaths</td>
<td>20 867</td>
<td>13%</td>
<td>2 713</td>
<td>6 051</td>
</tr>
<tr>
<td>Lung cancer (asbestos)</td>
<td>Incidence</td>
<td>18 713</td>
<td>10%</td>
<td>1 871</td>
<td>3 742</td>
</tr>
<tr>
<td></td>
<td>Deaths</td>
<td>20 867</td>
<td>10%</td>
<td>2 086</td>
<td>4 172</td>
</tr>
<tr>
<td>Pleural mesothelioma</td>
<td>Incidence</td>
<td>632-681</td>
<td></td>
<td>537</td>
<td>599</td>
</tr>
<tr>
<td>Naso-sinus</td>
<td>Incidence</td>
<td>250</td>
<td></td>
<td></td>
<td>502</td>
</tr>
<tr>
<td>Leukemia</td>
<td>Incidence</td>
<td>2 233</td>
<td></td>
<td>112</td>
<td>413</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>Incidence</td>
<td>7 815</td>
<td></td>
<td>625</td>
<td>1 110</td>
</tr>
<tr>
<td></td>
<td>Deaths</td>
<td>3 470</td>
<td>10%</td>
<td>31</td>
<td>492</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Incidence</strong></td>
<td><strong>29 668</strong></td>
<td></td>
<td><strong>3 767</strong></td>
<td><strong>7 651</strong></td>
</tr>
</tbody>
</table>

Source: InVS 2003

Update incidence 2005: 4 826 to 9 606 in men
3. The social burden of work-related cancers

"Occupational cancers" in France

Source: InVS 2003
3. The social burden of work-related cancers

Missing tables of « occupational cancer »

- At least 45 (17 IARC group 1, 28 group 2A) agents or activities (InVS 2005)
- Tables needing to be adapted:
  - Restrictive list of activities (ex: chromium VI)
  - Duration of exposure (ex: asbestos)
  - Medical history (ex: silica dust ad lung cancer, condition of prior silicosis)
  - ...
- Priority tables (Diricq commission report, 2011):
  - Ovary and larynx cancers - asbestos
  - Breast cancer - night shift work
  - Colorectal cancer - wood dust (table 47)
  - ...
- Multiple exposures
The social construction of the invisibility of work-related cancers in France

3. The social burden of work-related cancers

- J-Job history 1116
- Eligible & Consent 1302
- E-« Exposed » 945 (E/J=85%)
- M-Medical certificate 570 (M/E=60%)
- N-Notification to HI 369 (N/M=65%)
- C- Compensated 281 (C/N=76%) (C/M=49%) (C/E=30%)
- P-Pending 20 (P/N=5%)
- R-Refusal 68 (R/N=19%)

Unmasking, toxic ignorance

Heterogeneity

Restrictive criteria

No notification

Logic of assessment

Source: GISCOP study 01/03/2002-11/05/2012
A dominant model of interpretation hiding occupational & environmental hazards

Attributable causes of cancer:

1. individual behaviors: smoking, alcohol
2. genetic risk factors: «at risk work » or « at risk workers »?
3. individual conditions not included in the IARC list of carcinogens: estimate of cancer cases which did not appear by the fact to avoid obesity and to have a physical activity

(Source: Attributable Causes of Cancer in France in the year 2000. IARC Working Group Reports, Lyon, 2007)
Learning from biology & toxicology
Each cancer = a complex history

• Cancer is not responding to the simple model:
  “one cause = one or several effect(s)”

• It is a process:
  • long (several decades)
  • complex (several events, several steps)
  • Involving multiple necessary and sufficient “causes”

• For a person suffering cancer, it is not possible to scientifically choose between the different possible “causes”: smoking? alcohol? occupational and/or environmental exposure to carcinogens?

• Synergistic effects are under-studied and socially invisible

EASHW Workshop on Carcinogens and Work-related Cancers, 3-4 September 2012 - Berlin GISCOP93, University Paris 13, France
3. The social burden of work-related cancers

The cost of under-notification and under-compensation

E-« Exposed » → M-Medical certificate → N-Notification to HI → C- Compensated

- Imputed to a specific employer
- Not imputed to a specific employer

R-Refusal by HI

Disputed by victim
Approved by court → Paid by HI

Disputed by employer
Approved by court → Paid by HI

Estimated cost for HI=251-657 millions€/year (Diricq 2011)

HI: Health Insurance
3. The social burden of work-related cancers

Social inequalities and deficit of prevention

• Eurofound results (2010): the proportion of European workers exposed to chemicals is increasing (15%)
• No data on the social division of carcinogen exposure
• Asbestos issues as emblematic of the dilemma for protecting workers from carcinogens exposure at the final step of the « industrial hazards chains »
• In spite of changes in work organization, no change in the prevention & compensation systems of occupational cancer
Charles C. Ebbets (1932), picture of 11 workers at the 69th floor of the General Electric building, NYC

Thank you for your attention