NEW SOUTH WALES

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SWIMMING POOLS ACT 1992: REGULATION AND COMPLIANCE IN NEWCASTLE, NEW SOUTH WALES

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This article reports on compliance with the Swimming Pools Act 1992 in respect of private swimming pools, and the impact of a reinspection program on compliance in the City of Newcastle. It highlights aspects of the Swimming Pools Act 1992 that are least likely to be complied with, and identifies some characteristics which predict compliance.

BACKGROUND

The drowning and near drowning of toddlers (aged 0-4 years) in private swimming pools raises emotive debate and community conflict[1]. Private swimming pools represent the single most dangerous water environment for children in this age group, with between 67 per cent and 100 per cent of all drownings in the 0-4 age group between 1991and1993.

Reduction of toddler drowning and near drowning is identified as a priority in the NSW Injury Goals and Targets[2]. The proposed 50 per cent reduction to be achieved by the year 2000 could be achieved by preventing all swimming pool drownings alone.

The major preventive actions available to reduce these events in NSW are:

- appropriate supervision of children who have permission to be at the pool side; and
- pool fencing to protect unsupervised toddlers.

On August 1, 1992 in NSW the Swimming Pools Act 1992 replaced legislation which had been passed in 1990. The major change in the new Act was the removal of the requirement for all private pools to have isolation fencing. The new legislation requires only pools built after August 1, 1990 to be surrounded by isolation fencing. Pools built before this date needed only to be surrounded by a child-resistant barrier that separates the pool from any adjoining premises.

Under the provisions of the Act, local councils are responsible for its regulation and enforcement. Each local council is required to:

- take such steps as are appropriate to ensure that it is notified of the existence of all swimming pools within the council's boundaries to which this Act applies; and
- promote local swimming pool owners' awareness of the requirements of the Act.

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The difficulty with these provisions is that many local councils believe the pool owner is responsible for ensuring a pool complies with the legislation and that the requirement for a council inspection applies only to pool installation under building application requirements. There is confusion about whether further inspections after installation are required. Although there is no clear requirement to inspect any swimming pools on a regular basis, there are provisions in the legislation to prosecute non-compliers. In practice it is up to councils to decide whether regular inspections of swimming pools are necessary to ensure owners' awareness of the legislation. In many cases, there appears to be a diffusion of responsibility due to a lack of direction from a central coordinating body.

In NSW there has been no evaluation of the level of compliance with the existing legislation, the effect of enforcing the legislation, or local councils' fulfilment of their mandatory requirements.

The need to monitor compliance is illustrated by a survey of pool owners in Perth[3], which revealed that 14 per cent of owners believed their gates and fencing would fail an inspection of compliance with the legislation. On inspection, 50 per cent of pools failed to comply with the legislative requirements. In all, 46 per cent of the gates had faulty self-latching devices and 32 per cent had gates on which self-closing mechanisms failed.

The Pool Fencing Advisory Committee* recommended in 1993 that a regular survey or inspection program of private pools be undertaken to collect information on the number of private pools, including data on fencing configuration, pool owner and frequency of child visitors to the residence[4]. This has not been implemented.

This study was undertaken to estimate the compliance of pool owners in the City of Newcastle. Newcastle is in the Hunter Valley in NSW, with a population of 131 309 people in 1991. Routine swimming pool inspections had not been carried out in the City of Newcastle area within the previous six years due to increased workload of health and building surveyors following the 1989 earthquake.

The study focused on unauthorised or unregistered pools and a sample of registered pools in the council area. It examined compliance with the Act of both these types of pools, estimated the change in compliance of the non-complying unregistered pools after the first inspection, and identified aspects of the Act least likely to be complied with. It also identified predictors of compliance with the Act.

METHOD

Determining location of swimming pools

The study began in June 1995. Two staff were responsible for determining the location of pools and the subsequent inspection of unauthorised and unregistered pools. Aerial surveillance maps of the City of Newcastle area (scale 1:8,000), dated February 1993, were obtained from the Lands and Information Centre. Magnifying glasses were used to identify potential pools in each property, and these were located on council survey maps. Registration status of potential pool sites was determined using the council's computerised Property Lands Network and Spatial System (PLANES). Inspection dates of registered pools were identified. Pools that were recorded in PLANES, but not through the aerial surveillance, were placed on the survey maps to create a location register as well. A suburb list of identified unauthorised or unregistered pools was compiled.

A survey form was designed to cover all aspects of the Regulations. Particular attention was given to the type of pool or spa, pool location, pool position, fence description, compliance status of the fence, gate, doors, windows and warning signs with the Act, and – if non-compliant – the reasons for non-compliance.

All identified unauthorised pools were inspected and those not complying were reinspected. After this process and an education campaign (described below), an initial inspection was made of a sample of registered pools. This sample was selected by randomly selecting surveys maps from a group of maps where 10 or more residential pools had been identified, with each survey map having equal chance of being selected.

A 20-cell grid was used on the selected maps to determine the starting street where inspections would take place. The longest street in the cell was the starting point for inspections. An alternate odd/even system was used to determine on which side of the street inspections should begin. When all residences in a street had been visited once, the next nearest street with a pool was started with the same designated starting side. Visits were made between 10am and 4pm and residences were inspected only if the owners were at home. Basic details were collected on those residences where the occupant was not home to determine inspection rates.

The inspection procedure for all pools was as follows. An appointment was made for the inspection. At the inspection the Swimming Pool Safety Program was briefly explained to the occupant, emphasising the safety aspects of the survey. Pool owners were asked to consent to the inspection. Refusal of permission to inspect at that time would lead to a notice for an inspection to be carried out within 24 hours. It was anticipated that the survey would take about 10 minutes. On completion of the survey, the occupant received a copy of the survey form and was advised of any action needed, and the time for compliance with this. The occupant was also advised of the consequences (ie penalties and liabilities) of not complying after the set date. The reinspection procedure was also explained, to ensure occupiers would comply at re-inspection.

Education Campaign

The Swimming Pool Safety Program included an educational component aimed to increase awareness of the need for pool safety and of the requirement for all pools to comply with the requirements of the Swimming Pools Act 1992. It consisted of a Swimming Pool Education Package and Display which was exhibited throughout the community, and a press release which generated local and national media exposure. The press release was aimed at all pools owners. Its purpose was to:

- inform pool owners of their obligation to notify the council of the existence of pools;
- help identify unauthorised pools which may have been missed from aerial photographs;

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* This committee was established to advise the Minister for Local Government and Co-operatives on appropriate amendments to the Swimming Pools Act 1992.

TABLE 1

CHARACTERISTICS OF ALL UNAUTHORISED OR UNREGISTERED POOLS AND A SAMPLE OF REGISTERED POOLS IN THE CITY OF NEWCASTLE

	Unauthorised or unregistered pools (%) (n=211)	Sample of registered pools (%) (n=345)
Date of building		
Before 1975	11	6
1975-1984	34	22
1985-1990	32	41
1991-1995	9	30
Unknown	14	1
Years since last inspection		
Within past 5 years	-	20
5-9 years ago	-	46
10-13 years ago	-	13
No record of inspection	100	19
Type of pool		
In ground	61	86
Above ground	39	14
Type of fencing		
Isolation fencing	45	58
Perimeter fencing	54	42
No fencing	1	0.3
Compliance with the Swimming Pools Act 1992	10	17

- increase awareness of changes in the Swimming Pools Act 1992;
- inform pool owners of the survey;
- make pool owners aware of the dangers associated with pools; and
- notify the public that unauthorised pools had been identified.

Predictors of compliance

The data collected on the sample of registered pools were analysed to identify predictors of compliance, using multiple logistic regression. Pool position (in ground, above ground), fencing configuration (isolation, perimeter), years since last inspected (0-4 years, 5-13 years, never), installation year (1991-1995, 1960-1990) and a set of interaction strata for years since inspection and installation year (0-4 years and 1991-1995, 0-4years and 1960-1990, 5-13 years and 1960-1990, never and 1991-1995, never and 1960-1990) were examined for possible associations with overall pool compliance and gate compliance. Gate compliance was of interest as it was the most common cause of non-compliance.

RESULTS

There are about 50,500 residential properties within the City of Newcastle local government area. A total of 211 unauthorised or unregistered pools and about 3,300 authorised pools were identified. One hundred and thirty-two pools were identified using the PLANES database but were not identified on the aerial surveillance maps, and 79 pools were identified on the survey maps but were found not to be registered. All the unauthorised pools were inspected, but only 345 (41 per cent response rate) of the registered pools approached could be inspected as the house occupants were not home for the other 422 pools when the inspector called.

TABLE 2

PROPORTION OF ALL UNAUTHORISED OR UNREGISTERED POOLS AND A SAMPLE OF REGISTERED POOLS IN THE CITY OF NEWCASTLE NOT COMPLYING WITH SWIMMING POOLS ACT 1992

	Unregistered pools (%)	Registered pools (%)
All pools		
Fences		
Missing sections	11	6
Gaps >10cm b/w members	2	1
Gaps >10cm under fence	7	3
Fence height <1.2m	6	1
Design of fence allows climbing	7	3
Footholds in/near fence	6	5
Unstable/poor construction	4	3
Retaining walls	0.4	1
No fence	0.4	0.2
Total	20	20
Gates		
faulty/missing self-latching	42	31
Faulty/missing self-closing	40	35
Swings inward	1	10
Gaps >10cm under gate	2	0.2
Latch height/shielded	17	5
Unstable/poor construction	2	1
Footholds in gate	1	1
Total	65	56
Warning signs		
Sign absent	52	47
Sign not in pool area	3	1
Sign not permanently affixed	1	0.2
Sign lacks adult supervision required	2	–
Total	58	48
Perimeter fenced pools only		
Doors		
Latch height	30	19
Faulty/missing self-latching	6	1
Total	36	19
Window		
No screening/child effective locks	24	28

The characteristics of the unauthorised or unregistered pools and the sample of registered pools is shown in Table 1. Unregistered pools were more likely to have been built prior to 1985, were more likely to be above-ground pools, and only 10 per cent (21 pools, 95 per cent CI: 6.0 per cent-14.2 per cent) were found to comply with the Swimming Pool Act 1992. Only 17 per cent (60 pools, 95 per cent CI: 13.0 per cent-21.0 per cent) of the registered pools complied with the Act.

The reasons for non-compliance for the two types of pools were categorised into problems with the fence, gate or warning signs (Table 2). The unregistered pools were more likely to not comply with the Regulations regarding gates and warning signs compared to the registered pools. The unregistered perimeter fenced pools were more likely to not comply with the regulations regarding doors.

Changes in compliance following reinspection of the unregistered pools

Of the 188 unauthorised or unregistered pools which did not comply with the Act, 165 were successfully reinspected within 90 days of the notice. Of these, 145 pools complied upon reinspection. Twenty pools still did not comply and 23

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pools were not reinspected within the study period due to insufficient time (follow-up inspections were undertaken by council health and building surveyors). Assuming that pools complying under first inspection would still comply (10 per cent) and those that were not reinspected still did not comply, a total of 89.0 per cent (95 per cent CI: 84.9 per cent-93.1 per cent) of pools would comply if a non-compliance notice was served and re-inspection took place. This represented a significant increase in compliance of 79 per cent ($p<0.0001$).

The features of the 20 pools still failing to meet the legislative requirements were fencing (5 pools), gates (8 pools), doors (2 pools), windows (1 pool) and warning signs (7 pools).

Predictors of compliance

The only significant predictor of overall pool compliance was fencing configuration. It was found that pools with isolation fencing were 1.93 times more likely to comply overall with the Swimming Pools Act 1992 ($p<0.05$).

Installation year, years since last inspection and the interaction effect of installation year and years since last inspection were significant predictors of gate compliance. Pools installed between 1960 and 1990 were 0.54 times as likely to comply with gate requirements as pools built between 1991-1995. Pools that had been inspected 5-13 years ago were 0.59 times as likely to comply with gate requirements as pools inspected 0-4 years ago. There was no difference in the likelihood of gate compliance between pools that have never inspected and pools that were inspected within the past four years, although this finding may be due to a failure to record inspections which may have actually occurred.

There was no difference between pools that had been inspected in the past five years regardless of the age of the pool. Pools inspected 5-13 years ago and installed between 1960 and 1990 were 0.54 times as likely to comply with gate requirements as pools inspected 0-4 years ago and built between 1991 and 1995.

When compliance was examined in relation to the time since inspection as a continuous variable for all pools that had previously been inspected only, it was found that there was a significant decrease in the likelihood of compliance with each year since last inspected.

DISCUSSION

The main findings of the study were as follows:

- The great majority of pools installed before 1990 and not inspected in the last five years were the most likely to not comply with the Swimming Pools Act 1992.
- Pool owner education through community awareness programs alone is not effective in ensuring that swimming pools meet the requirements of the Act.
- If the status of swimming pools in the City of Newcastle is indicative of most areas in NSW, considerable work is needed to ensure that pools are meeting basic safety requirements.

We found very low rates of compliance with the Swimming Pools Act 1992; only 17 per cent of registered pools and 10 per cent of unregistered pools complied. This finding is of particular concern in relation to registered and authorised pools, which were council approved and were inspected at the end of a community pool safety awareness campaign aimed at improving compliance.

Compliance of the unauthorised or unregistered pools with the Act improved markedly following the reinspection program, increasing from 10 per cent to 89 per cent. Of all pools inspected during this program, 79 per cent of those which subsequently complied did so as a direct result of advice given during the first inspection.

Although the educational program was not formally evaluated, the observation that only the 17 per cent of registered and authorised pools were found to comply suggests the greatest possible effect of the education campaign would be only in the order of 5-10 per cent. Comparing this with the large increase in compliance after the reinspection program suggests the latter is a more effective method for gaining an increase in compliance.

The major factor of non-compliance is attributed to defective pool gates. The logistic regression modelling of gate compliance revealed that there was a significant improvement if the premises had been inspected 0-4 years previously, regardless of the age of the pool. Before 1990 there was no defined standard, as there is with the current Act, and it was based on what the council inspector deemed to be unsafe. These less stringent safety requirements at the time of inspection for older pools may account for the difference in current compliance with the legislation. If this were the case, inspection of older pools is justified to ensure that they comply with the existing safety requirements.

While the logistic regression modelling was helpful, the fundamental findings should attract the greatest attention. Pools in the City of Newcastle area are in need of improvements if pool owners are to meet their responsibilities under the Swimming Pools Act 1992.

The Council of the City of Newcastle will continue the inspection program to ensure compliance is maintained. Establishing a pool register and location register allows the Council to target problem areas more efficiently. It also facilitates continuing assessment of compliance and evaluation of the impact of new strategies on the level of compliance over time.

ACKNOWLEDGEMENT

We thank Dr Cait Lonie for her advice and assistance.

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VACCINE STORAGE IN SOUTH WEST NEW SOUTH WALES

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To ensure the potency of vaccines used in immunisation programs it is essential that vaccine temperatures be maintained between 2°C and 8°C during both storage and transport[1] – the so-called vaccine "cold chain". Any deviation from this temperature range will result in some degradation of the vaccine. Exposure to temperatures outside the recommended range has a cumulative effect in reducing vaccine potency and cannot be reversed[1].

This article reports on a survey of vaccine storage conditions in premises of five types of vaccine providers: local councils, hospitals, community health centres (CHCs), general practitioners (GPs) and pharmacies. The effectiveness of the distributing hospital pharmacy refrigerator was also assessed.

Because the South West Health Districts cover vast distances and experiences extremes of temperature, it is important to identify weaknesses in the cold chain as well as improve the standards of vaccine handling.

METHODS

A telephone survey of councils, hospitals and CHCs was conducted to identify premises at which vaccines were stored. A 10 per cent random sample of GPs and pharmacies was undertaken and included in the storage survey. Eighty premises were selected as a representative sample of the target population. The sample comprised 13 councils, 27 hospitals, 18 CHCs, 12 GPs and 10 pharmacies.

A letter was sent to a staff member (identified during the survey) at each location explaining the survey. At the initial visit to each premises a maximum/minimum thermometer was installed. The thermometer was placed in the vicinity of the vaccines in an upright position. Basic procedures on how to read the thermometer were explained to the staff member. The thermometer was read for a one-month period at approximately the same time every day, and the maximum and minimum temperatures were recorded on the temperature sheet provided. At the end of the survey period the temperature data sheet was returned to the South West Centre for Public Health. The thermometer was retained by the vaccine provider.

Each vaccine storage refrigerator was inspected to determine location of vaccines, other items stored such as food or beverages, excessive ice build-up, whether the refrigerator was regularly monitored, and whether there was an uninterruptable power supply to the refrigerator.

RESULTS

Compliance with the storage requirements was generally good (Table 3). Of the 80 premises, 67 had vaccines stored in the correct location. A total of 47 premises contained some form of temperature monitoring. Very few had a maximum/minimum thermometer. Only one of the premises studied read and recorded the temperature daily.

A total of 24 premises stored food and beverages in the vaccine refrigerator and 11 premises showed a build-up of ice.

Power interruptions were common due to blackouts or accidental disconnection of vaccine refrigerators in those service providers surveyed.

Compliance with the recommended temperature range was poor, with all five service providers reporting inappropriate temperatures for vaccines (Table 4). Wide variations occurred outside the recommended temperature range, with the highest temperature being 27°C and the lowest -10°C. Each group surveyed had vaccines exposed to sub-zero temperatures. With the exception of the pharmacy group, all groups had vaccines exposed to temperatures greater than 20°C.

TABLE 4

TEMPERATURE RANGES IN REFRIGERATORS

Service Provider (n)	Maximum range	(median)	Minimum range	(median)
Council (13)	0°C to 22°C	(5°C)	-4°C to 8°C	(1°C)
CHC (18)	0°C to 22°C	(5°C)	-5°C to 14°C	(2°C)
Hospital (27)	-3°C to 27°C	(6°C)	-10°C to 15°C	(2°C)
GP (12)	1°C to 25°C	(6°C)	-6°C to 11°C	(1°C)
Pharmacy (10)	0°C to 8°C	(4°C)	-2°C to 7°C	(1°C)

TABLE 3

VACCINE STORAGE CONDITIONS

Service Provider (n)	Correct location (%)	Power interruptions (%)	Build-up of ice (%)	Store food (%)	Other drugs (%)	Other appliances (%)	Refrigerator monitored (%)
Council (13)	11 (85)	6 (46)	2 (15)	5 (38)	0 (0)	1 (8)	7 (54)
CHC (18)	18 (100)	4 (22)	3 (17)	7 (39)	9 (50)	1 (6)	7 (39)
Hospital (27)	20 (74)	15 (55)	2 (8)	1 (4)	23 (85)	1 (4)	18 (67)
GP (12)	10 (83)	3 (25)	3 (25)	4 (33)	9 (75)	2 (17)	7 (58)
Pharmacy (10)	8 (80)	4 (40)	1 (10)	7 (70)	9 (90)	5 (50)	8 (80)
Total (80)	**67 (84)**	**32 (40)**	**11 (14)**	**24 (30)**	**50 (62)**	**10 (12)**	**47 (59)**

Note: Correct location — vaccines being stored in the main body of the refrigerator (not in the door).
Power interruptions — blackouts, accidental disconnection.
Build-up of ice — excessive ice in freezer compartment.
Store food & other drugs — storing food, beverages or pharmaceutical drugs in with the vaccines.
Other appliances — other electrical appliances were connected to the same power point.
Refrigerator monitored — whether refrigerator contained a thermometer.

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Vaccine storage in South West NSW

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DISCUSSION

To store vaccines effectively, vaccines must be located in the main body of the refrigerator with the temperature maintained between 2°C and 8°C.

Storage location practices in the premises surveyed were generally acceptable, with most vaccines in the main body of the refrigerator. However, some refrigerators were overstocked, and vaccines were stored in the door. Previous studies have indicated that the temperature in the door of the refrigerator is higher than the main body[1]. It is suggested that vaccine handlers should order only the amount of vaccine they will need rather than order in bulk. This will reduce the amount of storage time and ensure vaccines are used well before their expiry date.

Only one provider (a GP) maintained a refrigerator within the recommended temperature range. At this GP's surgery a staff member responsible for the vaccines maintained a log book and recorded the temperature of the refrigerator twice daily. It is essential that vaccine handlers record the temperature at least once daily in a log book and ensure the refrigerator is maintained appropriately.

It was observed that no refrigerator contained bottles of water, as recommended, to insulate the refrigerator[1]. The temperature fluctuation of most refrigerators may have been reduced if bottles of water had been stored in them.

Most vaccines are affected by freezing[2]. Hepatitis B vaccine has a freezing point of -0.5°C and the vaccine is destroyed if frozen[3]. The freezing point for absorbed diphtheria-tetanus-pertussis (DTP) vaccine is between -5°C and -10°C[3]. It is alarming that many of the sites had temperatures low enough to destroy the potency of hepatitis B vaccine. Some premises also had temperatures which could affect the potency of DTP and tetanus toxoids.

The maximum/minimum thermometer is a good indicator of the temperature range to which vaccines are exposed, but gives no indication of the length of time the vaccine is at a particular temperature. It is important therefore, to have a cold chain monitor in the refrigerator to measure the cumulative effect of temperatures on vaccines.

CONCLUSION

Our results suggest that vaccine handlers have insufficient knowledge about correct storage procedures and the risks associated with temperature extremes.

Despite published recommendations, vaccine handlers frequently fail to maintain the temperature within the recommended range. The mere placement of a vaccine product in a refrigerator without adequate monitoring is insufficient. Adequate training on correct storage locations and practices is essential for all staff handling vaccines.

Vaccine handlers should be encouraged to follow the National Health and Medical Research Council (NHMRC) guidelines[2], with particular reference to the following:

- a maximum/minimum thermometer be placed in every vaccine refrigerator and the temperature recorded daily;
- a trained staff member at each location be responsible for maintaining the vaccine cold chain; and
- adequate training be given to all staff handling vaccines.

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LETTERS TO THE EDITOR

LOCAL GOVERNMENT AREAS AND RATE OF SERIOUS IMMERSIONS OF TODDLERS

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We noted with interest the comment by Sayer and Lonie[1] that the differences among local government areas (LGAs) in NSW in the rate of serious immersions of toddlers (0-4 years) in swimming pools may, in part, be attributable to the number of pools in each LGA and hence the degree of exposure. Here, we thought, might be an example of a difference in mortality rate or health status going against the dominant trend of greater affluence being associated with better health. Perhaps, we reasoned, the more affluent LGAs would have more private swimming pools, resulting in a greater exposure of the children of wealthy parents to the risk of a serious immersion.

To test this hypothesis, we regressed Sayer and Lonie's standardised serious immersion ratios (SSIR) for LGAs in NSW for 1986 and 1989-92 combined against the respective Jarman 8 Index for 1986[2]. The results (see Table 5) are equivocal but still interesting. For all 166 LGAs in NSW there is no statistically significant relationship between SSIR and affluence, but for the 37 LGAs in metropolitan Sydney there is a statistically significant relationship whereby the variation in affluence explains approximately 12 per cent of the variation in SSIR. Removing those LGAs where the SSIR is zero produces results which are of borderline statistical significance: in the 29 Sydney LGAs the explained variation is still approximately 12 per cent, whereas in the 90 NSW LGAs the explained variation is approximately 4 per cent.

These results suggest that, at the LGA level, affluence may predict toddlers' serious immersion incidents in private swimming pools. The relationship appears stronger in metropolitan Sydney and possible explanations for this include: a closer relationship between affluence and private swimming pool ownership in urban areas; and less adult supervision of toddlers around private swimming pools in urban areas. We must, however, note that we do not know the actual relationship between private swimming pool ownership and affluence in LGAs.

Whether the serious immersion of toddlers in swimming pools is an example of greater affluence being associated with worse health remains to be proven. A larger sample size or more years' data would assist the analyses at LGA level but definitive proof requires the collection of family-specific data.

TABLE 5

LINEAR REGRESSION OF STANDARDISED SERIOUS IMMERSION RATIO (SSIR) (1986 AND 1989–92 COMBINED) AGAINST JARMAN 8 INDEX (1986) FOR LOCAL GOVERNMENT AREAS (LGAs) IN NSW

	n	Beta coefficient	p value	R squared
All LGAs	166	-0.003	0.684	0.001
NSW	37	-0.041	0.035	0.121
LGAs with SSIR>0				
NSW	90	-0.017	0.053	0.042
Sydney	29	-0.044	0.056	0.128

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HEALTH, GEOGRAPHY AND MAPPING

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Recent articles by Stewart *et al*.[1,2] have described interesting and important results relating to the geographic variation in suicide mortality in NSW. It is disappointing, however, that they have not used one of the geographer's most useful tools - the map. Much of the information shown in Figures 1 and 1 to 6 in the first[1] and fourth[2] of their series on the epidemiology of suicide, respectively, could have been presented on a map. Such a presentation would have complemented the existing presentation of results and aided and enhanced their interpretation. For example, the reader would have instantly seen where a particular location is, and similar areas would have been easily identified.

Two recent Australian examples of the use of maps to illustrate health information are A Social Health Atlas of Australia'[3] and An Atlas of Premature Mortality in New South Wales 1981-1988[4]. Incidentally, the latter contains a section on suicide mortality and although results are only presented for males and females separately, the list of local government areas with unusually high and low standardised mortality ratios is quite similar to that in Stewart *et al*[2].

While there has been considerable discussion and comment on the statistical aspects of the work of Stewart *et al*[1,2,5,6], a brief discussion of possible causes of the spatial variation in suicide mortality would have been interesting (factors such as socioeconomic stresses, disabling mental illness and isolation are very briefly mentioned[1]), or to have been directed to recent research that has examined such causes. If such research does not exist, it would seem to be a vital gap in our understanding of this tragic phenomenon.

The results presented by Stewart *et al*[1,2] are a good example of what Geographers have termed the Modifiable Areal Unit Problem[7,8] where 'results will differ not only as the number of observations is changed to a different scale but, at each scale, one can get incredibly varied results according to how the observations have been aggregated into groups'[7]. Echoing the wisdom expressed by Vimpani in his recent article in the *Bulletin*[9], 'a deeper, more holistic, understanding of the contemporary human dilemma' will require an integrative approach where 'people will need to

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INFECTIOUS DISEASE REPORTING BY AREA HEALTH SERVICES

In this edition of the *Bulletin* we report for the first time on infectious diseases by the new Area Health Services in NSW. Regular readers will note that, until now, Table 6 has reported cumulative cases of notifiable diseases for the year by Public Health Unit service areas (either an urban Area or a group of rural Districts). In July 1996, the 23 former rural Health Districts were reorganised into eight Area Health Services. Starting with this issue of the *Bulletin*, we will present notifiable diseases reports among residents of each of the 17 NSW Health Areas received during the preceding month.

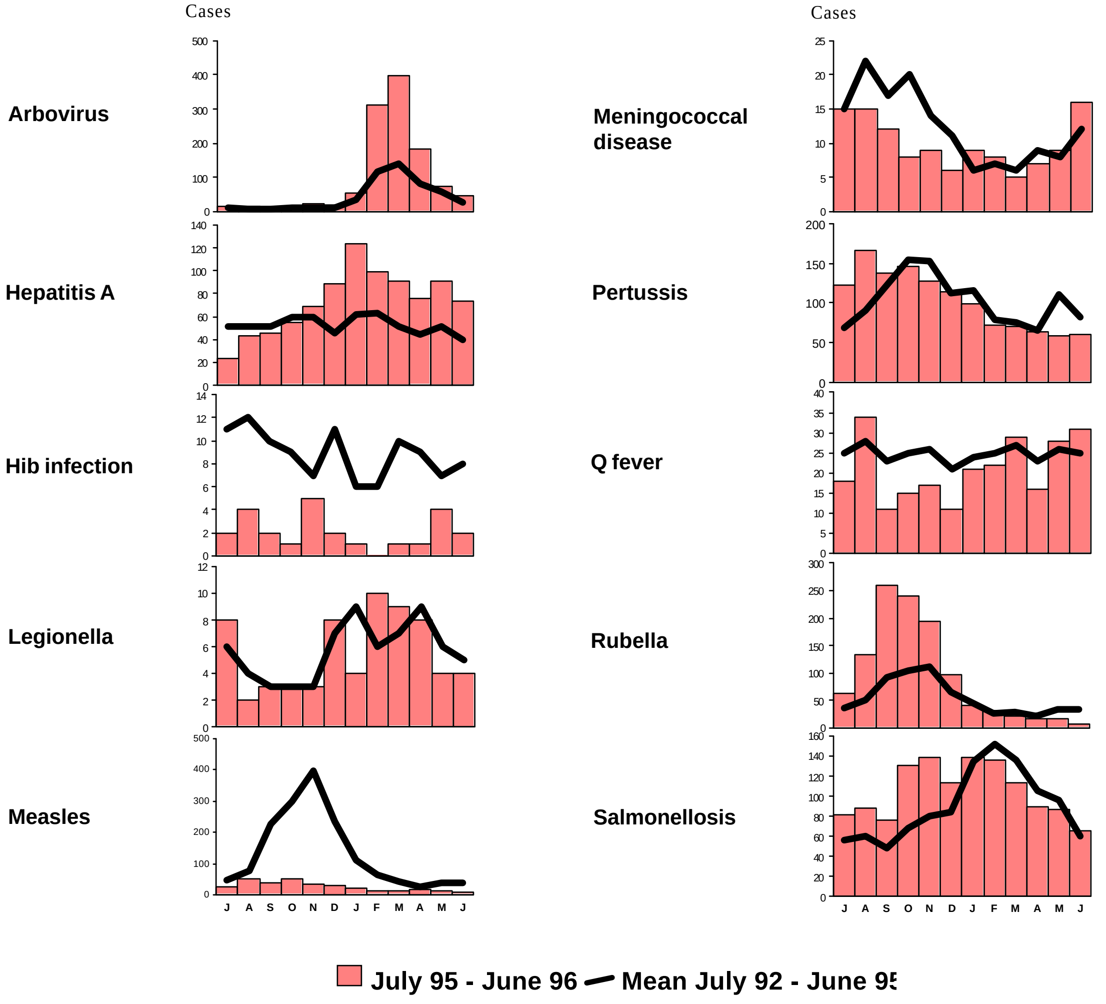
TRENDS

With winter well established, the illnesses with the usual pathogens have been reported, prominent among them ***Neisseria meningitidis*** (Figure 1), **respiratory syncytial virus (RSV)** (Figure 2) and **influenza A** (Figures 3 and 4).

In July, 18 cases of **meningococcal disease** were reported, bringing the total so far for the year to 72. Household and other close contacts (such as other small children in child care) of **meningococcal** cases may be at increased risk of disease. Public Health Units (PHUs) can help identify contacts who will benefit from antibiotic prophylaxis. Hospitals and laboratories should telephone their Public Health Unit on provisional diagnosis of meningococcal disease to ensure contacts are correctly identified and treated. Health care workers (including emergency department staff and ambulance officers) are **rarely** at increased risk of disease and are therefore **not** candidates for prophylaxis unless they have **intimate** exposure to nasopharyngeal

FIGURE 1

REPORTS OF SELECTED INFECTIOUS DISEASES, NSW, 12 MONTHS TO JUNE 1996 BY MONTH OF ONSET (WITH HISTORICAL COMPARISON)



excretions and precautions have not been taken (e.g., during mouth-to-mouth resuscitation, emergency intubation or suctioning).

The outbreaks of **hepatitis A** seen predominantly in eastern Sydney and the Shoalhaven earlier this year have continued, albeit at lower levels, and several other Areas (notably Central Sydney, Western Sydney, Mid Western NSW, Northern Rivers and Western NSW), have reported increased numbers of cases (Table 6). Doctors, hospitals and laboratories are reminded to telephone PHUs to report suspected cases of hepatitis A and ensure that contacts at risk are promptly identified and treated.

EASTERN SYDNEY LABORATORY SURVEILLANCE PROGRAM

Figure 2 shows reports of rotavirus, RSV and cryptosporidiosis received by the Eastern Sydney Laboratory Surveillance Program (ESLSP)[1] by four-week reporting period. In the ESLSP, nine laboratories voluntary report diagnoses of selected infectious diseases to the South Eastern Sydney PHU. These data show that reports of **RSV** peaked in May-June, but that **rotavirus** infections have risen (in line with historical trends). Reports of **cryptosporidiosis** have remained relatively low.

AUSTRALIAN CHILDHOOD IMMUNISATION REGISTER (ACIR)

The ACIR began on January 1 1996, managed by the Health Insurance Commission (HIC). The HIC reports that in NSW, 79 per cent of immunisation encounter forms were received from general practitioners, 10 per cent from local councils, 7 per cent from community health centres, 3.5 per cent from hospitals and 0.3 per cent from Aboriginal Health Services.

Preliminary NSW data indicate that at 30 June 1996:

- 633,139 children <7 years of age were registered on the ACIR through the Medicare database;
- 423,954 valid vaccinations were reported; and
- 327 parents opted off the recall/reminder system.

These data indicate that the ACIR is well and truly under way. Further analysis is required to gain an accurate picture of childhood immunisation rates in the community.

The NSW Health Department has signed an agreement with the HIC for the release of identified data on children recorded as 90 days overdue for vaccination. The data will be distributed to immunisation providers via PHUs with strict confidentiality provisions that limit their use to immunistion. As soon as reliable data from the ACIR are available, regular reporting on coverage will be published in the *Bulletin*. A Departmental Circular providing guidelines for the follow-up of these children will be released shortly.

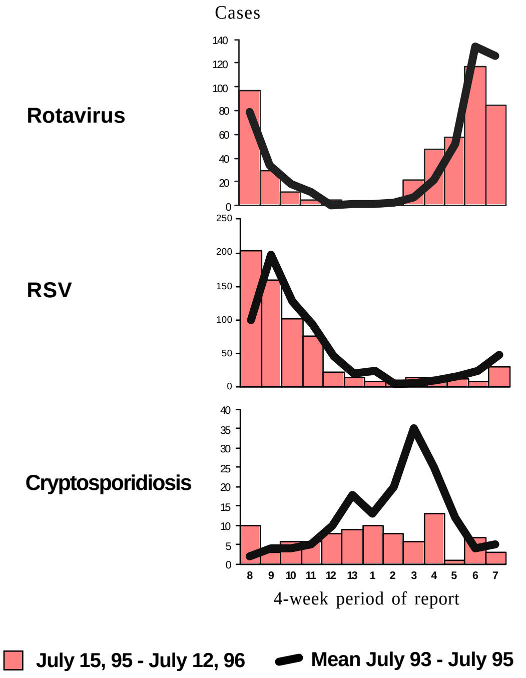
Q FEVER IN SOUTHERN NEW SOUTH WALES

Greg Sam, Louise Remington, Paul Van Buynder, South Eastern Public Health Unit

An abattoir in Southern NSW recently experienced its second major outbreak of Q fever in 10 months. Q fever was confirmed serologically in 37 of the 150 employees (31 male and six female) from all work areas of the abattoir. Onset of illness occurred between June 13, 1996 and July 26, 1996. All cases exhibited flu-like symptoms including sudden onset of fever, coughing and muscle pains. Almost all required review by a general practitioner, and four were admitted to hospital because of hepatic and splenic involvement. The age range of cases was 18 to 57 years. None had been immunised.

FIGURE 2

REPORTS OF SELECTED INFECTIOUS DISEASES, EASTERN SYDNEY LABORATORY SURVEILLANCE PROGRAM, YEAR (13 X 4 WEEK REPORTING PERIODS) TO JULY 12, 1996, BY DATE OF REPORT



Q fever is caused by *Coxiella burnettii*, a highly resistant rickettsial organism found in placental tissues, birth fluids and/or excreta from infected cattle and other livestock. Infection is most commonly acquired by inhaling infected aerosols. The acute manifestations of the disease are well documented. About 65 per cent of cases experience fatigue, arthralgia and myalgia for six months or more, and 20 per cent may experience a post-Q fever fatigue syndrome for a number of years[1].

The high attack rate in this outbreak, and the distribution of cases throughout the facility, demonstrate the efficiency of dissemination of contaminated aerosols and the risk to susceptible individuals in these environments.

Formalin-inactivated whole cell Q fever vaccine was first used on a trial basis in South Australian abattoirs in 1981 and licensed in 1989. Since its widespread availability in NSW in 1993, notifications for Q fever have declined. Between 1993 and 1995 the level of notifications for the disease decline from 6.6/100,000 to 2.2/100,000. Individuals involved in the meat industry or other vocations involving contact with livestock make up more than 90 per cent of cases[3].

Reluctance by some sections of the meat industry to provide vaccination programs has been largely due to perceived

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Infectious diseases

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inequities of the cost/benefit ratio for staff at greatest risk, i.e. those entering the workforce for the first time or staff employed on a casual basis. The cost of acute disease to the workplace has been estimated to be $7,000 and chronic sequelae estimated to around $50,000 per patient per year[4]. Common law action for damages is also possible for workplace injury. Clearly the benefit of an institutionalised vaccination program is justified.

The abattoir in which these outbreaks occurred has begun a Q fever vaccination program.

1.Marmion BP, Ormsbee RA, Kyrkou M et al. Vaccine prophylaxis of abattoir-associated Q fever: 8 years experience in South Australian abattoirs. *Epidemiology and Infection.* 1990; 104: 275-287.
2.Q fever: greater immunisation coverage needed. *NSW Public Health Bulletin.* 1995;6:71-73.
3.Marmion BP. Vaccine prophylaxis of q Fever. 200 Year Celebration of Vaccine Development 1796-1996. SA Health Commission; May 1996: 12-13.

FIGURE 3

NSW GP SENTINEL SURVEILLANCE 'INFLUENZA-LIKE ILLNESS', 1996

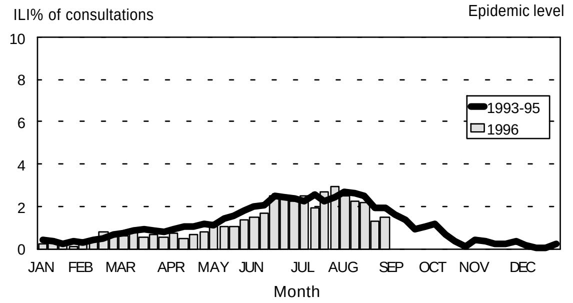
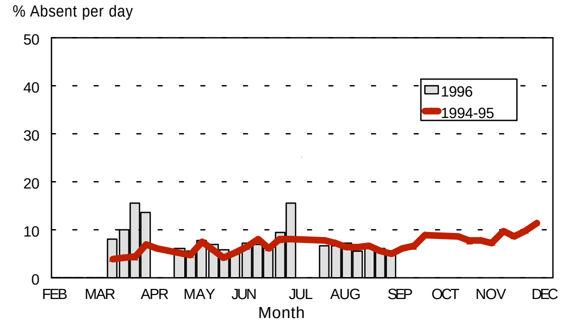


FIGURE 4

SCHOOL ABSENTEE RATE SURVEILLANCE, NSW 1996



INFLUENZA SURVEILLANCE

Influenza activity continued at a moderate level during the first half of August, similar to the historical average for this time of year.

Reports of influenza-like-illness (ILI) from the NSW Sentinel GP Surveillance Scheme are received through five PHUs from about 50 doctors carrying out around 7,000 consultations a week. Figure 3 shows the State average consultation rate for ILI in the last week of July was 3.5 per cent, slightly higher than the average for the previous few years. Southern and New England were the only Areas to report data for August so far and both reported consultation rates of around 3.5 per cent.

School absentee rates are being monitored from 12 schools with a total of about 11,000 students, through six PHUs. Figure 4 shows that the average absentee rate has continued at levels similar to the historical average for this time of year. The high absentee rates in early July were in the last week of term and not due to infectious diseases.

Reports from Westmead, Prince of Wales and Liverpool Hospital laboratories indicate that during the first two weeks of August, virology diagnoses of influenza (mainly in children) continued at levels similar to the previous month (23 influenza A diagnoses and no influenza B diagnoses). Serological diagnoses of influenza A (mainly in adults) increased during this period, however, with 20 reports, compared with eight reports in the previous fortnight.

JAPANESE ENCEPHALITIS

In March and April 1995, three cases of Japanese encephalitis (JE) were reported among residents of a single Torres Strait island (population 780). Two died. Until then, Japanese encephalitis had never been reported in Australia or east of Bali[1].

Japanese encephalitis is caused by a virus (an arthropod-borne flavivirus) carried by mosquitoes. Infection causes an acute brain syndrome including reduced consciousness, generalised spasticity, focal neurological signs, and fits. No specific treatment is available for JE; of all patients, one-quarter die, and 30 per cent have long term neuropsychiatric problems. In populations exposed from birth, however, for each clinical case, between 100 and 1,000 people are infected without symptoms. Adults who are not immune, such as travellers to infected areas, have higher rates of serious illness[2].

About 500,000 cases of JE are reported each year in Asia, mostly from rural areas of China, Taiwan, Hong Kong, Korea, South-east Asia, the Indian subcontinent, Sri Lanka, Guam, Indonesia, the Philippines, and Russia. The virus reservoir is primarily in animals such as pigs, horses, and wild birds. In subtropical areas, outbreaks occur at the end of the wet season. The risk to travellers appears low; the main risk is travelling to endemic rural areas for long periods, especially during epidemic seasons[2].

An effective vaccine is widely used in Asia, and is available in Australia for travellers >1 year of age spending at ≥1 month in endemic rural areas, or ≥1 year in endemic urban areas[2].

In April 1995, in response to identification of the Torres Strait cases, control activities were initiated including[1]:

- education of the community about personal mosquito protection measures;
- identification and control of mosquito breeding sites;
- a serological study of 212 island residents. (This suggested previous flavivirus infection in 59 (28 per cent) and recent JE infection in 21 (10 per cent));

- a serological survey of island horses and pigs (showing evidence of infection); and
- vaccination of 3,440 people mainly resident in the outer Torres Strait Islands[3].

To Australians, JE historically has been a risk to some travellers to Asia. The recent Torres Strait cases were the first reported in Australia. While it seems possible the virus could be carried to NSW by birds and mosquitoes, this has never been recorded and it is impossible to predict if it will ever occur.

In NSW, structures in place to detect and control outbreaks of mosquito-borne diseases, including mandatory laboratory reporting of cases of arboviruses (including JE) and the Arbovirus Disease Surveillance and Control Plan should allow early detection and control of locally acquired disease. Research currently under way in Queensland on risks to humans and animals will further guide policy.

1. Hanna J, et al. Probable Japanese encephalitis acquired in the Torres Strait. *Comm Dis Intell* 1995;19:206-208.
2. NHMRC. The Australian Immunisation procedures handbook. 5th ed. Canberra: 1994.
3. Hanna J, et al. Vaccination against Japanese encephalitis in the Torres Strait. *Comm Dis Intell* 1996;20:188-190.

INFECTIOUS DISEASES COMMITTEES

Infectious Diseases Advisory Committee (IDAC)

IDAC met in July and considered future changes to the list of notifiable diseases in NSW. Proposals for changes to the list were sought from members of the Laboratory Surveillance Advisory Committee and Public Health Unit staff. IDAC also considered the national list of notifiable conditions.

The proposed changes to the schedule will not come into effect until a system is developed that would allow laboratory reports to be transmitted electronically to a single, secure database. This will probably not occur for at least several months.

IDAC supported the following changes to the list:

Conditions to be notified by doctors:

- acute viral hepatitis to be notified by telephone.

Conditions to be notified by hospital chief executive officers:

- hepatitis A, paratyphoid, typhoid and rabies to be notified by telephone.

Conditions to be notified by laboratories:

- campylobacteriosis, chancroid, *Chlamydia trachomatis* infections, donovanosis, shigellosis, yersinosis, equine morbillivirus infection, influenza, rotavirus infection and respiratory syncytial virus to be included on list; and
- flaviviruses, hepatitis A, rabies and equine morbillivirus infection to be notified by telephone.

NSW Immunisation Advisory Committee (IAC)

At its last meeting, IAC reviewed 78 cases of adverse events following immunisation (AEFIs) notified in 1994 and 1995. A full report of this review will be published in a future issue of the *Bulletin*. AEFIs are defined as at least one of the following conditions occurring ≤30 days after administration of a vaccine:

- persistent screaming (>3 hours)
- anaphylaxis
- shock
- hypotonic/hypertonic episode
- encephalopathy
- convulsion
- aseptic meningitis
- thrombocytopaenia
- death

Health professionals are reminded that all AEFI should be reported to the local Public Health Unit.

1.Contributing microbiology laboratories include: Prince of Wales Hospital, St Vincents Hospital, New Children's Hospital Virology Lab, Sugerman's Pathology, Frack & Mansfield Pathologists, Quinn Pathology Services, Douglas Laboratories, Macquarie Pathology Services and Hanly Moir Pathology.

Letters to the Editor

►*Continued from page 89*

break out of the mould into which specialisation has placed them and begin to collaborate with a much broader range of disciplines'. It is clear that geography must be one of these disciplines.

1. Stewart G, Chipps J, Sayer G. Suicide mortality in NSW: geographic variations. *NSW Public Health Bulletin* 1995;6(6):49-52.
2. Stewart G, Chipps J, Sayer G. Suicide mortality in NSW local government areas. *NSW Public Health Bulletin* 1996;7(1-2):1-10.
3. Glover J, Woollacott T. *A Social Health Atlas of Australia*, Volumes 1 and
2. Australian Bureau of Statistics Catalogue No. 4385.0, September 1992.
4. Curson P, Siciliano F. *An Atlas of Premature Mortality in New South Wales 1981-1988.* Report prepared for the Commonwealth Department of Community Services and Health, April 1992.
5. Harrison J, Moller J, Dolinis J. Letter to the Editor. Suicide mortality in NSW: geographic variations. *NSW Public Health Bulletin* 1995;6(9):92-93.
6. Stewart G, Chipps J, Sayer G. On the achievement of real targets: reply to Harrison et al. *NSW Public Health Bulletin* 1995;6(9):93-94.
7. Jones K, Moon G. *Health, Disease and Society*. *An introduction to medical geography.* London: Routledge & Kegan Paul, 1987, p128.
8. Openshaw S. The modifiable areal unit problem. *Concepts & Techniques in Modern Geography* 38. Norwich: Geo Books, 1983.
9. Vimpani G. The seduction of medicine by health outcomes: from meaning to measurement. *NSW Public Health Bulletin* 1995;6(11):132.

TABLE 6

INFECTIOUS DISEASE NOTIFICATIONS FOR NSW IN JULY 1996, RECEIVED BY AREA HEALTH SERVICE

	Area Health Service																	Period	
Condition	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	Total for July	Year to date
Blood-borne and sexually transmitted																			
AIDS	-	4	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	7	166
HIV infection	4	-	1	-	4	-	-	-	11	1	-	-	-	-	1	-	-	37	276
Hepatitis B - acute viral	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	24
Hepatitis B - other	34	30	42	1	51	2	2	1	23	3	3	5	-	-	-	2	2	201	2,678 *
Hepatitis C - acute viral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Hepatitis C - other	41	13	2	1	21	9	25	5	64	31	17	12	1	3	-	10	25	282	4,516 *
Hepatitis D - unspecified	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Hepatitis, acute viral (NOS)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
Gonorrhoea	1	-	2	-	-	-	-	-	16	2	-	1	1	-	1	-	-	24	287
Syphilis	6	5	5	-	10	-	2	-	9	-	-	9	-	-	2	-	-	48	431
Vector-borne																			
Arboviral infection	-	-	-	-	-	-	3	-	-	8	3	1	1	-	-	-	-	16	1,083
Malaria	1	1	1	2	1	-	1	-	2	-	-	-	-	1	-	-	-	10	131
Zoonoses																			
Brucellosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Hydatid disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Leptospirosis	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	2	21
Q fever	-	-	-	-	-	-	-	-	-	-	1	2	1	1	1	1	7	14	161
Respiratory/other																			
Legionnaires' disease	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	40
Meningococcal (invasive) infection	2	3	-	-	-	3	1	-	3	1	2	-	-	1	-	1	1	18	72
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Mycobacterial tuberculosis	-	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	199
Mycobacteria other than TB	2	1	-	-	4	-	-	-	-	-	1	-	-	-	-	-	-	8	225
Vaccine-preventable																			
Adverse event after immunisation	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	3	28
H.influenzae (invasive) infection	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	10
Measles	-	-	1	1	-	-	1	-	2	1	-	-	-	-	-	1	-	7	99
Mumps	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	15
Pertussis	-	6	1	2	1	-	3	-	3	4	-	-	-	-	-	6	3	29	454
Rubella	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-	-	-	4	140
Faecal-oral																			
Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Foodborne illness (NOS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41
Gastroenteritis (instit)	14	-	-	5	-	-	-	-	-	-	-	-	-	1	-	-	-	20	164
Hepatitis A	4	-	4	1	1	-	1	3	10	-	2	3	-	5	-	-	1	35	590
Listeriosis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6
Salmonellosis (NOS)	5	5	6	4	3	3	4	-	7	5	1	2	-	-	-	-	3	48	677
Typhoid & paratyphoid	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	22

* Includes acute

Abbreviations used in this Bulletin:
CSA Central Sydney Health Area, SES South Eastern Sydney Health Area, SWS South Western Sydney Health Area, WSA Western Sydney Health Area, WEN Wentworth Health Area, NSA Northern Sydney Health Area, CCA Central Coast Health Area, ILL Illawarra Health Area, HUN Hunter Health Area, NRA Northern Rivers Health Area, MNC Mid North Coast Health Area, NEA New England Health Area, MAC Macquarie Health Area, MWA Mid West Health Area, FWA Far West Health Area, GMA Greater Murray Health Area, SA Southern Health Area, OTH Interstate/Overseas, U/K Unknown, NOS Not Otherwise Stated.

Please note that the data contained in this Bulletin are provisional and subject to change because of late reports or changes in case classification. Data are tabulated where possible by area of residence and by the disease onset date and not simply the date of notification or receipt of such notification.