

Supplementary Material

Recall of exposure in UK farmers and pesticide applicators: trends with follow-up time

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Table S1. Recalled exposure information collected in each study.

| Exposure information | Study | | |
|---------------------------------|-------|-------|------|
| | PUHS | PIPAH | SHAW |
| Frequency of application | | | |
| Years | √ | | |
| Days per year | √ | √ | √ |
| Hours per year | √ | √ | √ |
| Crops (areas of work) | √ | √ | √ |
| PPE items | √ | √ | √ |
| Hygiene habits | | √ | |
| Application method | | √ | √ |

Table S2. Regression model coefficients (95% confidence intervals) of the geometric mean ratio of recalled to baseline years (n=132), days (n=433) and hours (n=408) per year mixing and applying pesticides. Coefficients represent estimation relative to the reference group. Adjusted for all parameters in the table at the time of follow-up, plus cohort.

| Parameter | Years ^{1,2} | Days ³ | Hours ⁴ |
|-------------------|----------------------|-------------------|--------------------|
| <i>Age</i> | | | |
| <60 years | 1.00 | 1.00 | 1.00 |
| ≥60 years | 0.89 (0.70-1.13) | 0.98 (0.80-1.22) | 1.19 (0.89-1.58) |
| <i>Sex</i> | | | |
| Male | 1.00 | 1.00 | 1.00 |
| Female | 1.38 (0.94-2.02) | 0.95 (0.54-1.67) | 2.02 (0.99-4.13) |
| <i>Education</i> | | | |
| Secondary or less | 1.00 | 1.00 | 1.00 |
| Beyond secondary | 1.12 (0.92-1.38) | 1.02 (0.86-1.20) | 1.04 (0.83-1.31) |
| <i>Experience</i> | | | |
| <40 years | 1.00 | 1.00 | 1.00 |
| ≥40 years | 1.04 (0.82-1.32) | 1.01 (0.81-1.24) | 0.96 (0.72-1.27) |

¹Data from the PUHS study only.

²Overall GMR for years = 1.18 (95% CI: 1.07-1.30)

³Overall GMR for days = 0.99 (95% CI: 0.91-1.08)

⁴Overall GMR for hours = 0.98 (95% CI: 0.87-1.10)

Table S3. Recall of the five most reported PPE items when mixing or handling dry pesticides in the PIPAH cohort.

| PPE item | N | Baseline Prevalence n (%) | Recalled Prevalence n (%) | Prevalence Ratio | Sensitivity (%) | Specificity (%) | Overall Agreement (%) | AUC |
|-------------------|-----|---------------------------|---------------------------|------------------|-----------------|-----------------|-----------------------|------|
| Gloves | 323 | 237 (73.4) | 246 (76.2) | 1.04 | 85.2 | 48.8 | 75.5 | 0.67 |
| Boots | 323 | 233 (72.1) | 219 (67.8) | 0.94 | 78.1 | 58.9 | 72.8 | 0.69 |
| General work wear | 323 | 194 (60.1) | 138 (42.7) | 0.71 | 51.0 | 69.8 | 58.5 | 0.60 |
| Face shield | 323 | 157 (48.6) | 144 (44.6) | 0.92 | 64.3 | 74.1 | 69.4 | 0.69 |
| CE marked clothes | 323 | 115 (35.6) | 136 (42.1) | 1.18 | 64.4 | 70.2 | 68.1 | 0.67 |

Table S4. Washing and changing behaviours after pesticide use (PIPAH only).

| Behaviour | N | Baseline Prevalence n (%) | Recalled Prevalence n (%) | Prevalence Ratio | Sensitivity (%) | Specificity (%) | Overall Agreement (%) | AUC |
|----------------------------------|-----|---------------------------|---------------------------|------------------|-----------------|-----------------|-----------------------|------|
| Wash hands before eating | 311 | 310 (99.7) | 308 (99.0) | 0.99 | 99.4 | 100 | 99.4 | 1.00 |
| Bathe right after | 313 | 105 (33.6) | 87 (27.8) | 0.83 | 58.1 | 87.5 | 77.6 | 0.73 |
| Wash clothes \geq 2 days after | 314 | 183 (58.3) | 205 (65.3) | 1.12 | 84.7 | 61.8 | 75.2 | 0.73 |
| Washed clothes separately | 314 | 134 (42.7) | 143 (45.5) | 1.07 | 74.6 | 76.1 | 75.5 | 0.75 |
| Remove boots outside home | 315 | 298 (94.6) | 291 (92.4) | 0.98 | 94.0 | 35.3 | 90.8 | 0.65 |

Table S5. Baseline and recalled application method for pesticide use on crops.

| Method | N | Baseline Prevalence n (%) | Recalled Prevalence n (%) | Prevalence Ratio | Sensitivity (%) | Specificity (%) | Overall Agreement (%) | AUC |
|---------|-----|---------------------------|---------------------------|------------------|-----------------|-----------------|-----------------------|------|
| PIPAH | | | | | | | | |
| Tractor | 323 | 235 (72.3) | 287 (88.9) | 1.22 | 97.5 | 34.1 | 80.2 | 0.66 |
| Manual | 323 | 14 (4.3) | 11 (3.4) | 0.79 | 57.1 | 99.0 | 97.2 | 0.78 |
| SHAW | | | | | | | | |
| Tractor | 17 | 14 (82.4) | 15 (88.2) | 1.07 | 100 | 66.7 | 94.1 | 0.83 |
| Manual | 22 | 2 (9.1) | 11 (50.0) | 5.5 | 100 | 55.0 | 59.1 | 0.78 |

Study questionnaires and materials



Pesticide users' health study: survey of pesticide usage

How to complete the questionnaire

This questionnaire asks about *which* pesticides you have used at work, and *how* and *when* you used them. It is vital that we have this information so that we can study how pesticides may affect the health of people who use them.

- Please complete the questionnaire as fully as possible, even if you have not used many pesticides or do not use them at the moment.
- We have kept the questions as simple as possible and most just require 'tick' answers in the appropriate boxes.
- All information you give will be treated in *strict confidence*.

We would like to know about your exposure to pesticides over the whole of your working life up to 2006. By pesticides, we mean products such as herbicides (weed-killers), insecticides, fungicides, fumigants, and growth regulators.

1. Have you ever used pesticides in your work up to 2006?

Yes

No → Please go to question 3

2. When did you first use pesticides in your work? (enter year first used)

3. Please list the approximate dates of the most recent jobs you have had in your working life up to 2006, starting with the most recent.

| | Year started | Year finished | Did you use pesticides in this job? |
|-------------------|----------------------|----------------------|--|
| Last job in 2006 | <input type="text"/> | | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Previous job No.1 | <input type="text"/> | <input type="text"/> | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Previous job No.2 | <input type="text"/> | <input type="text"/> | Yes <input type="checkbox"/> No <input type="checkbox"/> |

The following questions (4-11) relate to your last job in 2006. If you had no current job in 2006, please go to question 12.

4. When did you start this 2006 job?

Year started

5. How many years in this 2006 job did you use pesticides?

Years → If you did not use pesticides in this job please write '0' and go to question 12

6. On average, how many hours per year did you use pesticides in this 2006 job and on how many days?

hours per year
 on days per year } (Please answer both if possible, if not, whichever is easier)

24. In this previous job, did you normally work as a contractor?

Yes No

25. In this previous job, did you personally handle pesticide concentrate?

Yes, often
 Yes, sometimes
 No, only dilute product

26. In this previous job, were you ever knowingly made ill by exposure to pesticides?

Yes No

27. In this previous job did you work with any of the following? (please tick all that apply)

Sheep dips Non-agricultural pesticides (e.g. wood treatment)
 Rodenticides Other veterinary medicines

Contact details for the study team

Study team:

Dr Anne-Helen Harding (Principal Investigator, PIPAH).
 Health and Safety Laboratory, Harpur Hill, Buxton, Derbyshire, SK17 9JN, UK.
 Email: PIPAH@hse.gov.uk. Tel: 0800 093 4809

Dr Karen Galea (Principal Investigator, IMPRESS project).
 Institute of Occupational Medicine, Edinburgh, UK
 Email: karen.galea@iom-world.org. Tel: 0131 449 8034

Please return the questionnaire and consent form in the envelope provided.

7. Please tick the appropriate boxes which summarises your main areas of pesticide work in 2006 (please tick all that apply)

| Agriculture | Horticulture | Other |
|---|---|---|
| <input type="checkbox"/> Cereals (wheat, barley, oats, rye etc) | <input type="checkbox"/> Orchard crops (apples, pears, plums etc) | <input type="checkbox"/> Golf courses, bowling greens, sports grounds |
| <input type="checkbox"/> Oilseeds (oilseed rape, linseed) | <input type="checkbox"/> Soft fruit (strawberries, currants etc) | <input type="checkbox"/> Amenity weed control: roads, pavements etc |
| <input type="checkbox"/> Potatoes | <input type="checkbox"/> Mushrooms | <input type="checkbox"/> Forestry |
| <input type="checkbox"/> Sugar beet | <input type="checkbox"/> Outdoor vegetables | <input type="checkbox"/> Aquatic |
| <input type="checkbox"/> Grassland and/or fodder crops | <input type="checkbox"/> Glasshouse crops (edible or ornamental) | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Other arable crops | <input type="checkbox"/> Hardy nursery stock | <input type="text"/> |
| <input type="checkbox"/> Hops | <input type="checkbox"/> Outdoor ornamental flowers and bulbs | <input type="text"/> |

8. In this 2006 job, did you normally work as a contractor?

Yes No

9. In this 2006 job, did you personally handle pesticide concentrate?

Yes, often → Please go to question 10
 Yes, sometimes → Please go to question 10
 No, only dilute product → Please go to question 11

10. What personal protective equipment did you normally wear when handling concentrate products? (please tick all that apply)

Gloves Rubber boots Coverall/Apron
 Face shield Respirator
 Other (please specify)

11. In this 2006 job did you work with any of the following? (please tick all that apply)

Sheep dips Non-agricultural pesticides (e.g. wood treatment)
 Rodenticides Other veterinary medicines

The following pages relate to previous jobs prior to 2006 where you have used pesticides. Please answer one set of questions for each job. If you have not used pesticides in any previous job, the questionnaire is complete.

12. Previous job details (please refer to your answers to question 3)

| | | |
|--------------------|----------------------|----------------------|
| | Year started | Year finished |
| Previous job No. 1 | <input type="text"/> | <input type="text"/> |

13. How many years in this previous job did you use pesticides?

Years

14. On average, how many hours per year did you use pesticides in this previous job and on how many days?

| | | |
|---------------------------------------|---|---|
| <input type="text"/> hours per year | } | (Please answer both if possible, if not, whichever is easier) |
| on <input type="text"/> days per year | | |

15. Please tick the appropriate boxes which summarises your main areas of pesticide work in this previous job (please tick all that apply)

| Agriculture | Horticulture | Other |
|--|--|---|
| <input type="checkbox"/> Cereals (<i>wheat, barley, oats, rye etc</i>) | <input type="checkbox"/> Orchard crops (<i>apples, pears, plums etc</i>) | <input type="checkbox"/> Golf courses, bowling greens, sports grounds |
| <input type="checkbox"/> Oilseeds (<i>oilseed rape, linseed</i>) | <input type="checkbox"/> Soft fruit (<i>strawberries, currants etc</i>) | <input type="checkbox"/> Amenity weed control: roads, pavements etc |
| <input type="checkbox"/> Potatoes | <input type="checkbox"/> Mushrooms | <input type="checkbox"/> Forestry |
| <input type="checkbox"/> Sugar beet | <input type="checkbox"/> Outdoor vegetables | <input type="checkbox"/> Aquatic |
| <input type="checkbox"/> Grassland and/or fodder crops | <input type="checkbox"/> Glasshouse crops (<i>edible or ornamental</i>) | <input type="checkbox"/> Other (<i>please specify</i>) |
| <input type="checkbox"/> Other arable crops | <input type="checkbox"/> Hardy nursery stock | <input type="text"/> |
| <input type="checkbox"/> Hops | <input type="checkbox"/> Outdoor ornamental flowers and bulbs | <input type="text"/> |

16. In this previous job, did you normally work as a contractor?

Yes No

17. In this previous job, did you personally handle pesticide concentrate?

Yes, often
 Yes, sometimes
 No, only dilute product

18. In this previous job, were you ever knowingly made ill by exposure to pesticides?

Yes No

19. In this previous job did you work with any of the following? (please tick all that apply)

| | |
|---------------------------------------|--|
| <input type="checkbox"/> Sheep dips | <input type="checkbox"/> Non-agricultural pesticides (e.g. wood treatment) |
| <input type="checkbox"/> Rodenticides | <input type="checkbox"/> Other veterinary medicines |

The following questions (20–27) relate to the second previous job where you used pesticides. If you only used pesticides in one previous job the questionnaire is complete.

20. Previous job No. 2 details (please refer to your answers to question 3)

| | | |
|--------------------|----------------------|----------------------|
| | Year started | Year finished |
| Previous job No. 2 | <input type="text"/> | <input type="text"/> |

21. How many years in this previous job did you use pesticides?

Years

22. On average, how many hours per year did you use pesticides in this previous job and on how many days?

| | | |
|---------------------------------------|---|---|
| <input type="text"/> hours per year | } | (Please answer both if possible, if not, whichever is easier) |
| on <input type="text"/> days per year | | |

23. Please tick the appropriate boxes which summarises your main areas of pesticide work in this previous job (please tick all that apply)

| Agriculture | Horticulture | Other |
|--|--|---|
| <input type="checkbox"/> Cereals (<i>wheat, barley, oats, rye etc</i>) | <input type="checkbox"/> Orchard crops (<i>apples, pears, plums etc</i>) | <input type="checkbox"/> Golf courses, bowling greens, sports grounds |
| <input type="checkbox"/> Oilseeds (<i>oilseed rape, linseed</i>) | <input type="checkbox"/> Soft fruit (<i>strawberries, currants etc</i>) | <input type="checkbox"/> Amenity weed control: roads, pavements etc |
| <input type="checkbox"/> Potatoes | <input type="checkbox"/> Mushrooms | <input type="checkbox"/> Forestry |
| <input type="checkbox"/> Sugar beet | <input type="checkbox"/> Outdoor vegetables | <input type="checkbox"/> Aquatic |
| <input type="checkbox"/> Grassland and/or fodder crops | <input type="checkbox"/> Glasshouse crops (<i>edible or ornamental</i>) | <input type="checkbox"/> Other (<i>please specify</i>) |
| <input type="checkbox"/> Other arable crops | <input type="checkbox"/> Hardy nursery stock | <input type="text"/> |
| <input type="checkbox"/> Hops | <input type="checkbox"/> Outdoor ornamental flowers and bulbs | <input type="text"/> |

PESTICIDE USE QUESTIONNAIRE (2016)

The Improving exposure assessment methodologies for epidemiological studies on pesticides study (IMPRESS) is a research project that aims to look at the reliability of exposure assessment in health studies of those who apply pesticides as part of their work activity. The research is carried out by a consortium led by the Institute of Occupational Medicine, Edinburgh and is funded by the European Crop Protection Association (ECPA).

You have been invited to take part in this study as you have previously completed a similar questionnaire as part of the ongoing PIPAH study. This questionnaire is a follow-up to those you completed previously. It is designed to provide an overall picture of your recall regarding use of pesticides during the previous questionnaire assessments. As such it has the same structure and contents to the survey you have responded to in **2016** (some questions, unnecessary for this new project, have been removed) and concerns your activities performed during the same year (from **January to December 2016**). To make this easier for you, we are asking for your 'best estimates' rather than for very detailed information.

All information provided will be treated as strictly confidential, and will only be used for research.

If you have any questions, please ring the freephone number **0800 093 4809** or email **PIPAH@hse.gov.uk**

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

Please answer each question like this, making sure that you write inside the boxes:

Please cross the box of your choice, for example: Yes No

Or, write in the boxes, for example:

Typical number of hours per day spent working with pesticide

Please note if you make a mistake please block fill the box that is not applicable and put a cross in the correct box, for example:

Yes No

SECTION 1

Your work history

1. Please enter today's date

Day Month Year

2. Were you in paid work (employed or self-employed) within the year starting from **January to December 2016**?

Yes No

SECTION 1

Your work history

3. Please describe all of the paid jobs you had in the period between January to December 2016. If you are a contractor, please consider this as one job unless you changed employment. If you had a paid job in 2016 which you started before 2016, please enter the actual start month and year for this job.

| Job title | Industry | Location | Postcode district | Main activity of the company or organisation you worked for | Start month and year | | | End month or year (if applicable) | | | | |
|-----------|------------|------------|-------------------|---|----------------------|---|---|-----------------------------------|---|---|---|---|
| | | | | | M | Y | Y | M | M | Y | | |
| | | | | | 0 | 3 | 8 | 7 | 1 | 0 | 1 | 6 |
| J1 | FARMER | SHREWSBURY | SY5 | GROWING CEREAL AND FODDER CROPS | 1 | 1 | 1 | 6 | | | | |
| J2 | CONSULTANT | SHREWSBURY | SY5 | REARING BEEF CATTLE | | | | | | | | |
| J1 | | | | PROVIDING ADVICE | | | | | | | | |
| J2 | | | | | | | | | | | | |
| J3 | | | | | | | | | | | | |
| J4 | | | | | | | | | | | | |
| J5 | | | | | | | | | | | | |
| J6 | | | | | | | | | | | | |
| J7 | | | | | | | | | | | | |

Examples: A study participant began working as a farmer in March 1987 and stopped in October 2016. He then worked as a consultant for the rest of the year. This information would be recorded as:

Contact details for the study team

Study team:

Dr Anne-Helen Harding (Principal Investigator, PIPAH).
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Email: PIPAH@hse.gov.uk. Tel: 0800 093 4809

Dr Karen Galea (Principal Investigator, IMPRESS project).
Institute of Occupational Medicine, Edinburgh, UK
Email: karen.galea@iom-world.org. Tel: 0131 449 8034

Please return the questionnaire and consent form in the envelope provided.

SECTION 2 Your work with pesticides

Please note that for the purpose of this questionnaire, the term "pesticide" includes:

- plant protection products, for example herbicides, plant growth regulators, fungicides, and insecticides;
- biocides used for pest control including insecticides, rodenticides and insect repellents used in livestock houses, and wood preservatives; and
- veterinary medicines used against ectoparasites, for example sheep dip, pour ons and similar products.

4. Did you personally mix, load, handle or apply pesticides as part of your job in the year from January to December 2016? (please put a cross in one box)

Yes No (if No, please return the questionnaire in the envelope provided)

5. In your work with pesticides during 2016 did you normally work as a contractor?

Yes No

i. Did you own or work on a farm in 2016?

Yes No (if No, please go to Question 6)

ii. How many acres were grown on the farm where you worked in 2016? (please put a cross in one box)

- None
 Less than 5 acres (<2 ha)
 5-49 acres (2-18 ha)
 50-199 acres (19-80 ha)
 200-499 acres (81-201 ha)
 500-999 acres (202-404 ha)
 More than 1000 acres (>404 ha)

iii. Which animals were raised on the farm where you worked in 2016? (please cross all that apply)

- None
 Cattle (beef)
 Cattle (dairy)
 Pigs
 Sheep
 Poultry (broiler, commercial scale)
 Poultry (eggs, commercial scale)
 Other farm animals (please specify)

6. Please indicate your main areas of pesticide work and enter an estimate of the number of days you personally mixed, loaded, handled or applied pesticides in those areas of work, and typically how many hours you spent per day mixing, loading, handling or applying pesticides, in the year January to December 2016. (please put a cross in all boxes that apply)

Worked in this area Number of days in year 2016 Typical number of hours per day in 2016

Example: A PIPAH study member is a cereal grower and applies pesticides to them on two different occasions, on average working with these pesticides for four hours a day. This would be recorded as:

Cereals 2 4

Field Crops

Cereals (wheat, barley, oats, rye etc)

Oilseeds (oilseed rape, linseed)

Potatoes

Sugar beet

Grassland and/or fodder crops

Other arable crops

Horticulture

Hops

Orchard crops (apples, pears, plums etc)

Soft fruit (strawberries, currants etc)

Outdoor vegetables

Mushrooms

Protected edible crops

Protected ornamental crops

Hardy nursery stock

Outdoor ornamental flowers and bulbs

Other

Golf courses, bowling greens, sports grounds

Amenity weed control: roads, pavements etc

Forestry

Aquatic

Pest control (rural)

Pest control (urban)

Poultry/ Livestock/ Animal house area

Grain stores

Sprays applied around farm yards or gardens

Other (please specify)

Other (please specify)

7. In 2016, what types of personal protective equipment (PPE) and engineering controls did you normally use when you personally mixed, loaded or handled pesticides which were liquid (including pastes and gels), dry (including granular) or 'other'? A separate list of codes is provided on the yellow coloured card. Please enter all the relevant codes into the boxes provided or cross the "Did not mix/load/handle" box.

Example: if a study participant normally used nitrile gloves, an apron, a face shield, a type 6 chemical protective suit and rubber boots when mixing, loading or handling a liquid pesticide, this would be recorded as:

| Gloves | Boots | CE marked clothes | General work wear | Face shield | Respiratory protection | Other items | Other items | Other items | Engineering controls | Did not mix, handle or load |
|-------------------------------------|-------|-------------------|-------------------|-------------|------------------------|-------------|-------------|-------------|----------------------|-----------------------------|
| GN | RB | | C1 | FS | | AP | | | | |
| Liquid pesticides | | | | | | | | | | |
| GN | RB | | C1 | FS | | AP | | | | |
| Liquid pesticides | | | | | | | | | | |
| | | | | | | | | | | |
| Dry pesticides | | | | | | | | | | |
| | | | | | | | | | | |
| 'Other' pesticides (please specify) | | | | | | | | | | |
| | | | | | | | | | | |
| <input type="text"/> | | | | | | | | | | |

8. In 2016, which application method(s) did you use when you personally applied pesticides which were liquid, dry or 'other', and what types of personal protective equipment (PPE) and engineering controls did you use? Please list the most frequently used application method first and the least frequently used method last. A separate list of application method codes is provided on the blue coloured card and the list of PPE and engineering codes is provided on the yellow coloured card. Please enter all the relevant codes into the table.

Example: if a study participant usually applied liquid pesticides using a variable geometry boom (wearing long-sleeved work wear with full-length trousers and leather boots in an enclosed cab with in-cab filtration system) and occasionally applied pesticides using a motorised knapsack (wearing 2-piece rainwear, a half mask with reusable filter, rubber boots and neoprene gloves) this would be recorded as:

| Application method number | Application method | Cab | Gloves | Boots | CE marked clothes | General work wear | Face shield/eye protection | Respiratory protection | Other items | Other items | Other items |
|---------------------------|--------------------|-----|--------|-------|-------------------|-------------------|----------------------------|------------------------|-------------|-------------|-------------|
| Example | VA | CF | | LB | | C4 | | | LS | LT | |
| | MK | | GE | RB | | C5 | | RR | | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

9. When you applied pesticides in 2016, did you use at least the recommended personal protective equipment (PPE) and engineering controls? (please cross one)

- Never Often
 Rarely Always
 Sometimes

SECTION 3 Other aspects of your work with pesticides

10. In 2016, did you mix, load, handle or apply more than one pesticide product in a working day? (please put a cross in one box)

- Yes, often
 Yes, sometimes
 No

11. In 2016, did you personally mix pesticide concentrate? (please put a cross in one box)

- Yes, often
 Yes, sometimes
 No

If No, please go to question 12

If Yes, where did you mix pesticide concentrate? (please put a cross in one box)

- Indoors
 Outdoors
 Indoors and outdoors

In 2016, did you mix different pesticides together in a tank for a single application? (please put a cross in one box)

- Yes, often
 Yes, sometimes
 No

12. In 2016, did you usually store mixed chemicals?

- Yes No

13. In 2016, how often did you personally clean your pesticide application equipment after use? (please put a cross in one box)

- Never
 Annually
 After each spray round

Other (please specify)

If Never, please go to question 15

In 2016, for a normal cleaning session, how long did you usually spend cleaning your pesticide application equipment?

- hours minutes

In 2016, did you wear any personal protective equipment when cleaning your pesticide application equipment? (please put a cross in one box)

- Yes No

If Yes, please refer to the list of personal protective equipment on the separate yellow card, and enter in the table below the relevant codes for the items you wore in 2016

| | |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |

14. In 2016, did you usually repair or maintain your own pesticide application equipment? (please put a cross in one box)

- Yes No

If Yes, did this involve (please cross all that apply):

- Light running repairs/maintenance, such as changing or unblocking a nozzle
 More substantial repairs/maintenance tasks

15. In 2016, did you apply pesticides in protected environments (glasshouse, polytunnel, etc)? (please put a cross in one box)

- Yes No

If Yes, on average how many hours after applying pesticide did you re-enter this protected environment?

- hours

16. In 2016, did you apply pesticides in outdoor environments (field and horticultural crops, etc)? (please put a cross in one box)

- Yes No

If Yes, on average how many days after applying pesticide did you return to this outdoor environment?

- days

17. In 2016, after working with pesticides, did you usually wash your hands before eating? (please put a cross in one box)

- Yes No

18. In 2016, after working with pesticides, did you usually bathe or shower before continuing with other activities? (please put a cross in one box)

- Yes No

19. In 2016, did you usually wear the same work clothes (not PPE) you used when working with pesticides two or more days without washing them? (please put a cross in one box)

- Yes No

20. In 2016, were the clothes (not PPE) you use when working with pesticides usually washed separately? (please put a cross in one box)

- Yes No

21. In 2016, did you usually take your work boots or shoes off before entering your home? (please put a cross in one box)

- Yes No

22. In 2016, were agricultural or professional pesticides ever stored (even temporarily) in your home, basement or garage? (please put a cross in one box)

- Yes No

Thank you for taking part in the study and for completing this questionnaire.

Please return your completed questionnaire in the pre-paid envelope provided, along with the completed consent form. We are not able to use questionnaire responses without the consent form also being completed and returned.

Title of Research

IMPRESS: Improving exposure assessment methodologies for epidemiological studies on pesticides: Recall of past pesticide exposure and determinants.

Associated documents:

- Crops and grains Showcard 4
- Sheep Showcards 1a & 1b

This questionnaire contains the following sections:

| | |
|-----------------------------|---|
| PART 1: CROP SPECIFIC | 2 |
| PART 2: SHEEP..... | 4 |

ID No: _____

Date:

Start time: _____

Full name:

Date of birth

PART 1: CROPS AND GRAINS

Table 1.1

| Year(s) | 1) Did you grow any crops? | 2) What acreage did you have? | 3) What type of pesticide did you used †† | 4) Did it contain OPs Y/N/DK | 5) What was the average no. hours/day that you used a pesticide? | 6) What was the average no. days/year that you used pesticides? | 7) How were pesticides applied ††† |
|---------|----------------------------|-------------------------------|---|---------------------------------|--|---|------------------------------------|
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† 1=wheat 2=barley 3=sugar beet 4=outdoor veg/potatoes 5=top & soft fruit 6=glasshouse production 7=other (specify)
 †† 1=herbicide 2=fungicide 3=insecticide 4=other (specify)
 ††† 1 = Tractor mounted/trailed boom sprayer: hydraulic nozzles 2 = Tractor mounted/trailed boom sprayer: rotary atomisers
 3 = Tractor mounted/trail broadcast air-assisted sprayer 4 = Hand-held sprayer 5 = Aerial application 6 = Other (specify)

Table 1.2

| 8) What were the names of the pesticides you used? CARD 4 | Type of crop † | 9) How often did you handle concentrate †† | 10) Did you mix the concentrate yourself? Y/N/DK | 11) How/where did you do this ††† (include all that apply) |
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† 1=wheat 2=barley 3=sugar beet 4=outdoor veg/potatoes 5=top & soft fruit 6=glasshouse production 7=other (specify)
 †† 1 = daily 2 = several times a week 3 = once a week 4 = more than once a month 5 = don't know
 ††† 1 = directly in the pesticide adaptor 2 = in a bucket in the field 3 = indoors 4 = outdoors 5 = other (specify) 6 = don't know

*Thank you for completing this questionnaire. I would like to ask some further questions.
 Is it convenient to do so now? If not, can I give you call on another day/time. Please note day/time*

PART 2: SHEEP

1 Have you ever been personally involved in treating your sheep for external parasites?

Yes → Continue

No → Go to memory questionnaire

Table 2.1

| Year(s) | 2) What method(s) did you use? <i>Please tick</i> | | | |
|---------|---|---------|-------------|-----------|
| | Dips | Showers | Injectables | Pour-on's |
| | | | | |
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Table 2.2

| Year(s) | On average, what was: 3) The size of your flock (Ewes/lambs) 4) The breed(s) | 5) On average, how many days did you treat during the year? | 6) On average, how many sheep/lambs did you treat per day? | 7) What was the greatest number of days in a row that you treated your sheep? | 8) What was the greatest number of sheep/lambs that you treated in one day? |
|---------|---|---|--|--|--|
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Table 2.3

| 9) What was the name of sheep dip/pesticide/active ingredient? CARD 1a & 1b | | 10) What was the dip/pesticide used for? † | 11) What method was used to apply it? †† | 12) What was the amount of concentrate used? <i>(pints, litres, gallons)</i> |
|---|--|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |
| 10. | | | | |

† 1 = infection 2 = endoparasites 3 = ectoparasites 4 = other (specify)
 †† 1 = injection 2 = topical (e.g.pour-on) 3 = oral 4 = eartag 5 = spray 6 = Dip 7 = other (specify)

13 Did you ever **handle concentrates**?

Yes → Go to Q14

No → Go to Q16

14 Did you ever **spill any concentrate** on any part of your body?

Yes → Go to Q15

No → Go to Q16

15) When did you wash the concentrate off? (*Please tick*)

Table 2.4

| <i>Please tick one box only</i> | | | |
|--|---------------------------|-------------------------------------|--------------------------|
| Never usually washed when applying treatment | Immediately after contact | At the end of the treatment session | Other interval (specify) |
| | | | |
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Table 2.5 If the farmer used dips, ask the following questions:

| 16) Which type(s) of dipping bath did you use? | 17) Where was the dipping bath/shower located? | 18) How did the sheep enter the dip? | 19) How many sheep were normally in the dip bath at the same time? | 20) Were there any splashguards or screens around the exit from the dip tank? |
|--|--|--|--|---|
| 1=straight swim 2=circular 3=other (specify) | 1=outside 2=in a building 3=in a mobile trailer 4=covered area 5=other (specify) | 1=walked in (angled ramp/slope) 2=dropped in (tilt/slide mechanism) 3=manually thrown in (by hand) | 1=one at a time 2=two at a time 3=more than two at a time | Y/N/DK |
| | | | | |
| | | | | |
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Table 2.6: These questions are about working with the treatment wash, by which I mean the sheep dip after it has been diluted by water in the **dipping bath or shower**.

| Year(s) | 21) Did you ever perform the following tasks? | 22) If you were a plunger/dipper/ paddler, what did you use to submerge the sheep? | 23) How many people were normally involved in sheep dipping? | 24) Did you ever get soaked to the skin with dip wash on any part of your body? | 25) Did you regularly enter the dipping bath, either accidentally or purposely e.g. to rescue a sheep? |
|---------|--|--|--|---|--|
| | 1=Put sheep in shower 2=Plunger/dipper/ paddler 3=Chucker 4=Helper 5=Other (specify) | 1=implement/tool 2=hands 3=feet 4=other (specify) | 1=one 2=two 3=three 4=four 5=> four | Y/N/DK | Y/N/DK |
| | | | | | |
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Table 2.7

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|--|--|
| 26) Were you ever involved in the disposal of the sheep dip? | 27) Did you ever come into contact with the used dip wash? |
| Y/N/DK | Y/N/DK |
| | |

Table 2.8: Did you ever use **personal protective equipment** when **handling or mixing concentrated products, or applying pesticides?**

Yes → Complete table below

No → Go to Q32

| Which type of protective equipment did you use: | Year(s) and Activity e.g. dipping, pour-on, shower, injectables | Gloves * | Rubber boots | Apron/Coverall | Leggings | Face shield | Respirator | Other (specify) | None |
|---|--|----------|--------------|----------------|----------|-------------|------------|-----------------|------|
| 28) When handling concentrated products? | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 29) When applying pesticide products? | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |

* Specify 30) If you used gloves, what was the material?: rubber (R), other synthetic (S), cotton (C), leather (L), other (O)

31) If you used gloves, what was their length?: wrist length (W), 12-inch/mid-forearm (F), above elbow (E)

32) Were you ever in contact with your sheep within 24 hours of pesticides being applied to them (applied by self or someone else)?

Yes

No

Thank you for answering these questions.

I would just like to finish off by asking some more general questionnaires.

Is it OK to do this now?

If not, can I call you back at another time?

If yes please note day/time

Memory questionnaire

Title of Research

IMPRESS: Improving exposure assessment methodologies for epidemiological studies on pesticides: Recall of past pesticide exposure and determinants

SHAW number

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Now I am going to ask you some questions about the past.

Note: Questions 1– 6 should be asked if the subject was born before 1940. Questions 7 – 12 should be asked if the subject was born after 1940.

Questions 1 – 6 to be asked if subject was born during or before 1940.

-
- | | | | |
|-------|--|---|--|
| 1. | When did the First World War begin? (Within 1 year) | Incorrect 1914 (in Europe) | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |
| 2. | When did the Second World War begin? (Within 1 year) | Incorrect 1939 (in Europe) | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |
| 3. | Who was the leader of the Germans in the Second World War? | Incorrect Hitler | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |
| 4. | Who was the leader of the Russians in the Second World War? | Incorrect Stalin | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |
| 5. | What was Mae West famous for? <i>Any appropriate verbal or non-verbal answer which indicates memory</i> | Incorrect Entertainer, Film Star, Life Jacket | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |
| 6. | Who was the famous flyer whose son was kidnapped? | Incorrect Lindbergh | <input type="checkbox"/> <input type="checkbox"/> |
| <hr/> | | | |

Questions 7 – 12 to be asked only if subject was born after 1940.

- | | | | |
|-----|--|-------------------------------------|--------------------------|
| 7. | Who was the US President who was shot in Texas? | Incorrect | <input type="checkbox"/> |
| | | John F. Kennedy | <input type="checkbox"/> |
| 8. | What is Yoko Ono famous for? | Incorrect | <input type="checkbox"/> |
| | | Wife of Beatle, John Lennon | <input type="checkbox"/> |
| 9. | Who was the first man to set foot on the moon? | Incorrect | <input type="checkbox"/> |
| | | Neil Armstrong | <input type="checkbox"/> |
| 10. | What was Edmund Hilary famous for? | Incorrect | <input type="checkbox"/> |
| | | First to reach summit of Mt Everest | <input type="checkbox"/> |
| 11. | Who was the first woman Prime Minister of India? | Incorrect | <input type="checkbox"/> |
| | | Indira Gandhi | <input type="checkbox"/> |
| 12. | Who was the famous cinema actress who married Prince Rainier of Monaco? <i>Close approximations to the name are acceptable.</i> | Incorrect | <input type="checkbox"/> |
| | | Grace Kelly | <input type="checkbox"/> |

Questions 13-16 to be asked to all

-
- | | | | |
|-----|--|-----------|--------------------------|
| 13. | What is the name of the present King or Queen? | Incorrect | <input type="checkbox"/> |
| | | Correct | <input type="checkbox"/> |
-
- | | | | |
|-----|---|-----------|--------------------------|
| 14. | Who is likely to be the next King or Queen? | Incorrect | <input type="checkbox"/> |
| | | Correct | <input type="checkbox"/> |
-
- | | | | |
|-----|--|-----------|--------------------------|
| 15. | What is the name of the Prime Minister? | Incorrect | <input type="checkbox"/> |
| | <i>For one month after an election, if the name of the former PM is given, ask 'Is he/she still Prime Minister?'</i> | Correct | <input type="checkbox"/> |
-
- | | | | |
|-----|--|-----------|--------------------------|
| 16. | What has been in the news in the past week or two? | Incorrect | <input type="checkbox"/> |
| | <i>If a general answer is given, e.g. 'war', ask for details</i> | Correct | <input type="checkbox"/> |
-

Appendix 20
Showcards for sheep questionnaire

Sheep



Card 1a

All Seasons

Asuntol

Auriplak

Battles

Bayer

Bayticol

BHC

Bloom

Border

Ciba Geigy

Click

Coopers

Creolin

Crovect

Cydectin

Dectomax

Derris

Diazadip

Dieldrin

Ectoforce

Ectomort

Flyte

Gold Fleece

Ivomec

Jason Winter

Mitigal

Osmonds

Paracide/Paracide Plus

Powerpack

Purl

Robust

Top Clip

Vetrazin

Wellcome

Youngs

Card 1b

Thiocyanates
Pyrethroids/Pyrethrum
Coal Tar
Petroleum oils (includes: gasoline or petrol, paraffin oil,
lubricating oil, petroleum jelly, Vaseline and paraffin wax)
Lime and Sulphur
Arsenic
Nicotine
Carbolic acid
Sulphur
Pine Tar products
Ammonia
Benzyl Benzoate
Fluorine
Lindane
Gammexane
DDT
DDD
Synthetic Thiocyanates (Lethane 384, Lethane 384
special, Lethane B.71, Thanite, Thansol 70)
Thymol/Salicylic Acid
Benzocaine
Ether
Iodine
Naphthalene
Organophosphates
Organochlorines

Card 4

2,4-D

AlBAGADAÆ HCH

Afalon

Aldrin

Arsenol

Atrazine

Benazolin

Caddy

Chlorotoluron

Clomaquat

CMPP

Cornox

CycloceI

Cyfluthrin

Cypermethrin

Dallion

Decis

Diazinon

Dichloroprop

Dichlorvos

Dieldrin

Diflubenzuron

Diuron

Duplosan

Eclipse

Elveron

Endrin

Fenitrothion

Fison's moss killer

Gesatop

Glyphosphate

Gramoxone

Hawk

Isoproturon

Lexus

Lexus Class

Linuron

Malathion

Manifold

MCPA

Mecoprop

Memolt

Metasytox

Mextrolbiox

Modus

Opusteam

P,P-DDE

P,P-DDT

P,P-DDD

Permethrin

Phantom

Propetamphos Round-Up

Round-Up

Rovral

SBK

Simazine

Spacer

Swift

Tattoo

Temik

Topic

TPPLE

Transcend

Tributyltin as TBT

Triphenyltin as TPT

Vydate

C2.1 Work history questionnaire from 1946 to 1975

| Year | Sheep | Cattle | Other livestock Please specify | Combinable Crops | Glasshouse Production | Outdoor Vegetables or Potatoes | Top & Soft Fruit | Other work Please specify |
|------|-------|--------|-----------------------------------|---------------------|--------------------------|-----------------------------------|---------------------|------------------------------|
| 1946 | | | | | | | | |
| 1947 | | | | | | | | |
| 1948 | | | | | | | | |
| 1949 | | | | | | | | |
| 1950 | | | | | | | | |
| 1951 | | | | | | | | |
| 1952 | | | | | | | | |
| 1953 | | | | | | | | |
| 1954 | | | | | | | | |
| 1955 | | | | | | | | |
| 1956 | | | | | | | | |
| 1957 | | | | | | | | |
| 1958 | | | | | | | | |
| 1959 | | | | | | | | |
| 1960 | | | | | | | | |
| 1961 | | | | | | | | |
| 1962 | | | | | | | | |
| 1963 | | | | | | | | |
| 1964 | | | | | | | | |
| 1965 | | | | | | | | |
| 1966 | | | | | | | | |
| 1967 | | | | | | | | |
| 1968 | | | | | | | | |
| 1969 | | | | | | | | |
| 1970 | | | | | | | | |
| 1971 | | | | | | | | |
| 1972 | | | | | | | | |
| 1973 | | | | | | | | |
| 1974 | | | | | | | | |
| 1975 | ↑ | ↑ | | | | | | |