



An Australian Government Initiative

Farm Health & Safety Joint Research Venture
Rural Industries R&D Corporation
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Pesticides and Adverse Health Outcomes in Australia –THE FACTS–

2005

Facts and Figures on Farm
Health and Safety Series
No 6



Australian Centre for Agricultural Health and Safety

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ISBN 1 74151 149 6
ISSN 1440-6845

Pesticides and Adverse Health Outcomes in Australia
Publication No. 05/051; Project No. US-121A

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Printed by Union Offset Printing, Canberra

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1. Introduction

Data which describes the full, or even partial, extent of human health effects from exposure to pesticides is difficult to source due to potential long latency periods for chronic illness, the difficulty in diagnosis, the non-specific nature of pesticide health effects and the lack of effective monitoring systems.

Under the Agricultural and Veterinary Chemicals Code Act, the Australian Pesticides and Veterinary Medicines Authority (APVMA) has legislative responsibilities relating to public health, worker exposure, environmental safety, efficacy and safety, and trade. However there is no single dataset that can provide a complete profile of adverse health effects that may have occurred in the Australian population.

Information relating to adverse health effects of pesticide exposure in Australia includes:

- death data
- hospital admissions
- calls to Poisons Information Centres.

As part of a project designed to provide the APVMA with information on agricultural chemicals pertaining to public health, worker exposure, and environmental safety, the Australian Centre for Agricultural Health and Safety was commissioned to collate and review data relating to public health and worker exposure. This document summarises information presented in the report to the APVMA titled *Pesticides and human health – a report of health data related to pesticides in Australia (2003)* which sourced data derived from:

- Australian Bureau of Statistics deaths data
- data relating to hospital admissions held by the Australian Institute of Health and Welfare relating to admissions due to acute pesticide poisoning
- workers' compensation claims data relating to poisoning from pesticides
- Poisons Information Centres data registering calls related to pesticides.

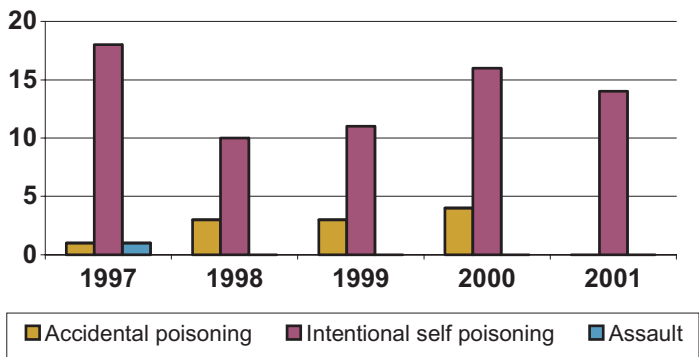
The information reported on excludes data relating to presentations to hospital Emergency Departments and to medical practitioners. Nor does the data reflect any long term health effects of exposure to pesticides.

This document has been produced to provide guidance to those agencies and individuals who are working to reduce risk associated with pesticide use in Australia. The publication is available electronically for use by educators and speakers in their efforts to raise awareness and promote safe handling of pesticides, and for those whose role is the development of public and industry policy to improve chemical safety.

2. Deaths due to pesticide poisoning in Australia

Figure 1 indicates the number of deaths in Australia where the External Cause of poisoning was pesticides for the years 1997 to 2001 inclusive (n=81).

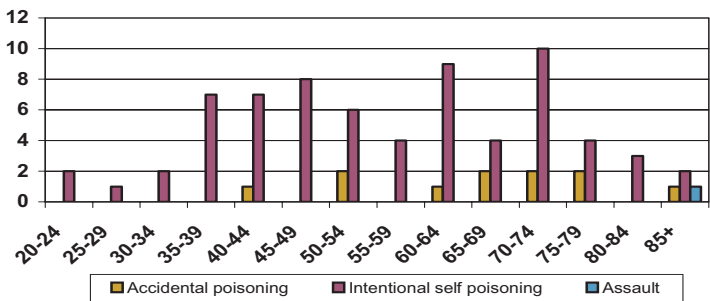
Figure 1 Number of persons fatally poisoned by pesticides, by year and intent, Australia 1997-2001



Source: Fragar et al (2003) Australian Bureau of Statistics mortality data (HOIST)

Eighty nine percent of cases were male, and while deaths occur in significant numbers from age 35, peaks occur in the age groups 60-64 and 70-74 years (Figure 2).

Figure 2 Number of persons fatally poisoned by pesticides, by age group and intent, Australia 1997-2001



Source: Fragar et al (2003) Australian Bureau of Statistics mortality data (HOIST)

All deaths due to non-intentional poisoning were of people over the age of 40 years, while intentional poisoning deaths occurred in adults aged over 20 years.

The 69 deaths due to intentional self poisoning represent 0.54% of all intentional deaths across Australia for the period 1997 to 2001. Similarly Kreisfeld et al (2004) reported 0.52% of Australian suicide deaths associated with pesticides for the year 2002.

2. Deaths due to pesticide poisoning in Australia (continued)

The organophosphate/carbamate group of pesticides were associated with the greatest number of deaths (of which 77% were intentional), followed by herbicides and fungicides. Arsenic was associated with 5 intentional deaths (Table 1).

Table 1 External cause of pesticide poisoning, by principle diagnosis (ICD10 codes), Australia 1997-2001

ICD10 Code	Description	X48 Accidental poisoning by and exposure to pesticides	X68 Intentional self-poisoning by and exposure to pesticides	X87 Assault by pesticides	Total	Percent
A00-B99	Certain infectious and parasitic diseases	2	4	-	6	7.4
C00-D48	Neoplasms	-	2	-	2	2.5
E00-E89	Endocrine, nutritional and metabolic diseases	-	2	-	2	2.5
F00-F99	Mental and behavioural disorders	2	14	-	16	19.8
G00-G99	Diseases of the nervous system	2	-	1	3	3.7
I00-I99	Diseases of the circulatory system	1	9	-	10	12.3
J00-J99	Diseases of the respiratory system	1	5	-	6	7.4
K00-K93	Diseases of the digestive system	-	1	-	1	1.2
T40.2	Poisoning by narcotics and psychodysleptics, other opioids	-	1	-	1	1.2
T49.0	Local antifungal, anti-infective and anti-inflammatory drugs, not elsewhere classified	-	1	-	1	1.2
T57.0	Toxic effect of arsenic and its compounds	-	5	-	5	6.2
T60.0	Toxic effect of organophosphate and carbamate insecticides	1	12	-	13	16.0
T60.1	Toxic effect of halogenated insecticides	-	1	-	1	1.2
T60.3	Toxic effect of herbicides and fungicides	2	8	-	10	12.3
T60.9	Toxic effect of pesticide, unspecified	-	4	-	4	4.9
Total		11	69	1	81	100.0

Source: Fragar et al (2003) Australian Bureau of Statistics mortality data (HOIST)

2. Deaths due to pesticide poisoning in Australia (continued)

The occupation of persons who died of pesticide poisoning is indicated in Table 2. Those associated with agriculture/horticulture comprise 21 of the 81 deaths. However, the spread across a wide range of occupations is noteworthy.

Table 2 External cause of pesticide poisoning (ICD 10 code), by occupation, Australia 1997-2001

Occupation	X48 Accidental poisoning by and exposure to pesticides	X68 Intentional self-poison- ing by and exposure to pesticides	X87 Assault by pesticides
Farmers & farm managers –active and retired	3	14	-
Agricultural labourers & related workers	1	1	-
Amenity horticultural tradespersons	-	2	-
Labourers, related workers, miscellaneous labourers – active and retired	3	8	-
Foreman	-	1	-
Mobile plant operators (except transport), plant machine operators - active and retired	1	2	-
Building trade persons – active and retired	-	4	-
Business professionals – active and retired	-	3	-
Managers & administrators, specialist managers –active and retired	-	4	-
Managing supervisors (sales & service)	-	2	-
Material recording & dispatching clerks	-	1	-
Other pensioner & retired	-	4	1
Tradespersons - vehicle, printing, food; trades assistants & factory hands – ac- tive and retired	-	4	-
Road & rail transport drivers	-	1	-
Salespersons, personal service workers, sales assistants, investment, insur- ance, real estate salespersons	1	4	-
School teachers, registered nurses, social professionals	-	4	-
Student	-	1	-
Cleaners	-	1	-
Home Duties	1	3	-
Unemployed	-	1	-
Unknown, not stated	-	4	-
Total	11	69	1

Source: Fragar et al (2003) Australian Bureau of Statistics mortality data (HOIST)

3. Hospital admissions due to pesticide poisoning

Between 1st July 1999 and 30th June 2001 there were a total of 944 separations from hospitals in Australia for which the principal diagnosis code was T60, "Toxic Effect of Pesticides" which equates to approximately 470 cases per annum. These admissions included intentional and non-intentional poisonings. Of these, 63 percent were males.

Table 3 shows the 507 cases where data is available to demonstrate age and intent for the year 1999-2000. Sixty percent of all admissions were classified as accidental (Fragar et al 2003).

Table 3 Hospital separations where principal diagnosis was pesticide poisoning (code T60), by age group and intent, Australia July 1999–June 2000

Age	Accidental		Intentional, self inflicted		Other	
	n	%	n	%	n	%
0-4	163	54	2	1	1	10
5-9	8	3	0	0	0	0
10-14	2	1	4	2	0	0
15-24	21	7	48	25	2	20
25-34	33	11	44	23	2	20
35-54	43	14	74	38	5	50
55-64	11	4	12	6	0	0
65-74	11	4	4	2	0	0
75+	10	3	7	4	0	0
Total	302	100	195	100	10	100

Source: Harrison & Henley 2003, AIHW National Injury Surveillance Unit

Note: 2000-2001 cases were not included due to concerns with data integrity

Table 4 Hospital separations with diagnosis of pesticide poisoning (code T60), by intent and pesticide group, Australia July 1999- June 2001

Pesticide type	Accidental n	Intentional n	Total hospital separations	%
Organophosphate/carbamate	130	69	388	41.1
Halogenated insecticides	10	2	27	2.9
Other insecticides	22	10	52	5.5
Herbicides & fungicides	29	24	103	10.9
Rodenticides	59	60	202	21.4
Other pesticides	20	11	63	6.7
Pesticides unspecified	32	19	109	11.5
Total	302	195	944	100

Source: Harrison & Henley 2003, AIHW National Injury Surveillance Unit

4. Calls to Poisons Information Centres related to pesticides

There were an average of 7760 calls per year to the NSW and Victorian Poisons Information Centres between 1998 and 2002 related to the broad pesticide groupings listed in Table 5. In Queensland there were 3,182 calls relating to these pesticide groups for 1998. If we assume that Western Australia contributed around 1,500 calls in 1998, then for that year it is estimated that in the order of 13,000 calls relating to pesticide exposure occurred, with an assumed gradual trend downwards from 1999¹.

The pesticide groupings associated with the highest number of calls was other insecticides, followed by baits and herbicides for all 5 years.

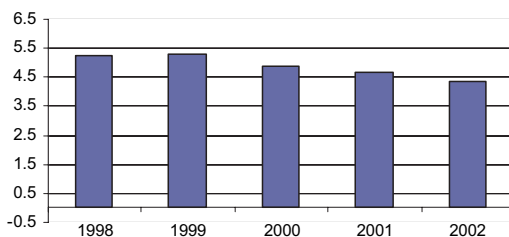
Figure 3 indicates that the proportion of all Poison Information Centre calls related to pesticides remains less than 6%. There has been a steady decline in calls related to chlorinated hydrocarbons, organophosphates, carbamates, borates, chlorophenoxy type herbicides and paraquat/diquat which may reflect changes in availability.

Table 5 Number of calls to NSW and Victorian Centres, by pesticide group, 1998-2002

Pesticides Group	1998	1999	2000	2001	2002	Total
Baits	2022	2330	2202	1885	1747	10186
Carbamates	317	312	237	234	185	1285
Chlorinated hydrocarbons	73	45	32	22	12	184
Organophosphates	1158	1078	923	943	798	4900
Other insecticides	3140	3201	2784	2716	2502	14343
Fumigants	36	56	46	44	44	226
Fungicides	156	155	120	106	83	620
Herbicides	1241	1313	1216	1174	1105	6049
Moth repellants	208	247	221	164	166	1006
Total Pesticide Poison Calls	8351	8737	7781	7288	6642	38799

Source: Fragar et al (2003)

Figure 3 Pesticides as a percent of all calls to NSW and Victorian Poisons Information Centres, 1998-2002



Source: Fragar et al (2003)

¹Calls to the NSW and Victorian Centres can be assumed to represent a reasonable proportion of calls across Australia, considering that 59% of Australia's total population resides in these two states, the Victorian and NSW centres provide services for South Australia and Tasmania and the NSW Centre has the only 24 hour service for all of Australia.

5. Child pesticide poisonings

Hospital admissions data (see Table 3) indicates that of the total 944 separations from hospitals in Australia for pesticide poisonings (diagnosis code T60), 54% of accidental poisoning cases occurred in children aged between 0 and 4 years of age.

More detailed information is available from the Poisons Information Centre where the highest number of calls for children relate to anticoagulant rodenticide, pyrethrin, organophosphate and borate chemicals (Table 6).

Table 6 Calls to NSW and Victorian Poisons Information Centres relating to children, 1998-2002

Pesticide Group	Total number of calls over 5 years	Child related calls (% of calls)
Baits	10 186	67.8
<i>rodenticides (warfarin)</i>	(3 370)	(74.8)
Carbamates	1 285	39.1
Chlorinated hydrocarbons	184	9.5
Organophosphates	4 900	33.8
Other insecticides	14 343	59.3
<i>borates</i>	(3 362)	(62.8)
<i>pyrethrins</i>	(4 225)	(43.4)
<i>insect repellants</i>	(2 867)	(86.6)
Fumigants	226	5.7
Fungicides	620	37.4
Herbicides	6 049	26.9
Moth repellants	1 006	83.4

Source: Fragar et al (2003)

Safe pesticide storage and practices will reduce the risk of children ingesting or being exposed to pesticides.



6. Workers' compensation claims relating to pesticides

The majority of claims submitted to workers' compensation agencies across Australia relating to exposure to plant and animal treatment chemicals from 1994/95/ to 1999/00 relate to the agriculture/forestry/fishing industry group. However, claims have also been made in the business, education, manufacturing and communication sectors. There were 3 deaths associated with plant chemicals, and 1 relating to animal treatment chemicals. This represents a claims case-fatality rate of 2.6 percent for plant treatments, and 1.3 percent for animal treatments.

It is estimated that there are between 13 and 33 claims relating to exposure to plant treatment chemicals, and between 8 and 25 claims relating to animal treatment products submitted to workers' compensation agencies across Australia per annum. The larger proportion of these claims relate to effects of single exposures. Claims relating to these chemicals were primarily in the agriculture/forestry/fishing industry, however, manufacturing industries, and property and business services, education and health industries had significant claims (Table 6).

Table 7 Workers' compensation claims* associated with exposure to plant and animal treatment chemicals by industry, Australia 1994/95-1999/00

Industry	Plant treatment		Animal treatment	
	Single contact	Long term contact	Single contact	Long term contact
Agriculture/forestry/fishing	33	9	7	np
<i>agriculture</i>	33	8	7	4
Mining	np	np	0	0
Manufacturing	8	np	np	np
Electricity, gas & water supply	np	0	0	0
Construction	np	np	np	0
Wholesale trade	np	0	0	0
Retail trade	np	0	np	np
Accommodation, cafes & restaurants	0	0	np	0
Transport & storage	0	0	np	0
Communication services	0	0	6	0
Finance & insurance	np	np	0	0
Property & business services	11	0	np	np
Government administration & defence	np	np	0	np
Education	np	0	9	0
Health & community services	np	np	6	np
Cultural & recreational services	np	np	0	0
Personal & other services	np	np	np	0
Total	88	24	45	17

Source: Fragar et al (2003) NOHSC database

*Duration of absence greater than one week

^{np} Case number less than 5

Claims relating to agriculture underestimate work related exposure as a high proportion of the agricultural workforce are self employed.

7. Workers’ compensation claims—agriculture

While data which reveals the full extent of the adverse health effects associated with pesticides is limited, workers’ compensation claims data suggest that workers in the horticultural and fruit growing industries may be at greater risk of pesticide exposure than other agricultural industries (Table 9).

Table 8 Number of workers’ compensation claims* associated with plant and animal treatment chemicals, by agricultural industry, Australia 2001-2003

Industry	Plant treatment chemicals	Animal treatment chemicals	All chemical products
Horticulture & fruit growing	20	np	37
Grain, sheep & beef cattle	np	9	21
Dairy cattle	0	0	np
Poultry	0	0	np
Other livestock	0	0	np
Other crop	np	0	8
Total	25	12	78

Source: NOS12 Database, NOHSC website January 2005

*Duration of absence was greater than one week

^{np} Case number less than 5

Safe handling of pesticides is a priority for action in all agricultural industries.



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– THE FACTS –

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