Hazard v Outrage
Birth Defects in New Plymouth

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Gorse

- A major weed in New Zealand – introduced from England in the 1830s as an inexpensive quick growing hedge for stock containment and shelter
- The environment and climate favoured the rapid spread through the country
- Declared a noxious weed in 1900
- 2,4,5-T was the most common herbicide used to control gorse in New Zealand
- Farmers were given a government subsidy for purchase of 2,4,5-T

Gorse Control

2,4,5-T Production and Aerial Application in NZ

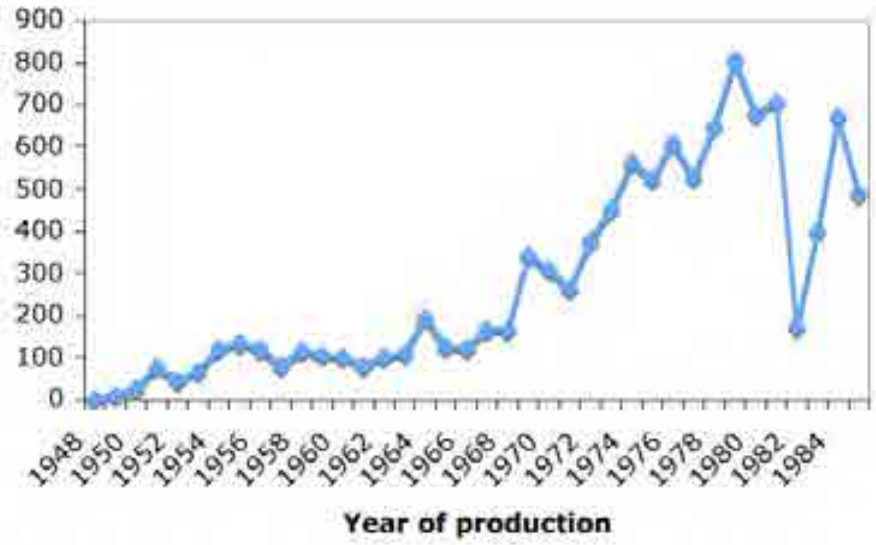


Figure 3 Production of 2,4,5-T in New Zealand by Ivon Watkins-Dow 1948-1985 according to figures supplied by company (*Source* Coster et al. 1986)

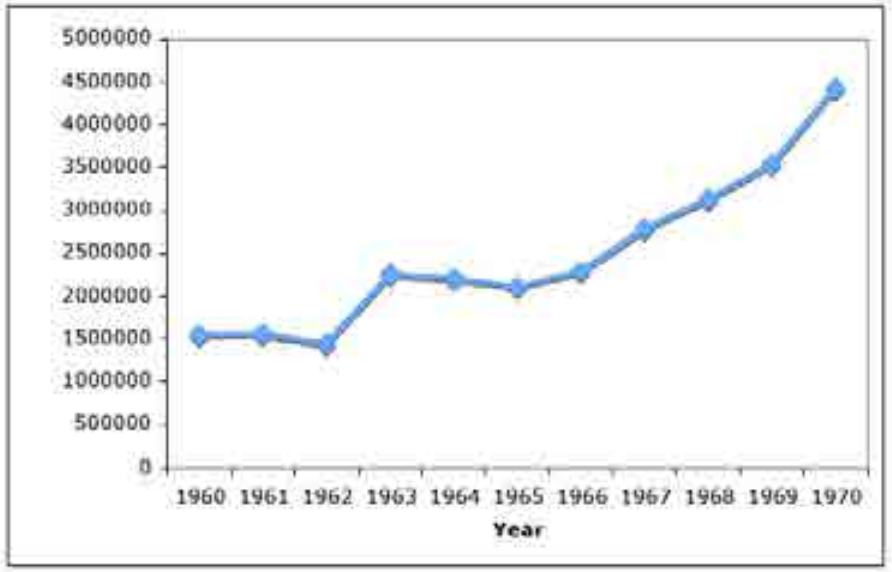


Figure 10 Litres of herbicide and insecticide distributed aerially annually in New Zealand (*Source* New Zealand Yearbook 1964, 1970,1972)

Figure 12 Early 1960s aerial photo of the Ivon Watkins factory (*Source*: activist collection

Figure 13 2004 view of the DowAgroSciences (NZ) Ltd. plant and the neighbourhood of Parituta (*Source*: picture taken by Bruce Wildblood-Crawford)

"What we are dealing with is New Zealand's Chernobyl."

We Were the Second Vietnam

"Dioxin is diabolic,"says epidemiologist Richard Clapp of the Boston University School of Public Health. "That's why I call it the Darth Vader of toxic chemicals. It disrupts many systems. You don't want it in your neighborhood."

Valley of the Shadow of Death

Paritutu is a residential area that rests on the fringes of the urban settlement of New Plymouth. As an ecosystem, it once boasted a spectacular coastline and prime fishing grounds. It also has a long history of indigenous settlement, as it was here that the tohunga or medicine people taught the natural sciences of local

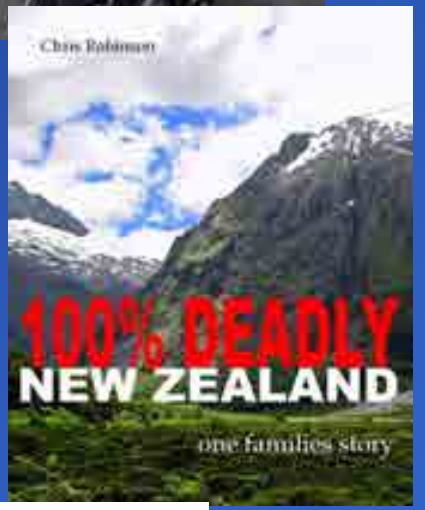
Playing around with the software of Life

The Killing Fields of Dioxin

People Poisoned Daily

In Aotearoa, dioxins from the Dow Ch
polluted the tissues of virtually every n
animal throughout the country. While th
significantly decreased since their reduc

Paritutu, New Zealand: Dow's Vietnam War dioxin dump



NZ Dioxin KILLS

AGENT ORANGE NEW ZEALAND

Taranaki hill-country farmer Bryan Hocken

- spent whole months spraying his Tarata farm and never used a mask
- 2,4,5-T is our bread and butter. It's a wonder chemical, cheaper and far more effective than other chemicals
- He's still fit and well," said his wife, Helen Hocken. "He fell off his bike last year, but he still has his own teeth. None of us have had any ill effects."

Birth Defects

Talking about the situation in Parititu Roy said, "Here in New Plymouth, Down's Syndrome and Spina Bifida are going through the roof. If you look at any major chemical plant anywhere in the world you will find massive rates of the same sorts of diseases. Our local school has 1200 kids. They advertised for ten special needs teachers. I've found out in one kindergarten alone there are four kids with cancer.

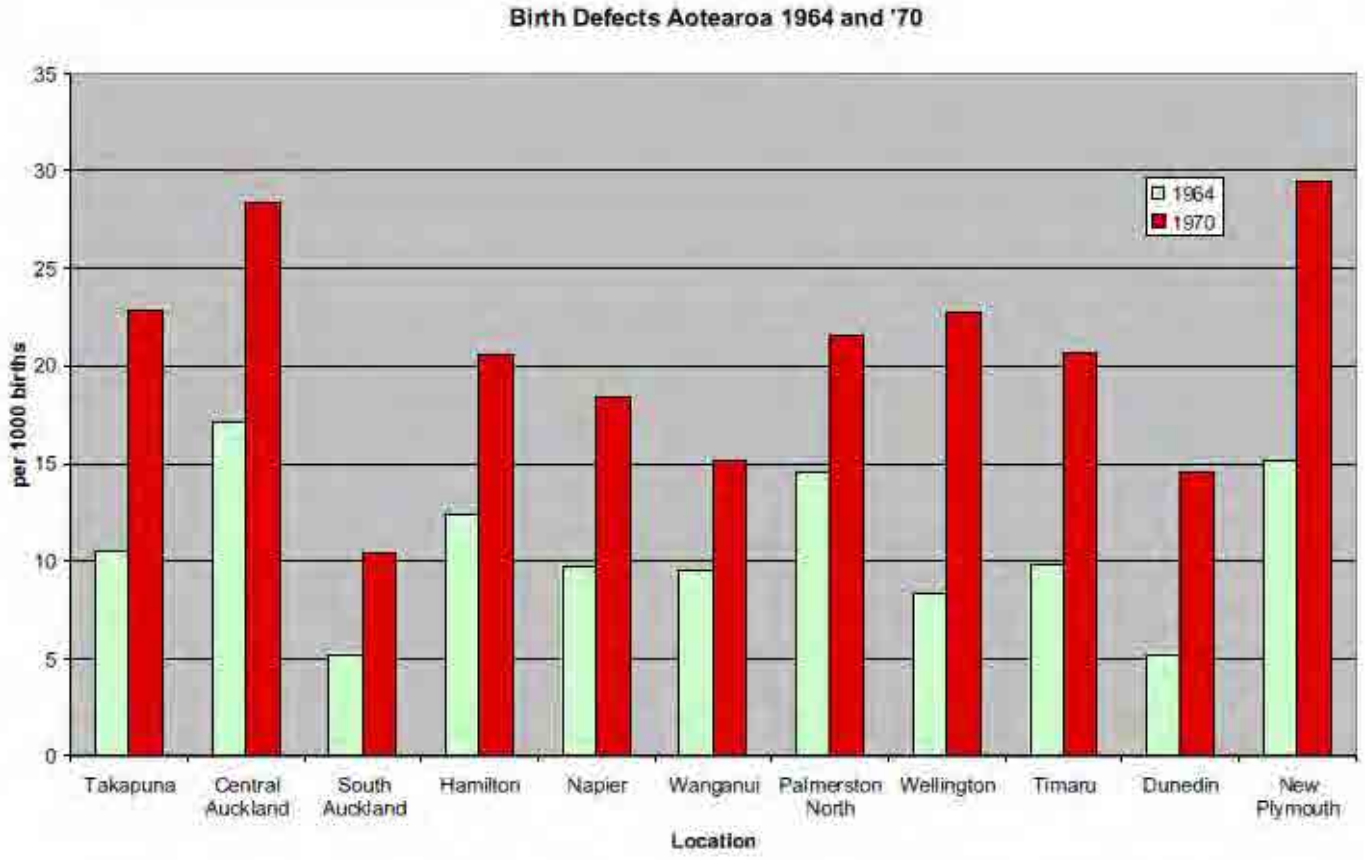
"Children have been born blind, without brains, and with the kind of horrifying injuries seen in Vietnam."

TOXIC WASTE:

Is this the result of dioxin poisoning in New Zealand? HAMISH CARNACHAN investigates the terrible legacy the Government claims to know nothing about

Figure 15 April 2002 Investigate article that claims a connection between 1960s dioxin emissions and birth defects. The article includes explicit pictures of birth defects taken at Westown Maternity Hospital, New Plymouth (*Source* Carnachan 2002: 28)

Birth Defects in New Plymouth



During the Vietnam War period, our nationwide rates of birth defects doubled.[40]
The Y-axis unit measures birth defects per 1,000 births in different New Zealand towns.

Sara and Forbes, 1972

- Made the first suggestion of dysmorphogenetic effects of 2,4,5-T usage in New Zealand.

- Reported two babies born with myelomeningocele (a variant of spina bifida) within a month of each other from adjacent Waikato farms ‘where for several years aerial spraying has been carried out with a chemical called 2,4,5-T.’

- ‘we cannot prove that the two women concerned here did in fact drink water contaminated by dioxin’ but ‘believe that 2,4,5-T should be treated with grave suspicion.’

Department of Health, 1977

- Reviewed the toxicology and epidemiology of 2,4,5-T and three alleged ‘clusters’ of neural tube defects (NTDs) in Waikato, Northland and Taranaki.
- The Taranaki cluster comprised five NTDs, four which occurred in Opunake (three in one road) in 1974-76 and one in Normanby in 1977.
- *No evidence was found to implicate 2,4,5-T as a causal factor in any of these ‘clusters’*
- In Taranaki three of the mothers had no exposure to pesticides in the first trimester of their pregnancy (the period during which NTDs arise), while the fourth had contact with Tordon 50D (2,4-D and picloram) and possibly to 2,4,5-T.

Department of Health, 1980

- Carried out an investigation in response to a medical practitioner linking the birth of two babies with fatal congenital abnormalities to 2,4,5-T exposure.
- One baby had biliary atresia and the other had cardiac defects.
- *It was not established that either woman was significantly exposed to 2,4,5-T at any time during her pregnancy*

Brinkman et al, 1986

- A Ministerial inquiry was carried out over concerns relating to uncertainty over exposure to dioxin from the IWD plant and possible health effects

- Noted that 'Submissions from individuals claiming that the pesticides [2,4,5-T and 2,4-D] had caused congenital defects, excessive miscarriages and soft tissue tumours were mainly anecdotal accounts.'

- Concluded: '*no substantiated evidence that the manufacture of these pesticides [2,4,5-T and 2,4-D] has had any ill effect on the health of the residents of New Plymouth*'

Other New Zealand Studies

- Hanify et al (1980, 1981a, 1981b) found in Northland *aerial 2,4,5-T spraying was significantly associated with talipes*, independent of ethnicity, but not with spina bifida, anencephaly, cleft lip with or without cleft palate, isolated cleft palate, cardiac defects or hypospadias/epispadias

- Smith et al (1981, 1982) found the *rate of birth defects among the children of New Zealand male pesticide applicators using 2,4,5-T did not differ from the rate among male agricultural contractors.* The rate for each group was similar to that reported in other New Zealand studies.

Published by Oxford University Press on behalf of the International Epidemiological Association *International Journal of Epidemiology* 2006;**35**:1220–1230

doi:10.1093/ije/dyl038

Association between Agent Orange and birth defects: systematic review and meta-analysis

Anh D Ngo,[1] Richard Taylor,[2] Christine L Roberts[3] and Tuan V Nguyen[4]*

Results In total, 22 studies including 13 Vietnamese and nine non-Vietnamese studies were identified. The summary relative risk (RR) of birth defects associated with exposure to Agent Orange was 1.95 [95% confidence interval (95% CI) 1.59–2.39], with substantial heterogeneity across studies. Vietnamese studies showed a higher summary RR (RR = 3.00; 95% CI 2.19–4.12) than non-Vietnamese studies (RR = 1.29; 95% CI 1.04–1.59). Sub-group analyses found that the magnitude of association tended to increase with greater degrees of exposure to Agent Orange, rated on intensity and duration of exposure and dioxin concentrations measured in affected populations.

Conclusion Parental exposure to Agent Orange appears to be associated with an increased risk of birth defects.

Commentary: Agent Orange and birth defects in Vietnam

Arnold Schecter[1]* and John D Constable[2]

"However we are not convinced that Vietnamese investigations linking congenital malformations to dioxin are, as yet, more than suggestive. *We know of no non-Vietnamese studies linking herbicide or dioxin exposure to congenital malformations other than spina bifida and anencephaly*. Earlier Vietnamese studies or case reports suggested a link to liver cancer and to hydatidiform mole and choriocarcinoma, but these did not hold up after more rigorous subsequent research by Vietnamese and Western scientists. [19,20] This article and its novel approach confirm the need for continued rigorously controlled research to definitively answer the question posed at the opening of this commentary. *To date the answer is, at best, scientifically equivocal and, at worst, without valid positive scientific evidence*"

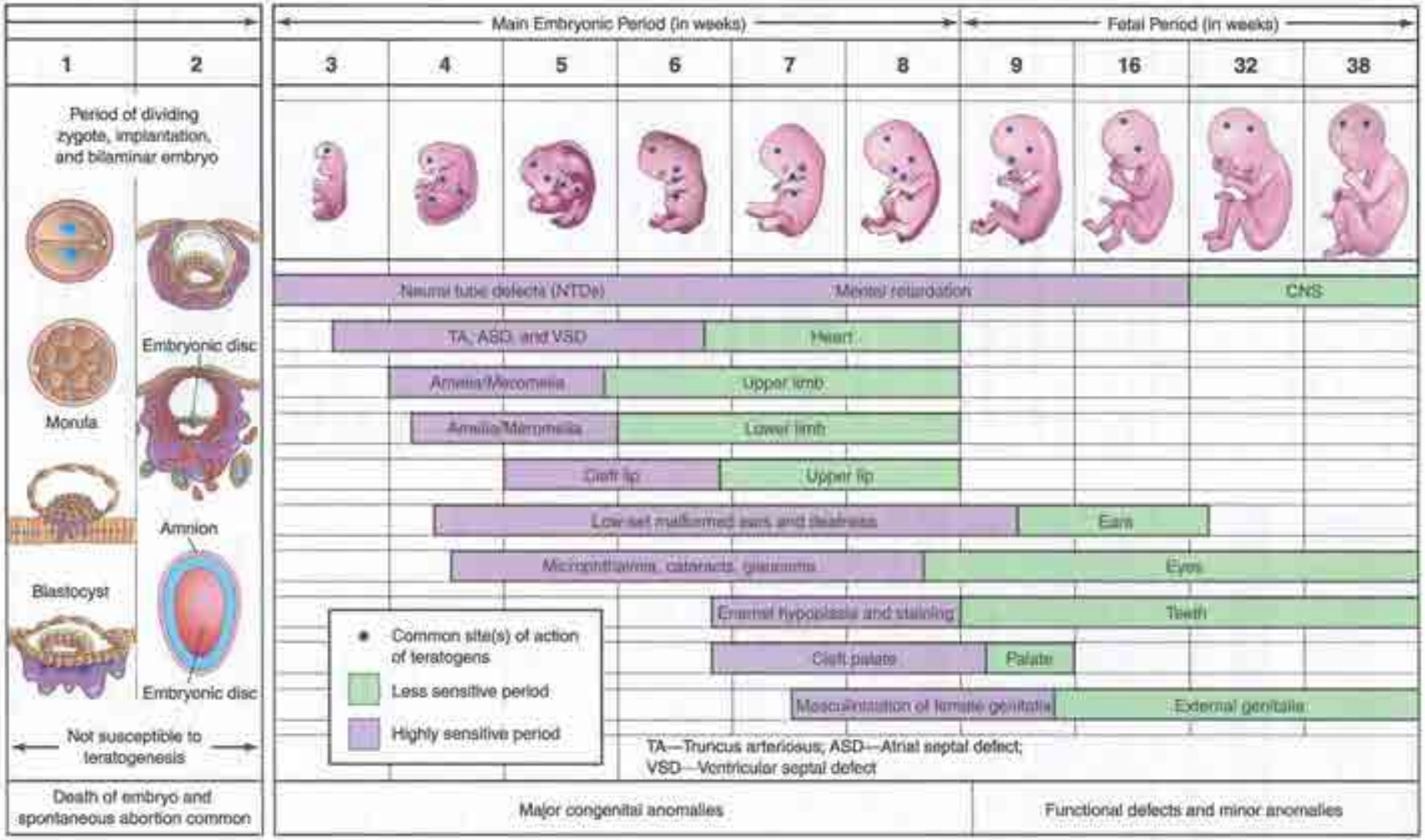


FIGURE 20-15. Schematic illustration of critical periods in human prenatal development. During the first 2 weeks of development, the embryo is usually not susceptible to teratogens; a teratogen either damages all or most of the cells, resulting in death of the embryo, or damages only a few cells, allowing the conceptus to recover and the embryo to develop without birth defects. *Mauve denotes highly sensitive periods* when major defects may be produced (e.g., amelia, absence of limbs, neural tube defects, e.g., spina bifida cystica). Green indicates stages that are less sensitive to teratogens when minor defects may be induced (e.g., hypoplastic thumbs).

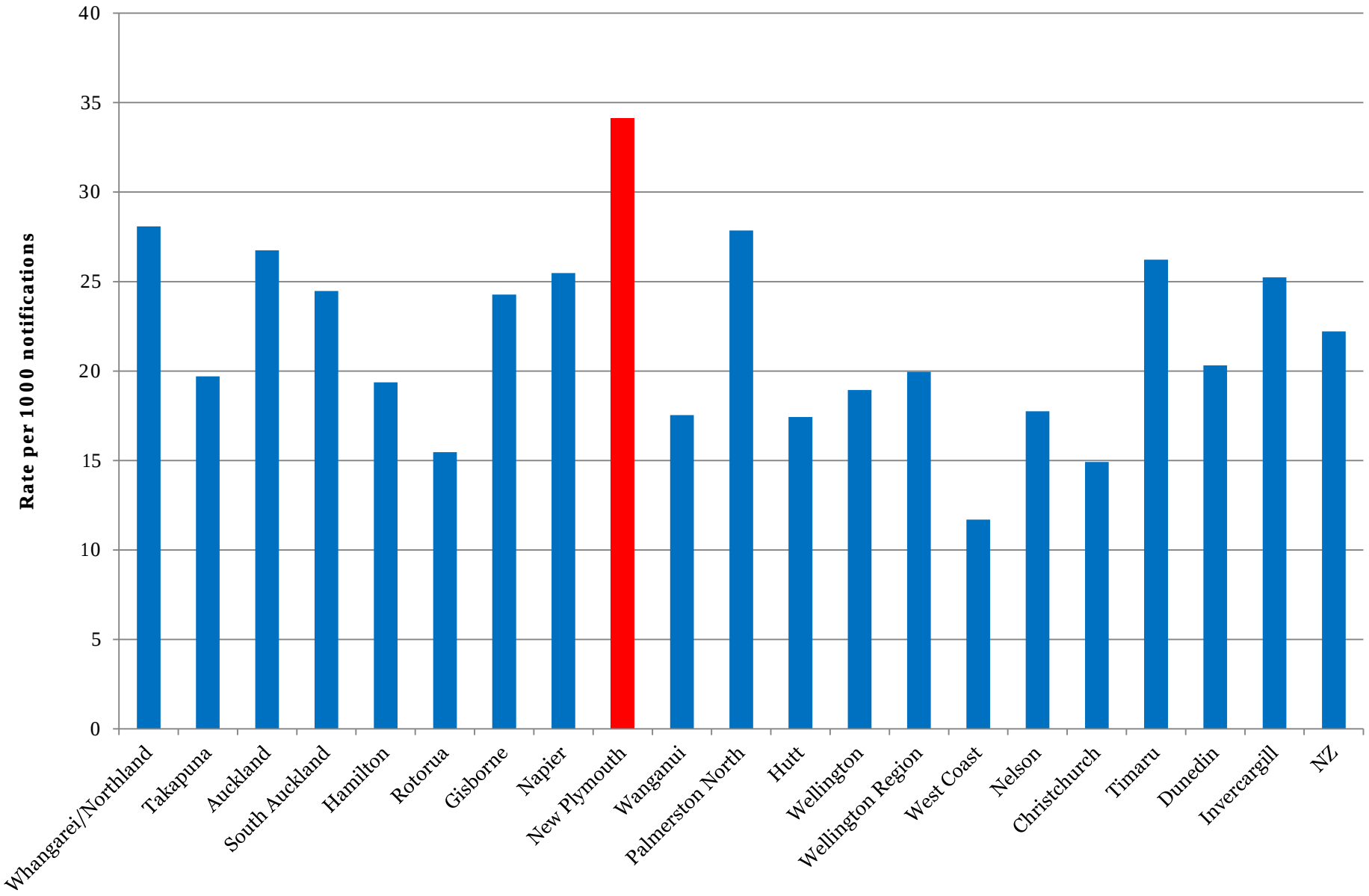
Study I
NZ Birth Defects Registry, 1980-89

- All live and still births with a birth defects diagnosed at birth or within the first 7 days of life.

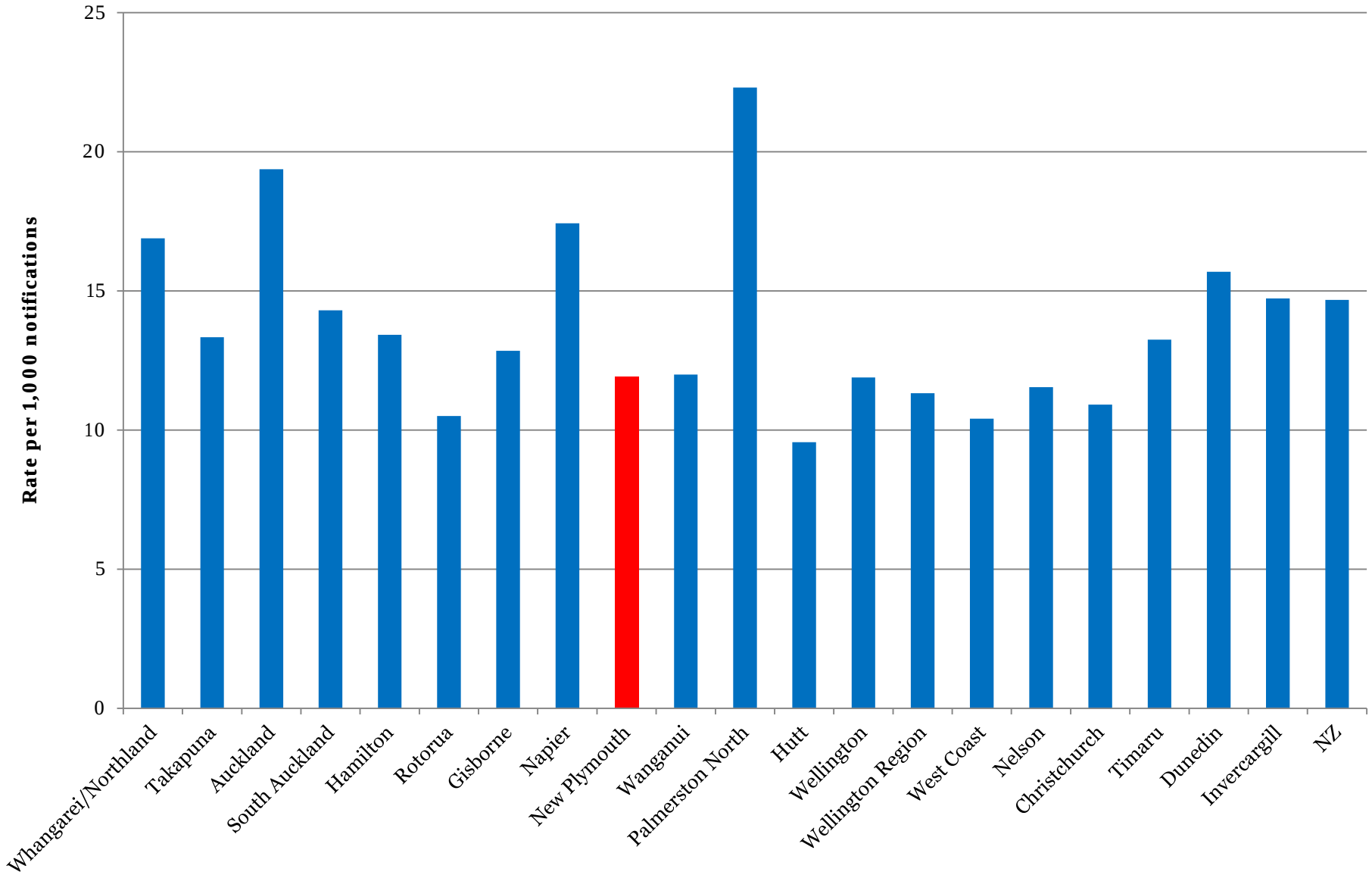
- During 1980-89, the New Plymouth district consistently had the highest reported rates of birth defects in New Zealand. Other areas also had high rates
  - Suspicion of a diagnostic bias of congenital dislocation of hips (CDH) and talipes

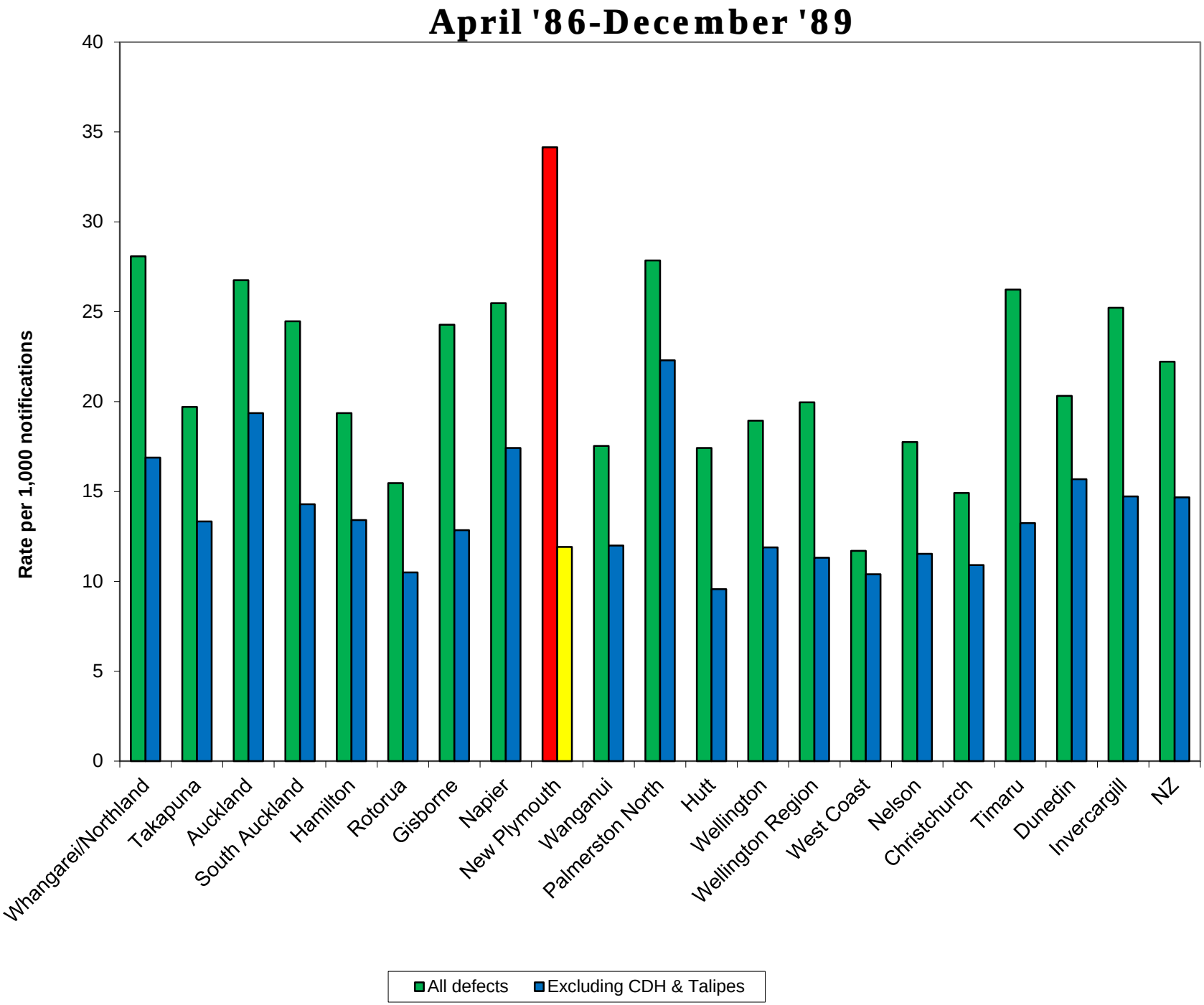
- From 1986, the NZBDMP also presented data for birth defects excluding CDH and talipes

All Birth Defects, April '86-December '89



Excluding Congenital Dislocation of the Hip & Talipes, April '86-December '89




April '86-December '89
Rate per 1,000 notifications
40
35
30
25
20
15
10
5
0
Whangarei/Northland
Takapuna
Auckland
South Auckland
Hamilton
Rotorua
Gisborne
Napier
New Plymouth
Wanganui
Palmerston North
Hutt
Wellington
Wellington Region
West Coast
Nelson
Christchurch
Timaru
Dunedin
Invercargill
NZ
All defects
Excluding CDH & Talipes

‘Man on a Hip’ Mission

- In the Taranaki region, an orthopaedic surgeon Victor Hadlow, has been described as a ‘Man on a ‘hip’ mission and ‘Taranaki’s Victor of Bones’
- Since 1964, Hadlow had ‘dedicated himself to ensuring every baby born in Taranaki Base Hospital’s maternity unit has been, and will continue to, be tested for displaced hips’
- Hadlow: ‘Taranaki has always had the highest number of bone specialists per head of population in New Zealand
- Hadlow (1988) found that the rate of congenital dislocation of the hip was more than three times the rate at National Women’s Hospital in Auckland

Study II

- During 1965-71, a midwife at Westown Maternity Hospital (WMH) in New Plymouth, collected data on the occurrence of the birth defects in births in the hospital.

- These unpublished data were compared to the prevalences of birth defects in New Plymouth with those reported in other New Zealand hospital and population based national and local studies.

Defect as recorded	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	Total
Anencephalic	3	0	4	2	1	2	12
Hydrocephaly	2	2	6	1	0	4	15
Microcephaly	1	1	2	0	1	0	5
Meningocele	2	0	5	3	1	3	14
Spina bifida	0	0	0	0	0	2	2
Congenital Heart	1	2	6	3	0	0	12
1 Artery Cord	6	1	1	1	5	2	16
Cystic Kidney	0	0	0	0	0	1	1
Renal Agenesis	0	0	1	0	1	0	2
Atresia of Bowel	0	1	1	1	1	2	6
Tracheo-oesophageal Fistula	0	1	0	0	0	0	1
Diaphragmatic Hernia	0	1	0	0	0	0	1
Exomphalos	3	0	0	0	0	0	3
Circulatory Defect	0	0	0	1	0	0	1
Liver Defect	0	0	1	0	0	0	1
Mongols	0	1	1	0	0	2	4
Trisomy (5)	0	1	0	1	0	0	2
Hare Lip	1	0	3	2	3	1	10
Cleft Palate	1	1	2	0	2	1	7
Talipes	12	6	8	9	0	6	41
Extra Digits	0	0	0	0	0	3	3
Hypospadias	2	2	1	2	3	6	16
Web Digits	1	1	0	2	2	0	6
Lung Deformity	0	0	0	0	0	1	1
Eye Abnormality	1	0	0	0	0	0	1
Ear Abnormality	1	0	0	0	0	0	1
Angioma	0	1	0	0	1	0	2
Tumour of Face	0	0	0	0	1	0	1
Rare Blood Cord	0	1	0	0	0	0	1
Stenosis of Larynx) Diagnosed before leaving hospital	0	0	1	0	0	0	1
Plyoric Stenosis) Diagnosed before leaving hospital	0	0	1	0	0	0	1
Teratoma	0	0	0	1	2[1]	0	3[1]
Achondroplasia	0	0	0	1	2	0	3
Oxycephaly	0	0	0	0	1	0	1
Lymphangiestasia	0	0	0	1	0	0	1
Nasal Bone Defect	0	0	0	1	0	0	1
Other Joint Defects	5	3	3	1	0	2	14
Imperforate Anus	0	0	1	0	1	0	2
Total	42	26	48	32[2]	27[2]	38	215[2]
Number of Babies Affected	37	24	29	27	22	28	167
C.D.H. Hips Splint	29	12	9	4	11	9	74

Rates of All Birth Defects

Place of Study	Years	Cases	Rate /1,000	95% CI
National Women's Hospital, Auckland	1964-67	387	24.03	21.65 - 26.61
Westown	**1965-71**	**167**	**30.97**	**26.42- 36.09**
Northland	1966-77	374	15.62	14.04 - 17.32
Queen Mary, Dunedin	1967-70	119	19.35	16.03 - 23.16
New Zealand	1978	1,440	27.62	26.16 - 29.13
New Zealand	1980-89	11,298	22.39	21.96 - 22.83

Neural Tube Defects

anencephaly

spina bifida

Prevalence of Anencephalus

Place of study	Years	Cases	Births	Rate /1,000	95% CI	
National Women's Hospital (1)	1964-67	40[a]	16,103	2.48	1.80	3.36
Westown Maternity Hospital (2)	**1965-71**	**12**	**5,392**	**2.23**	**1.24**	**3.73**
Westown Maternity Hospital (3)	1965-71	10	5,392	1.85	0.98	3.25
Northland (4)	1966-77	25	23,951	1.04	0.69	1.52
Queen Mary Hospital, Dunedin (5)	1967-70	8	6,151	1.30	0.64	2.41
National Women's Hospital (6)	1968-77	(b)	(b)	1.93	(c)	(c)
National Women's Hospital (7)	1968-77	(b)	(b)	2.70	(c)	(c)
Christchurch Women's Hospital (8)	1970-75	21[d]	17,913	1.16	0.75	1.76
New Zealand (9)	1978	51	52,143	0.98	0.74	1.29
New Zealand (10)	1978-82	205	261,150	0.78	0.68	0.90

Prevalence of Spina Bifida

Place of study	Years	Cases	Rate/1,000	95% CI
National Women's Hospital, Auckland	1964-67	18	1.12	0.69 - 1.72
Westown (2)	**1965-71**	**16**	**2.97**	**1.79 - 4.68**
Westown	1965-71	14	2.60	1.51 - 4.21
Northland	1966-77	36	1.50	1.07 - 2.06
Queen Mary, Dunedin	1967-70	10	1.63	0.86 - 2.85
National Women's Hospital, Auckland	1968-77	n/a	0.93	n/a
National Women's Hospital Auckland	1968-77	n/a	2.06	n/a
Christchurch Women's Hospital	1970-75	58	3.25	2.47 - 4.17
New Zealand (9)	1978	53	1.02	0.76 - 1.31
New Zealand (10)	1978-82	247	0.94	0.83 - 1.07

Congenital Dislocation of the Hip, Talipes

Congenital Dislocation of the Hip

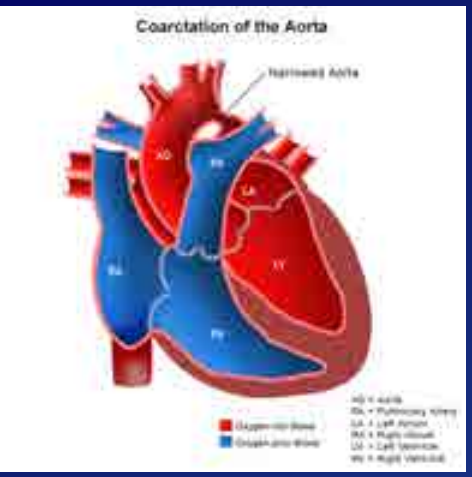
Place of study	Years	Cases	Rate/1,000	95% CI
New Plymouth	1976-85	172	16.33	13.96 - 18.99
National Women's Hospital, Auckland	1964-67	57	3.54	2.70 - 4.57
Westown	**1965-71**	**74**	**13.72**	**10.81 - 17.20**
New Zealand	1978	321	6.16	5.49 - 6.88

Talipes

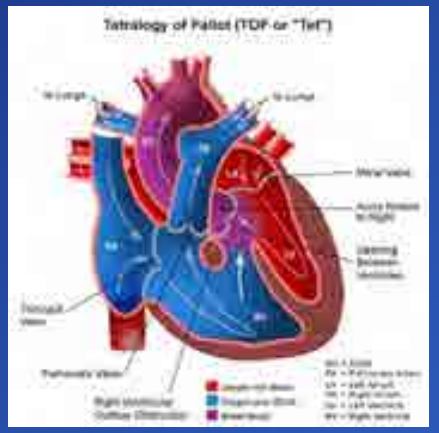
Place of study	Years	Cases	Rate/1,000	95% CI
National Women's Hospital, Auckland	1964-67	59	3.66	2.81 - 4.71
Westown	**1965-71**	**41**	**7.60**	**5.52 - 10.24**
Northland	1966-77	124	5.18	4.31 - 6.18
New Zealand	1978	225	4.32	3.76 - 4.93

Facial Clefts

Place of study	Years	Cases	Births	Rate /1,000	95% CI	
Auckland (1)	1960-76	396[a]	216,836[b]	1.83	1.65	2.02
National Women's Hospital (2)	1964-67	32[c]	16,103	1.99	1.38	2.77
National Women's Hospital (2)	1964-67	27[d]	16,103	1.68	1.13	2.40
Westown Maternity Hospital (3)	1965-71	17[e]	5,392	3.15	1.93	4.91
Northland (4)	1966-77	37	23,951	1.54	1.10	2.11
Queen Mary Hospital, Dunedin (5)	1967-70	13	6,151	2.11	1.21	3.48



Congenital Heart Defects



Place of study	Years	Cases	Births	Rate /1,000	95% CI	
National Women's Hospital (1)	1960-63	73[a]	13,653	5.34[a]	4.21	6.71
National Women's Hospital (2)	1964-67	76[b]	16,103	4.72[b]	3.73	5.90
Westown Maternity Hospital (3)	1965-71	12	5,392	2.23	1.24	3.73
Northland (4)	1966-77	35	23,951	1.46	1.03	2.01
Queen Mary Hospital, Dunedin (5)	1967-70	18	6,151	2.93[c]	1.81	4.51
New Zealand (6)	1978	181[a]	51,777	3.50[a]	3.00	4.05

Down Syndrome

Place of study	Years	Cases	Births	Rate /1,000	95% CI	
New Zealand (1)	1953-60	339[a]	462,590[a]	0.73[a]	0.66	0.82
National Women's Hospital (2)	1964-67	21	16,103	1.30	0.84	1.95
Westown Maternity Hospital (3)	1965-71	4	5,392	0.74	0.28	1.68
Northland (4)	1966-77	11	23,951	0.46	0.25	0.79
Queen Mary Hospital, Dunedin (5)	1967-70	5	6,151	0.81	0.34	1.72
New Zealand (6)	1978	37	52,137			
New Zealand (7)	1979-81	126	141,742	0.89	0.74	1.06

Hypospadias

Place of study	Years	Cases	Births	Rate /1,000*	95% CI	
National Women's Hospital (1)	1964-67	21	8,076	2.60	1.67	3.89
Westown Maternity Hospital (2)	1965-71	16	2,696	5.93	3.57	9.36
Westown Maternity Hospital (2)	1965-71	16	2,534	6.31	3.80	9.96
Northland (3)	1966-77	18	11,250	1.60	0.99	2.47
New Zealand (4)	1979-81	150	70,871	2.12	1.79	2.49

Comparison with Other NZ Studies

- The rate of birth defects at Westown was higher that the rates reported from Northland and Dunedin, but not in Auckland

- The rate of neural tube defects, facial clefts, Down syndrome, heart defects was not significantly different from the rates reported in New Zealand studies

- The rate of talipes at WMH was significantly higher than the rate reported in Auckland

- The rate of congenital dislocation of the hip at WMH was more than three times higher than the rate in Auckland

Conclusion

- The rate of birth defects in New Plymouth was consistently high during 1980-89 as it was in other areas
- In 1986-89, the reporting rate of all birth defects was highest in New Plymouth, but also significantly higher than the national average in Whangarei/Northland, Auckland, and Palmerston North districts
- The rate in New Plymouth in 1986-89 was not significantly different from the national average if cases of congenital dislocation of hips and talipes were excluded.
- There was no evidence from these data, of an increase in the rate of birth defects in the New Plymouth district following the accident at the IWD plant in April 1986

Peter Sandman

Risk = Hazard + Outrage

Risk =

*

CHECK LABELS ON CHEMICAL CONTAINERS

EVERY CHEMICAL CONTAINER MUST HAVE A WARNING LABEL

Risk =

Communication

+

Perception