

WHO/FAO/OIE COLLABORATING CENTRE FOR
REFERENCE & RESEARCH ON LEPTOSPIROSIS

**NATIONAL LEPTOSPIROSIS SURVEILLANCE
REPORT
NUMBER 18**

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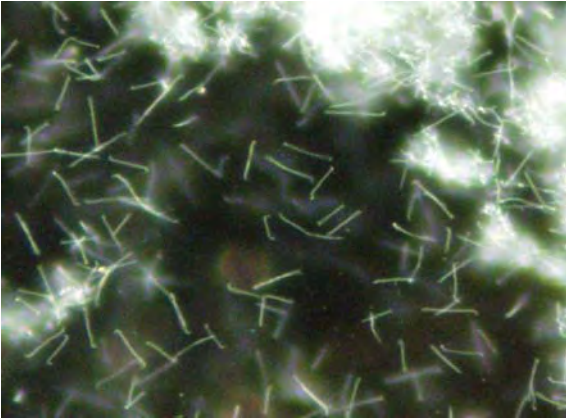
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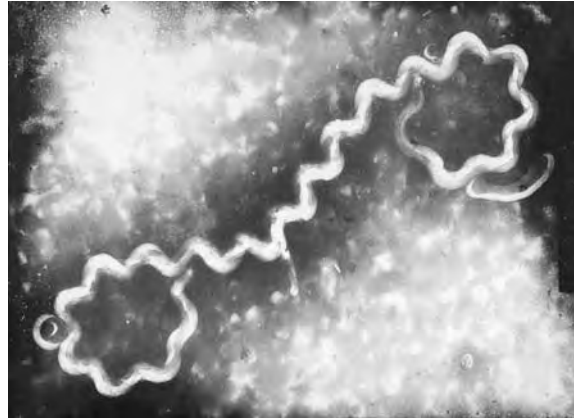
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This report summarises leptospirosis cases in 2009 based on the Reference Laboratory data. Whilst Surveillance questionnaires are an invaluable source of information regarding these cases, there was insufficient reporting regarding hospitalization and occupations for 2009.

Surveillance reports are available at: www.health.qld.gov.au/qhcss/lep_rep.asp



Leptospira under Dark Field Microscope



Leptospire under Electron Microscope

Leptospirosis: an introduction

Leptospirosis occurs worldwide but is most common in temperate or tropical climates. It is an occupational hazard for many people who work outdoors or with animals, including farmers, veterinarians, meat workers, dairy farmers, and military personnel. Infection is a recreational hazard for campers, or those who participate in outdoor sports in contaminated areas, and has been associated with swimming, wading, and white-water rafting.

Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*.

In humans, it causes a wide range of symptoms, including high fever, severe headache, chills, muscle aches, vomiting and may include jaundice, red eyes, abdominal pain, diarrhoea, or a rash.

Clinical diagnosis of Leptospirosis is problematic. Many Leptospirosis symptoms can be mistaken for indicators of other diseases while some infected individuals may exhibit no symptoms at all.

If the disease is not treated, the patient could develop kidney damage, meningitis, liver failure, and respiratory distress. The illness lasts from a few days to 3 weeks or longer and is treated with antibiotics. In rare cases, death occurs.

Outbreaks of leptospirosis are usually caused by exposure to water contaminated with the urine of infected animals. Many different kinds of animals carry the bacterium; they may become sick but sometimes have no symptoms.

Leptospira organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals, including marine mammals. Humans become infected through contact with water, food, or soil containing urine from these infected animals. This may happen by swallowing contaminated food or water or through skin contact, especially with mucosal surfaces such as the eyes or nose, or with broken skin.

Notifications

In 2009, Queensland accounted for 76% of leptospirosis notifications in Australia.

New South Wales followed up with 11.6% of the notifications, Victoria following with 7.5%, while the Northern Territory, ACT and Western Australia shared the remaining 4.8%.

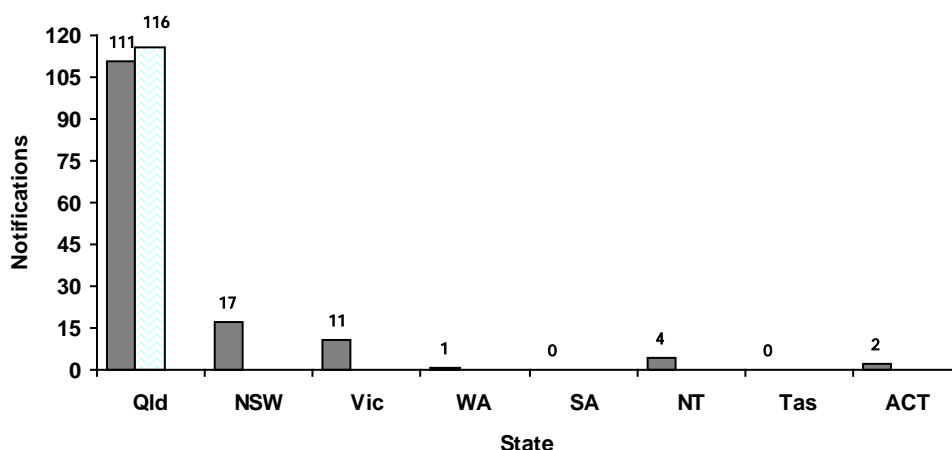
Table 1. Leptospirosis Notifications for Queensland & Australia 2008 & 2009

Year	Australia**	Queensland (Reference Laboratory Data).
2008	113	90 (79.6%)
2009	146	111 (76%)

**Australian figures for Tables 1,2 and 4 and Figure 1 consist of Reference Laboratory data for Queensland and *Communicable Diseases Network - Australia - National Notifiable Diseases Surveillance System* data for the remaining states (revised & updated 08/04/2010). All further graphs and tables in this report are based on the *Reference Laboratory* figures.

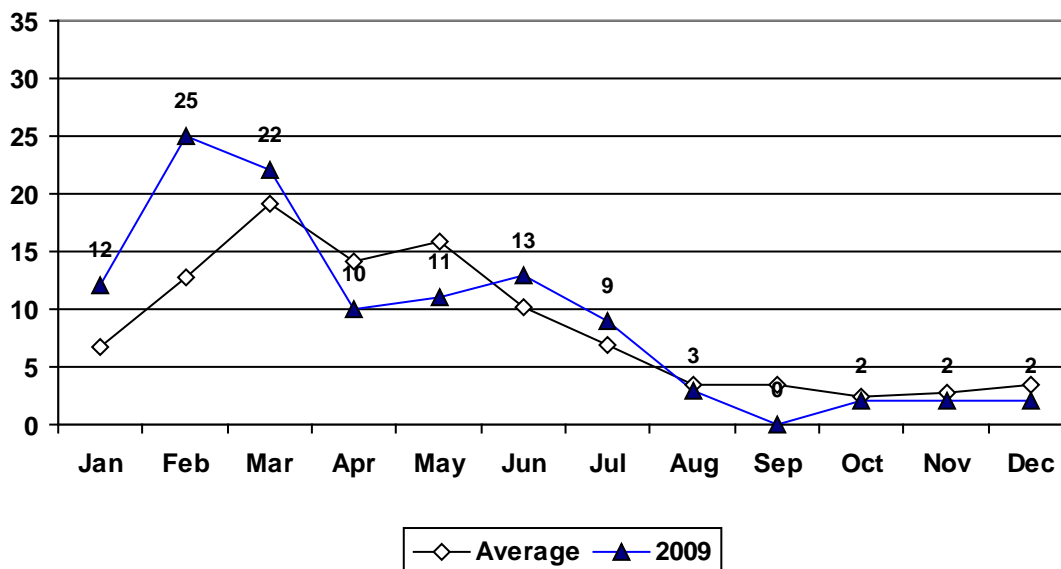
The Reference Laboratory implemented nucleic acid based testing for Leptospirosis in 2008. In 2009 there were 368 tests performed with a resulting 25 detections. Ideally serum submitted for testing should be accompanied by blood culture specimen and serum for serology (IgM antibodies are **usually** non-reactive at this stage). A further serum specimen collected 10 days or later after onset should be submitted for serological investigations. (See Appendix A)

Figure 1. Notifications of Leptospirosis for Australia in 2009 by State and Territory (Communicable Diseases Network Data)
Queensland total - 111 (Queensland probable total – 116 is also shown incorporating 5 unconfirmed cases)



Queensland notifications peaked in February/March following high rainfall in the Cairns/Hinterland region.

Figure 2. Leptospirosis Notifications for Queensland – **Average (2000-2009)** and **2009**



Notification Rates

Table 2 shows the notification rates per 100,000 population for all States and Territories of Australia for 2008 & 2009. (revised & updated data).

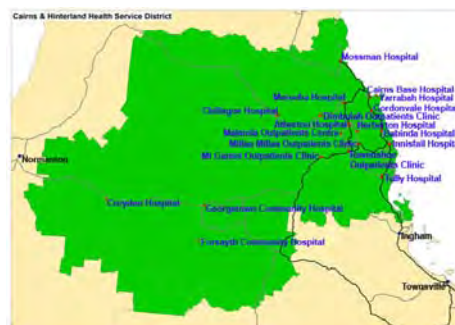
Table 2. Leptospirosis Notification Rates per 100 000 for 2008 and 2009 by State and Territory

State	2008 Rate / 100 000	2009 Rate / 100 000
New South Wales	0.24	0.23
Victoria	0.07	0.2
Queensland	2.06	2.49
South Australia	0	0
Western Australia	0.04	0.04
Tasmania	0	0
Northern Territory	0.45	1.76
ACT	0	0.56
<i>Australia</i>	0.52	0.66

Notifications by Queensland Health Service Districts

Table 3 provides notification numbers, percentages and rates per 100,000 population for districts in Queensland for 2008 & 2009. The Cairns & Hinterland District demonstrated the highest rate and accounted for well over half of Queensland's notifications with major centres Innisfail, Tully & Cairns submitting 28, 22 and 8 cases respectively.

(Note: The Director-General announced that, as of January 1 2009, Miriam Vale has been transferred from the Central Queensland Health Service District to the Sunshine-Wide Bay Health Service District.)



(www.health.qld.gov.au/maps/mapto/cairns.asp)

Table 3. Leptospirosis Notifications by Queensland Health Service Districts
(District Map shown in appendix B)

Health Service District	2008		2009		2009
	Cases	%	Cases	%	Rate/100 000*
Cairns and Hinterland	56	62.2	75	67.6	32.0
Cape York	1	1.1	0	0	0
Mackay	2	2.2	2	1.8	1.2
Mount Isa	1	1.1	0	0	0
Torres Strait-Northern Peninsula	0	0	0	0	0
Townsville	4	4.5	3	2.7	1.3
Central Queensland	2	2.2	0	0	0
Central West	3	3.3	1	0.9	8.0
Sunshine Coast-Wide Bay	4	4.5	8	7.2	1.4
Metro North	3	3.3	4	3.6	0.5
Children's Health Services	0	0	0	0	0
Gold Coast	0	0	1	0.9	0.2
South West	3	3.3	2	1.8	7.6
Metro South	2	2.2	2	1.8	0.2
Darling Downs-West Moreton	9	10.0	13	11.7	2.7
TOTAL ALL DISTRICTS	90		111		

(*District estimates based on 2006 census & population predictions).

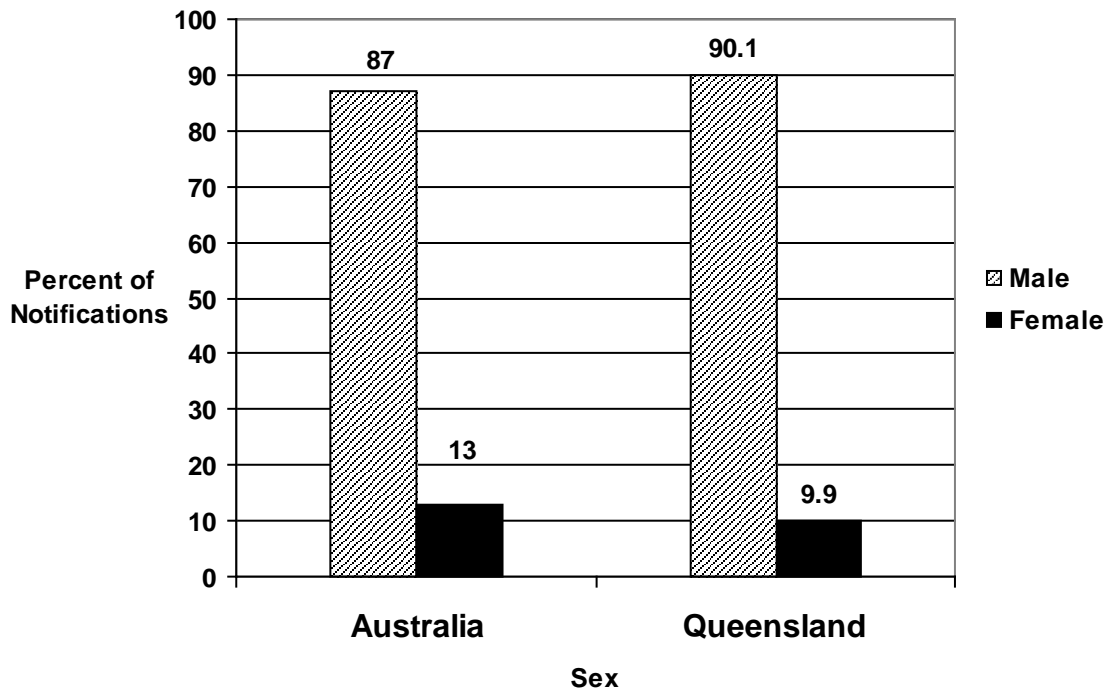
Age and Gender

Table 4 and Figure 3 show gender and age data reported for Australia and Queensland in 2009. The male to female ratio for the year was 6.7:1 and 9.1:1 respectively.

Table 4. Age

	Australia (Total) = 146	Queensland = 111
Average Female Age	Between 35-39 years	41.2 years
Average Male Age	Between 35-39 years	35.3 years
Average Age	Between 35-39 years	35.9 years
Oldest	Between 70-74 years	70 years (male)
Youngest	Between 10-14 years	12 years (male)

Figure 3. Gender



Serovars

Serovars Arborea, Zanoni and Australis (Table 5 & 6 and Figure 4 & 5) accounted for over half the notifications in 2009. Serovar Arborea showed the highest percentage of notifications, continuing on the trend from the previous year.

Table 5. Leptospirosis Notifications, **Australia** 2008 & 2009 by Serovar

Serovar	2008		2009	
	No.	%	No.	%
Arborea	24	21.2	43	29.4
Zanoni	19	16.8	25	17.1
Australis	12	10.6	19	13
Hardjo	19	16.8	16	10.9
Robinsoni	3	2.7	8	5.5
Topaz	6	5.3	8	5.5
Pomona	4	3.5	4	2.7
Szwajizak	3	2.7	4	2.7
Kremastos	5	4.4	3	2.1
Celledoni	0	0	2	1.4
Canicola	0	0	1	0.7
Medanensis	0	0	1	0.7
Tarassovi	0	0	1	0.7
Javanica	0	0	0	0
Copenhageni	3	2.7	3	2.1
Grippotyphosa	2	1.8	0	0
Bataviae	2	1.8	0	0
Bulgarica	0	0	1	0.7
Cynopteri	0	0	0	0
Pyrogenes	0	0	0	0
Unresolved/Unknown	11	9.7	7	4.8
Total	113		146	

Figure 4. Leptospirosis Notifications of Selected Serovars, Australia 2008& 2009

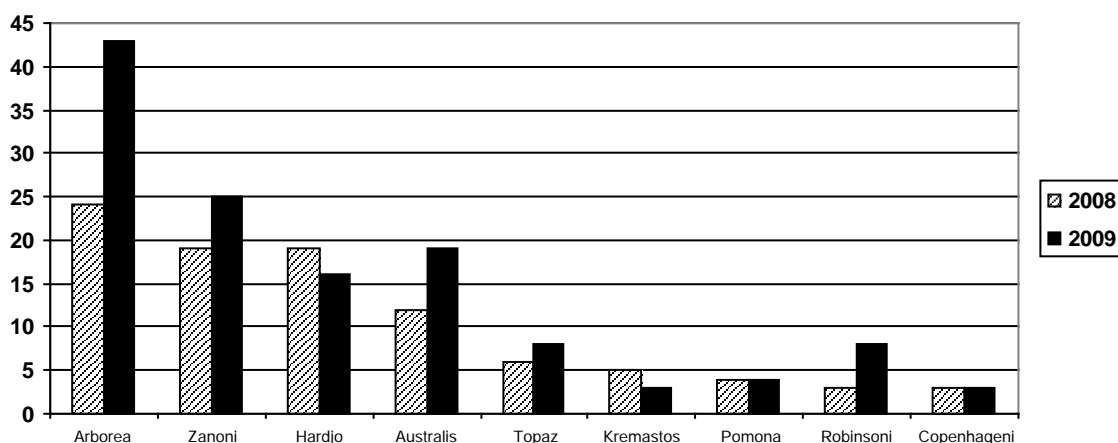
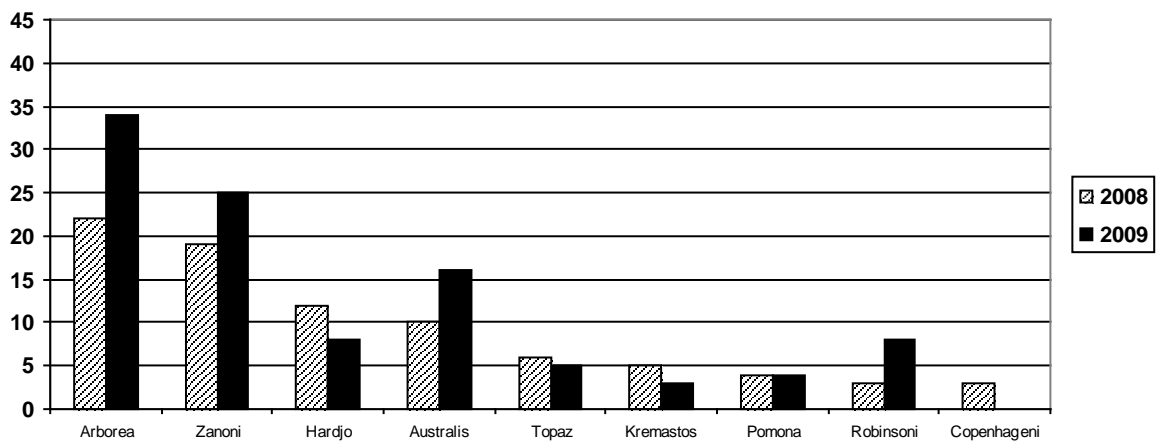


Table 6. Leptospirosis Notifications, **Queensland** 2008 & 2009 by Serovar

Serovar	2008		2009	
	No.	%	No.	%
Arborea	22	24.4	34	30.6
Zanoni	19	21.1	25	22.5
Australis	10	11.1	16	14.4
Hardjo	12	13.3	8	7.2
Robinsoni	3	3.3	8	7.2
Topaz	6	6.7	5	4.5
Pomona	4	4.4	4	3.6
Szwajizak	3	3.3	4	3.6
Kremastos	5	5.6	3	2.7
Celledoni	0	0	2	1.8
Canicola	0	0	1	0.9
Medanensis	0	0	1	0.9
Tarassovi	0	0	0	0
Javanica	0	0	0	0
Copenhageni	3	3.3	0	0
Grippotyphosa	2	2.2	0	0
Bataviae	1	1.1	0	0
Bulagarica	0	0	0	0
Cynopteri	0	0	0	0
Pyrogenes	0	0	0	0
Unresolved	0	0	0	0
Total	90		111	

Figure 5. Leptospirosis Notifications of Selected Serovars, Queensland 2008 & 2009



Distribution of Selected Serovars

Table 7. Distribution of Selected Serovars in Queensland by locality & district

District	Locality	Serovars					
		Arborea	Zanoni	Australis	Robinsoni	Hardjo	Topaz
Cairns & Hinterland	Mossman	0	0	1	0	0	0
	Cairns	1	3	2	0	0	1
	Gordonvale	0	0	1	0	0	0
	Atherton	1	2	0	0	0	1
	Malanda	0	3	0	0	0	0
	Babinda	0	0	0	0	1	0
	Innisfail	6	8	6	4	0	1
	Ravenshoe	0	2	0	0	0	0
	Mission Beach	0	0	0	2	0	0
	Tully	4	6	6	2	1	0
Townsville	Ingham	0	0	0	0	2	0
Mackay	Bowen	0	1	0	0	0	0
	Mackay	0	0	0	0	1	0
Sunshine Coast - Wide Bay	Monto	1	0	0	0	0	0
	Montville	1	0	0	0	0	0
	Biggenden	0	0	0	0	0	1
	Gympie	1	0	0	0	1	0
	Nambour	2	0	0	0	0	0
	Caloundra	1	0	0	0	0	0
South West	Roma	0	0	0	0	1	0
Darling Downs - West Moreton	Toowoomba	4	0	0	0	1	0
	Boonah	1	0	0	0	0	0
	Warwick	3	0	0	0	0	0
	Lowood	1	0	0	0	0	1
	Ipswich	1	0	0	0	0	0
Metro North	Caboolture	1	0	0	0	0	0
	Clontarf	1	0	0	0	0	0
	Brisbane	1	0	0	0	0	0
Metro South	Beaudesert	2	0	0	0	0	0
Gold Coast	Southport	1	0	0	0	0	0
	<i>Total</i>	34	25	16	8	8	5

Most Common Serovars

Serovars Arborea, Zanoni and Australis accounted for 67.6% of all Queensland notifications (and 62.6% of Australian notifications) of leptospirosis in 2009.

Leptospira Serovar Fact Sheets are available at: www.health.qld.gov.au/qhcss/lepto.asp

Serovar Arborea

This organism is found world-wide in rats and mice. In 1998, Arborea was first diagnosed in a patient in Northern New South Wales and, in the same year, routine cultures from mice and rats in the Brisbane area were positive for Arborea.

Arborea is now widespread throughout Queensland and northern New South Wales with human cases also recorded from Victoria and with animal cases (dogs) as far a field as Western Australia. It seems to affect mainly those who are involved in agricultural industries and areas where there is close contact with introduced species of mice and rats (especially *Mus domesticus* and *Rattus rattus*).

In 2009 Arborea continued the trend from the previous year, with 34 reported Queensland cases. These ranged from Cairns & Hinterland District (12), south from the Sunshine Coast-Wide Bay (6), through the Darling Downs-West Moreton District (10) and further again through the Metropolitan area (5) to the Gold Coast (1). Cases were also reported in New South Wales and Victoria making Arborea the most widespread Australian Serovar.

Serovar Zanoni

This organism was one of the serovars associated with "Cane-cutter's Disease". It is found mainly from Mackay to Cape York in coastal and tableland areas. The main carriers are rats and small marsupials (mainly bandicoots). In recent years it has been demonstrated in dairy cattle on the Atherton Tablelands (North Queensland) and many dairy workers have been infected. Probable sources of infection include contact with soil, water or other materials contaminated with the urine of one of these animals.

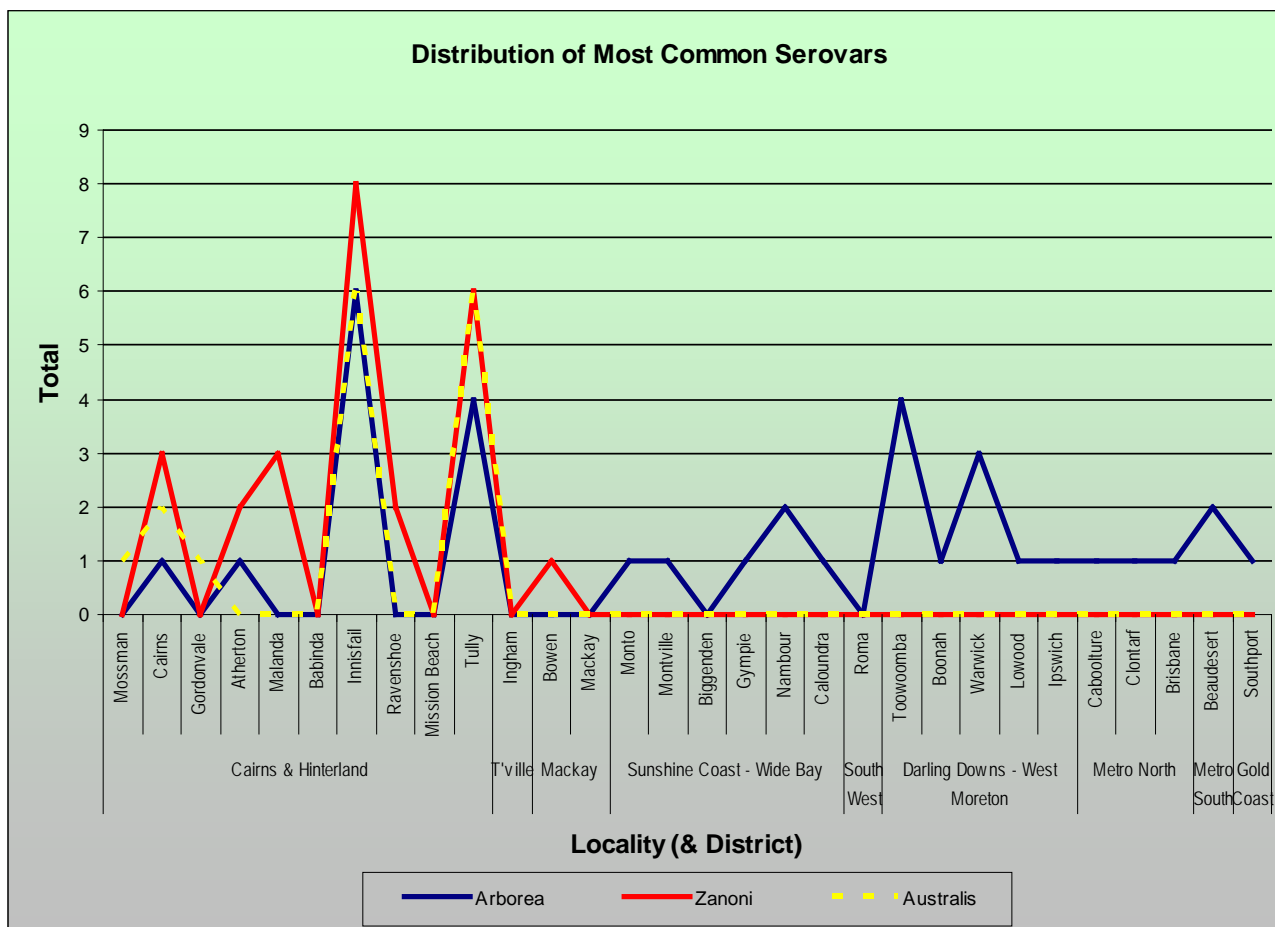
Zanoni is a very common serovar in North Queensland with 24 of the 25 Queensland cases reported from the Cairns & Hinterland district.

Serovar Australis

This organism was one of the serovars associated with "Cane-cutters' Disease". It is found from Sarina to Cape York, predominantly in coastal areas. The main carriers are rats and small marsupials, although there is serological evidence suggesting it can colonise the renal tubules of cattle. Probable sources of infection include contact with soil, water or other materials contaminated with the urine of one of these animals.

Australis is one of the most common serovars found in tropical Australia, with all 16 Queensland cases in 2009 reported from the Cairns & Hinterland District. Recent studies suggest that it may occur across the wet tropics of Australia into the Northern Territory (2 of the 4 cases reported in 2009) and Western Australia.

Figure 6. Distribution of the three most common serovars in Queensland per locality (& district)



Isolations

The isolation of leptospiral serovars from blood cultures in 2009 is outlined in Table 8. There were 318 submissions for 2009 including 10 interstate patients (New South Wales and Northern Territory with no resulting isolations). Of the 55 isolations for 2009, 27 were submitted from Innisfail, 21 from Tully, 3 from Atherton, 1 from Cairns, 2 from Mission Beach and 1 from Babinda.

Table 8. Serovar number and percentage of the isolates recovered in Queensland 2009

Serovar	Number of Isolations	Percentage of Isolations
Arborea	10	18.2%
Zanoni	17	30.9%
Australis	10	18.2%
Hardjo	2	3.6%
Robinsoni	8	14.6%
Topaz	2	3.6%
Szwajizak	3	5.5%
Kremastos	2	3.6%
Celledoni	1	1.8%
Unresolved	0	0
Total	55	

Occupations

Occupation data was available for only a small percentage of Australian notifications.

Table 9 shows the various known occupations for Queensland, New South Wales and Victorian cases with their respective infecting serovars. Queensland Districts are also indicated.

Table 9. Occupations – Australia, 2009

Occupation	QLD		NSW		VIC	
		Health District & Infecting Serovar		Infecting Serovar		Infecting Serovar
Banana Worker	14	Cairns & Hinterland Arborea=4, Zanoni=4, Robinsoni=3, Australis=1, Hardjo=1, Topaz=1				
Dairy Farmer					4	Hardjo
Farmer/Farm Hand/Rural Worker	3	Darling Downs-West Moreton/Metro South Arborea =2, Hardjo=1	2	Arborea=1 Bulgarica=1	2	Hardjo=1, Tarassovi=1
Grazier	2	Darling Downs-West Moreton/South West Arborea=1, Pomona=1				
Tradesperson/Council Worker	3	Sunshine Coast-Wide Bay/Darling Downs-West Moreton Arborea				
Student/Teacher/Lecturer	1	Gold Coast Arborea			1	Arborea
Unemployed/Retired	2	Sunshine Coast-Wide Bay/Darling Downs-West Moreton Arborea	1	Arborea		
<i>Unknown/Not Stated</i>	86 77.5%		14 82.4%		4 36.4%	

Hospitalisation

Hospitalisation data from 21 returned Surveillance Questionnaires (14.4% of all notifications) reported 12 cases as follows:

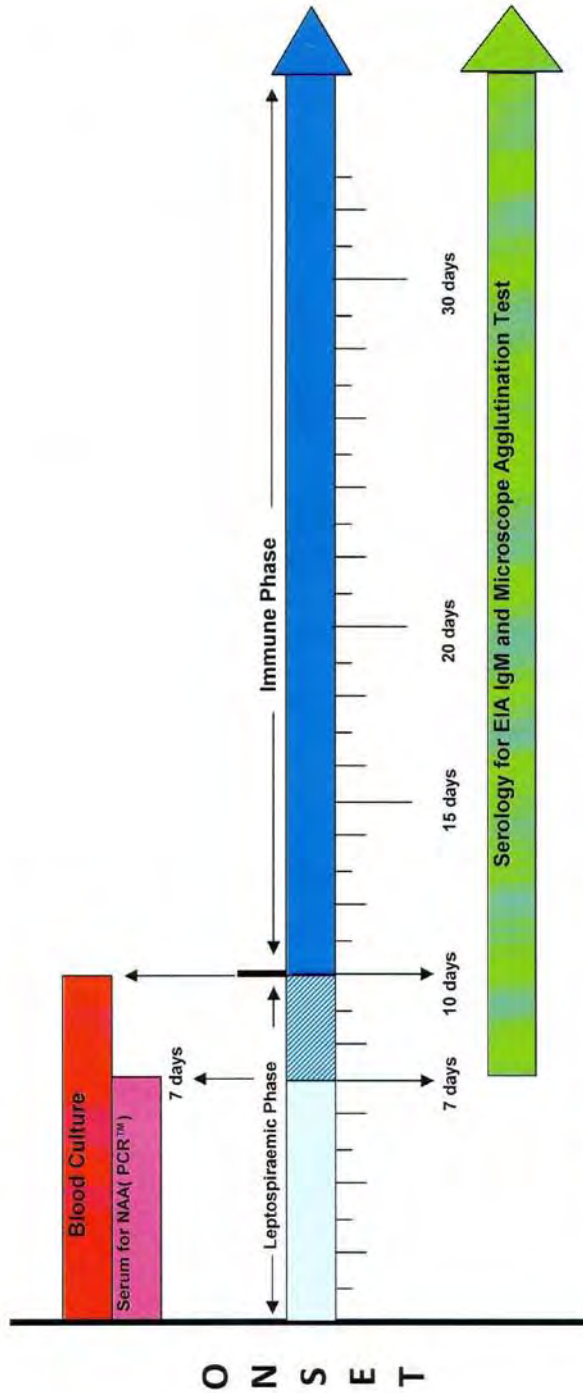
Queensland: Sunshine Coast-Wide Bay with 2 cases (av.2.5 days)
Darling Downs-West Moreton with 3 cases (av. 6.5 days)
South West with 1 case (7 days)
Metro South and Gold Coast with 1 case each (1 day)

New South Wales: 1 case (4 days)

Victoria: 3 cases (av.1.3 days)

Appendix A:

Specimen Collection for Leptospirosis Cases



For further information please contact the WHO/FAO/OIE Collaborating Centre for Reference & Research on Leptospirosis

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Appendix B:

Queensland Health Service Districts:

Cairns and Hinterland----(Atherton Tablelands, Babinda, Cairns, Innisfail, Tully)

Cape York----(Cooktown, Weipa)

Mackay----(Mackay, Moranbah, Bowen)

Mount Isa---(Cloncurry, Julia Creek)

Torres Strait-Northern Peninsula---(Bamaga, Thursday Island)

Townsville---- (Townsville, Charters Towers)

Central Queensland---- (Rockhampton, Gladstone, Central Highlands, Banana)

Central West----(Barcaldine, Longreach, Winton)

Sunshine Coast-Wide Bay ----(Sunshine Coast, Maryborough, Hervey Bay, Monto, Bundaberg , *Miriam Vale*)

Metro North----(The Prince Charles Hospital, Redcliffe, Caboolture, Kilcoy, Royal Brisbane and Women's Hospital)

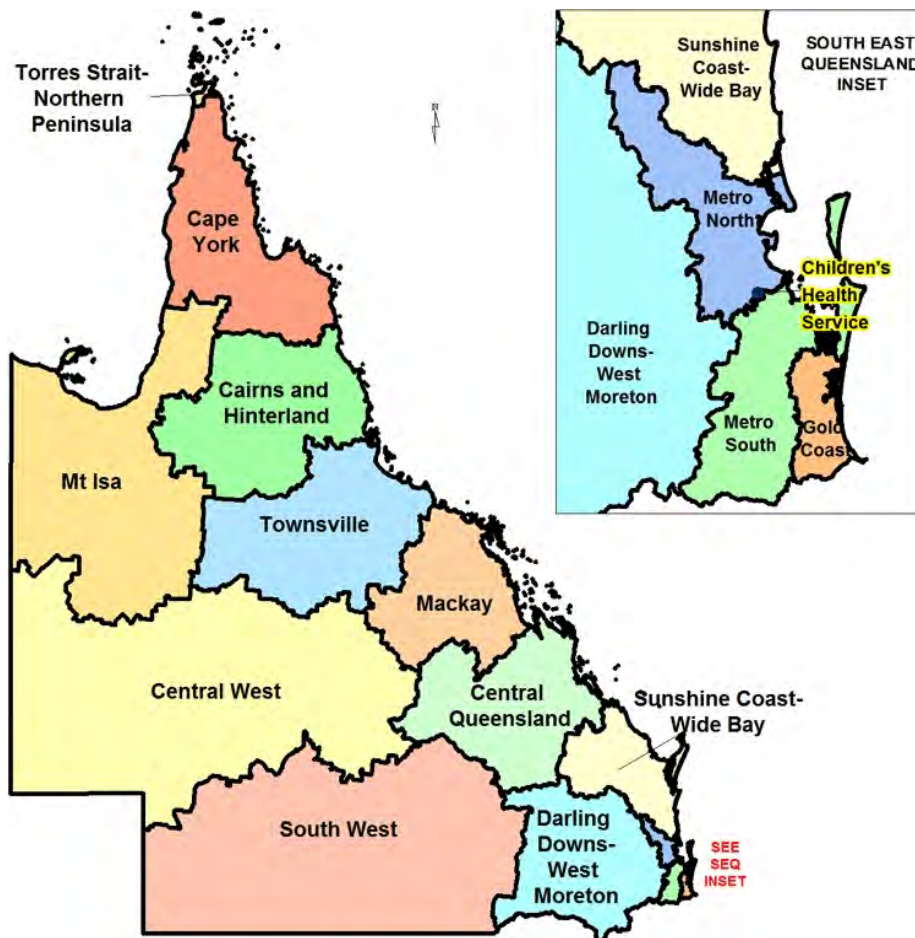
Children's Health Services----(Royal Children's Hospital)

Gold Coast---- (Gold Coast)

South West---- (Charleville, Roma, St. George)

Metro South----(Queen Elizabeth II Hospital, Logan-Beaudesert, Princess Alexandra Hospital, Redland and Wynnum)

Darling Downs-West Moreton----(Toowoomba, Darling Downs, West Moreton South Burnett)



(www.health.qld.gov.au/maps/)

WHO/FAO/OIE COLLABORATING CENTRE FOR REFERENCE & RESEARCH ON LEPTOSPIROSIS

The reference laboratory staff would like to acknowledge all contributors for their time and assistance in sending out questionnaires and in the collection of data essential for the compilation of this report.

