NEW SOUTH WALES
Public Health Bulletin

Volume 6
Number 4
April, 1995

NSW HEALTH DEPARTMENT

ISSN 1034 7674

PROGRAM BUDGETING AND MARGINAL ANALYSIS: A GUIDE TO RESOURCE ALLOCATION

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In this paper we explain how program budgeting and marginal analysis (PBMA) can be used to assist decisions about resource allocation at a local level, leading to improvements in the health of the population. We review overseas experience with PBMA and outline a proposed application of PBMA in NSW.

The focus of health services in NSW has shifted from efficiency defined in terms of outputs to maximising health outcomes. The purpose of the health system is to deliver better health rather than more health services, and goals and targets for improving health are being determined for the main health problem areas. If the vision of a health system oriented towards achieving the best possible health for the people of NSW is to be fulfilled, shifts of resources will have to occur. For improvements in health outcomes to become the main focus of the system at all levels, it must be recognised that changes will be achieved through marginal shifts rather than revolutions. To achieve this, appropriate incentives must be provided. Better health is a long-term outcome, so success will have to be measured in the shorter term by monitoring intermediate objectives for which there is evidence of a relationship to improved health.

WHAT IS PBMA?

Program budgeting involves dividing the health services in a geographical area, hospital or clinical unit into a set of programs. These programs must have clear health-related objectives. They may, for example, be based on particular disease groups or specific client groups.

The best available data are then used to estimate the resource costs and outputs for each program. Outputs should be quantified in terms of readily available measures, for example numbers of patients treated or numbers of visits. This step should be carried out across different programs and within each program. Program budgeting, therefore, provides a means to determine how much is being spent and the outputs achieved. It is intended only to provide the framework for evaluation and does not make a direct evaluation itself.

Marginal analysis forms the basis of the evaluation of the programs.

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It can be applied to the programs overall, or within each program at the subprogram level. Marginal analysis provides a means to determine what benefits would be lost and what benefits gained if a given amount of resources were to be shifted from one program to another (or, within a program, from one subprogram to another). Are the benefits gained greater than the benefits forgone? For example, if $100,000 were shifted from outpatient aged care services to aged care assessment, what benefits would be lost from outpatient care and what benefits would be gained in assessment? The answers to these questions provide an objective basis for deciding whether the resource shift is worthwhile.

The process of marginal analysis would be straightforward if all benefits could be measured in the same units of "health gain". Although this is not generally possible, marginal analysis can be undertaken with whatever information is available. The most important aspect is the process of explicit comparison of costs and benefits, giving the decision maker as much information as possible about the relative sizes of gains and losses.

The concepts underlying PBMA are simple. If less spending on one program frees resources which yield more benefits elsewhere than those which are forgone, there is a strong argument for shifting the resources. PBMA addresses the issue of allocation efficiency – i.e. maximising benefits with available resources. So far, the health system has made progress in addressing technical efficiency – i.e. how to produce a given output at lowest cost. However, managers must also focus on the question of which outputs to produce, and in what quantities. PBMA provides a mechanism for identifying the costs and benefits of expanding and contracting different services.

In addition, PBMA provides a mechanism whereby the trade-off between efficiency and equity objectives can be made explicit. The costs and benefits of particular proposals in terms of both health gain and, for example, equity of access, can be estimated and taken into account in decision making. However, this requires the equity objectives to be made explicit.

In an ideal world good information about the costs and outcomes of programs would be brought together to establish how to maximise health benefits with the available resources. In the real world, good data are often unavailable, and PBMA can be applied with whatever information is available. Routinely available cost and output information can be used but it is important to determine the relationship between routinely available measures and health gain (for example, from published studies).

PBMA IN PRACTICE

PBMA was first suggested as an approach to priority setting in health in the 1970s, with one of the earliest applications being in the Grampian region in Scotland[1,2,3]. It was also used by the UK Department of Health in London to assist in priority setting in the late 1970s. With the development of a focus on health outcomes internationally, there has been a resurgence of interest in PBMA. It is now being used by several health authorities in the UK (including Grampian, Teeside, Liverpool and – as described below – in Mid Glamorgan, Wales)[4,5] and in New Zealand (Midland Regional Health Authority). The New Zealand Ministry of Health has also recently recommended the use of PBMA by Regional Health Authorities. These initiatives are at different stages, but it is clear that the implementation of PBMA is complicated by factors such as rationalisation of services, overall resource constraints and population shifts. The UK experience of PBMA was comprehensively reviewed at a conference, the proceedings of which will appear in a special issue of *Health Policy* in 1995.

A pilot implementation of PBMA carried out on maternal and early child health services in the Mid Glamorgan District Health Authority was recently reported[5]. This example is particularly relevant to NSW because the focus on health gain in Wales has parallels with that in NSW. In Wales, areas of health gain had been defined and objectives established, and several districts had already produced program budgets defined for these areas. In the pilot, an expert group prepared 10 proposals for increasing resource allocation and 10 for decreasing resource allocation. It was emphasised that decreasing funding did not imply that the current allocation was excessive, but rather identified those activities which might be considered if reductions were to be made. The second stage involved applying economic analysis to estimate the net gains that would result if £100,000 were shifted from the areas of decreased funding to each area of increased investment. Criteria were established to evaluate the benefits in each instance. This stage is important because it recognises that efficiency is not the only objective.

Out of this process five proposals for investment and five for decreased funding were agreed, and are being implemented. As an example, one proposal for expansion was the identification of, and targeted support for, women with high-risk pregnancies, and one proposal for decreased funding was "number of ear, nose and throat operations of questionable benefit and length of stay"[5].

The overseas experience has showed that PBMA is "not only attractive in theory but useful in practice"[5], and several lessons follow from it:

- PBMA is likely to prove most successful in an environment and policy framework which supports it, such as in Wales;

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UNUSUAL FOX BEHAVIOUR: RABIES EXCLUSION INVESTIGATION

Desolie Lovegrove, Illawarra Public Health Unit
Keith Hart, Moss Vale Rural Lands Protection Board
Tony Ross, Elizabeth Macarthur Agriculture Institute
Michael Levy, AIDS / Infectious Diseases Branch
NSW Health Department

The Elizabeth Macarthur Agriculture Institute, the Moss Vale Rural Lands Protection Board and the Illawarra Public Health Unit were involved in an investigation into the possibility that a fox which attacked a group of campers at Kangaroo Valley may have been infected with rabies.

Late in April 1994 a group of about 60 primary school students and four adults from a Sydney school was on a camping trip at Bendeela Ponds, in Kangaroo Valley. One evening a fox approached one of the camping groups and bit through a sleeping bag, lacerating a boy's foot. On the same evening the animal ventured into an opening in a tent in which an instructor was sleeping. The instructor received a laceration to his hand.

First aid was administered immediately and the lacerations covered. The next day the instructor and the student who had received lacerations went to Shoalhaven Hospital for treatment. The lacerations were dressed (no suturing was required) and Adult Diphtheria and Tetanus (ADT) vaccine was administered.

That night the same or a similar animal entered the camp site. The animal approached three boys sleeping on the ground in sleeping bags. This time two boys received scratches to their hands during the encounter. First aid was provided but tetanus boosters were not required.

FOLLOW-UP ACTION

The incident was reported to the Water Board the next day. Water Board personnel set traps in the area and trapped a fox fitting the description of the animal involved in the attacks. They reported that the fox was behaving in a very agitated and aggressive manner (very unusual behaviour for a trapped fox). They shot the animal and it was sent to Elizabeth Macarthur Agriculture Institute for autopsy.

The autopsy was done under maximum security conditions. The animal was a 6kg adolescent fox, apparently healthy except that hair was missing from the tip of its tail to halfway down the tail (probably due to mange). This feature had been noted by some of the witnesses to the attacks and was the main basis of the belief that the animal trapped was the one involved in all biting incidents.

Samples of the brain and other tissues were sent to the Australian Animal Health Laboratory at Geelong to exclude a diagnosis of rabies.

The Illawarra Public Health Unit was consulted about the health risks of everyone who had been in contact with the fox and the fox's secretions – the adult instructor and the four students who had received lacerations from the fox, the Water Board staff who had trapped and shot the fox, the veterinary surgeons from the Elizabeth Macarthur Agriculture Institute and the Rural Lands Protection Board and the laboratory staff from CSIRO Australian Animal Health Laboratory who were involved in the testing.

One of the authors (ML) was consulted on whether post-exposure rabies immunisation should be instituted, with counselling for all contacts at risk. After extensive consultation within the NSW Health Department, a decision was made to wait for the preliminary autopsy report on the fox, which was due within 24 hours.

In the meantime, sufficient supplies of rabies immunoglobulin and rabies vaccine were held at the State Vaccine Centre and mechanisms for contact tracing, vaccinating and counselling all contacts were put into place.

The next day the Australian Animal Health Laboratory's preliminary report was received. This showed that the fluorescent antibody tests for rabies conducted on brain stem, cerebellum, hippocampus, cerebrum, optic nerve and salivary gland were all negative. It was then decided that no further public health action would be taken until the final laboratory reports were received. Subsequently all laboratory tests on the fox were reported as negative for rabies, reaffirming that there was no public health risk.

PUBLIC HEALTH EDITORIAL STAFF

The editor of the Public Health Bulletin is Dr Michael Frommer, Director, Research and Development, NSW Health Department. Dr Lynne Madden is production manager.

The Bulletin aims to provide its readers with population health data and information to motivate effective public health action. Articles, news and comments should be 1,000 words or less in length and include a summary of the key points to be made in the first paragraph. References should be set out using the Vancouver style, the full text of which can be found in *British Medical Journal* 1988; 296:401-5.

Please submit items in hard copy and on diskette, preferably using WordPerfect, to the editor, NSW Public Health Bulletin, Locked Mail Bag 961, North Sydney 2059. Facsimile (02) 391 9029.

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- the difficult stage of the process is marginal analysis, and it must be recognised that this takes time;
- the composition of the PBMA working groups needs careful attention, but the overseas experience suggests they should be multidisciplinary;
- marginal analysis involves value judgments which are dependent on local knowledge, and therefore it must be implemented locally;
- PBMA is dependent on preparedness to consider and then carry through the identified resource shifts; and
- there seems to be no rational alternatives which will allow an approach to efficiency based largely on existing data.

PBMA IN NSW

PBMA is being developed as an element of the outcomes approach in NSW. The Centre for Health Economics Research & Evaluation (CHERE) is working with the NSW Health Department's Policy and Planning Division to establish and evaluate pilot projects over the next 12 months. During 1995 CHERE will run a series of workshops for health service planners and managers on how to implement PBMA, and meetings with Area and District Health Services' Health Outcomes Councils to identify possible projects. In addition, PBMA is proposed as part of the implementation of an approach to improve outcomes for people with diabetes.

In this context it will be important to identify the respective roles of Statewide and Area or District services. For PBMA to be successful, clear State objectives must guide priority setting, and information about effective interventions must be readily available. This is best coordinated at a Statewide level. Although the process is not data driven, a Statewide data system and casemix information could be useful in assisting Areas and Districts in establishing program budgets. Decisions about the final structure of the programs, establishing goals, supplementing information on outputs and resources and undertaking marginal analysis and resource shifts are the province of Areas and Districts. Although PBMA may be time-consuming and difficult, the process can help to ensure that priority-setting decisions are based on objective criteria.

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1. Mooney GH. Programme budgeting in an Area Health Board. HERU discussion paper No 01/77, 1977.
2. Mooney GH. Planning for balance of care of the elderly. *Scottish Journal of Political Economy* 1978; 25:149-164.
3. Mooney G, Russell EM and Weir RD. Choices for health care. London: Macmillan, 1986.
4. Shiell A, Hall J, Jan S and Seymour J. Advancing health in New South Wales: planning in an economic framework. CHERE discussion paper No 23, 1993.
5. Cohen D. Marginal analysis in practice: an alternative to needs assessment for contracting health care. *Br Med J* 1994; 309:781-4.

PUBLIC HEALTH ABSTRACTS

Professor James S. Lawson, Professor and Head of the School of Health Services Management at the University of NSW, has prepared the following public health items from the literature.

REDUCING FALLS IN THE ELDERLY

Falling is a serious public health problem among elderly people because of its frequency, the morbidity associated with falls and the cost of necessary health care. In a prospective trial in the US, elderly subjects had a range of interventions, including modification of medications, removal of hazards, and appropriate physical exercise. During the year of follow-up 35 per cent of the intervention group had falls, compared with 47 per cent of the control group.

Tinetti ME, Baker DI, McAvay G et al. A multifactorial intervention to reduce the risk of falling among elderly people living in the community. *N Engl J Med* 1994; 331:821-827.

DOMESTIC VIOLENCE DURING PREGNANCY

A survey of pregnant women attending the Royal Women's Hospital in Brisbane has shown that 5.8 per cent had been abused. One-third sought medical treatment as a consequence of the abuse. The injuries included lacerations, bruising and gynaecological damage. Because most women will not reveal details of violence in the home unless asked, it is recommended that a relationship history should be included at the first visit with medical, obstetric and other histories.

Webster J, Sweett S, Stoltz TA. Domestic violence in pregnancy. *Med J Aust* 1994; 161:466-470.

ACCURACY OF WEIGHING INFANTS

The weighing of infants at Early Childhood Centres is a major preventive health activity. A Queensland study has demonstrated that due to normal physiological variations infants' mass can vary by as much as 3 per cent. Staff and parents should be made aware of this and should not become concerned with what are normal variations.

Alsop-Shields IE, Alexander HG, Dugdale AE. The accuracy of weighing infants. *Med J Aust* 1994; 161:489-490.

MALARIA VACCINES: THE SEARCH GOES ON

The journey to an effective vaccine against malaria has been long , tough and expensive. The major "breakthrough" was that of Pattaroyo et al in Colombia. This vaccine can prevent more than 30 per cent of infections in South America. The first results of trials in Africa have been reported. This was a tough test because malaria in parts of Africa is a universal infection, i.e. all the members of some populations are infected. The early results are encouraging in that protection at about 30 per cent is similar to Colombia. This does not seem so good compared with other vaccines, but it is the best attained with malaria.

White NJ. Tough test for malaria vaccine. *Lancet* 1994; 1172-1173.

INFECTIOUS DISEASES

NOTIFICATIONS

The summary of infectious disease notifications (Table 2) reveals no remarkable pattern. Over the period January-March 1995 (compared with the same period in 1994) there were increased numbers of notifications of foodborne illness (not otherwise specified), legionnaires' disease and mycobacterial infection (not otherwise specified). The increase in legionnaires' disease notifications was due to an outbreak in January, reported in the February 1995 issue of the *Bulletin*. Foodborne illness notifications were sporadic.

VACCINE PREVENTABLE CONDITIONS

Cases of measles were notified to every Public Health Unit (PHU) during the first three months of 1995 (Table 3). The notification rate for January-March was 11.8/100,000 population. This compares favourably with the notification rate for the same period in 1994 (16.7/100,000). However it was higher than those for 1993 (10.1/100,000) and 1992 (8.2/100,000).

Similarly, cases of pertussis have been notified to all PHUs in 1995 (Table 3). The notification rate for January-March was 9.5/100,000 population. This is less than the rate for the same period in 1994 (28.5/100,000).

INFLUENZA SURVEILLANCE

The first influenza surveillance report for the 1995 season will be in the next issue of the *Bulletin*. Influenza will be monitored through:

- sentinel general practitioner surveillance by 10 PHUs;
- school absentee rates reported to nine PHUs; and
- reports of laboratory diagnoses from two Sydney laboratories.

In addition, the Hunter PHU will conduct a survey of vaccination uptake by the staff and residents of nursing homes.

The 1994 Australian influenza season was classed as mild to moderate and the peak consultation rate occurred during July and August. In sentinel general practices the average weekly consultation rate for an influenza-like illness (ILI) peaked at 4.3 per cent in the first week of August. This was well below the consultation rate threshold for an epidemic (10 per cent). The predominant strain of influenza virus isolated in Australia was A/Guangdong/25/93(H3N2), which is present in the 1995 vaccine (see below).

Influenza A (H3N2) was the predominant strain isolated in other parts of the southern hemisphere including Brazil, Chile and New Zealand. Both influenza A (H3N2) and influenza B outbreaks were reported from Zambia and South Africa.

The 1994-1995 season in the northern hemisphere was reported as moderate, with severe localised outbreaks in some countries. In most regions of the USA, Europe, and Asia, influenza A (H3N2) predominated. Most strains isolated were closely related to the predominant strain in Australia last year. In Europe, influenza A (H3N2) predominated. In Asia, viruses isolated were predominantly influenza B. However, in June, July and August 1994, influenza A viruses were isolated more frequently in Hong Kong, Singapore and Thailand.

Influenza virus isolates were also identified from Asia, Europe and Oceania[1].

The National Health and Medical Research Council (NHMRC) has revised its recommendations for influenza vaccination as follows:

1. Influenza vaccine should be given routinely on an annual basis to:
   - Individuals over 65 years old
   - Aboriginal and Torres Strait Islander adults over 50 years old.
2. Annual vaccination should be considered for individuals who are in the following groups:
   - Adults with chronic debilitating diseases, especially those with chronic cardiac, pulmonary, renal and metabolic disorders
   - Children with cyanotic congenital heart disease
   - Adults and children receiving immunosuppressive therapy
   - Staff caring for immuno-compromised patients
   - Residents of nursing homes and other chronic care facilities
   - Staff of nursing homes and other chronic care facilities (in an attempt to protect the patients)[2].

The trivalent influenza vaccine for 1995 recommended by the Australian Influenza Vaccine Committee will contain the following strains:

- A/Texas/36/91 (H1N1)-like,
- A/Guangdong/25/93 (H3N2)-like,
- B/Panama/45/90-like.

The A/Guangdong/25/93 (H3N2)-like strain replaces the A/Beijing/32/92 (H3N2)-like strain included in the 1994 formulation. One dose is sufficient for people of all ages except young children. Two doses separated by an interval of at least four weeks are recommended for children and those with some impairment of immune mechanism.

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1. Influenza. *Wkly Epidemiol Rec* 1994; 69:291.
2. National Health and Medical Research Council. *The Australian immunisation procedures handbook*. 5th ed. Canberra: Australian Govt Publishing Service, 1994.

NON-NOTIFIABLE SEXUALLY TRANSMITTED DISEASES

In 1994, 19 sexual health centres (SHCs) provided data describing non-notifiable sexually transmissible diseases to 13 PHUs. Since surveillance through SHCs began in 1993, the distribution of diagnoses has not changed appreciably between diseases or geographic areas of the State.

Genital warts are the STD most frequently reported in NSW by SHCs. Males contributed 68 per cent of the cases between 1993 and 1995.

Seventy per cent of genital herpes diagnoses are herpes simplex virus (HSV) type 2. Sexual health centres in NSW report a higher rate of HSV diagnosis in males (notifications January-March 1995: males 54, females 35). This differs from notifications from laboratory-based systems where the rate in females is double that in males. These notifications are probably biased by higher case ascertainment in women of child-bearing age as pregnant women are screened for HSV as part of their antenatal screening.

Table 9 covers notifications for the conditions which are rare in NSW, viz donovanosis and lymphogranuloma venereum (LGV). While donovanosis is endemic in parts of central Australia, no case has been recorded in NSW since 1988. LGV is common in many developing countries. Only one case has been reported in Australia since 1987, and this was acquired overseas.

TABLE 1

INFECTIOUS DISEASE NOTIFICATIONS FOR 1994/1995 BY SELECTED MONTH OF ONSET FOR NOTIFICATIONS RECEIVED BY MARCH 31, 1995

Condition	Dec	Jan	Feb	Mar
Adverse event after immunisation	6	3	1	2
AIDS	29	19	12	2
Arboviral infection	8	18	23	25
Foodborne illness (NOS)	14	14	28	8
Gastroenteritis (instit.)	35	2	3	1
Gonorrhoea infection	30	28	32	12
H influenzae epiglottitis	–	–	–	1
H influenzae infection (NOS)	2	–	1	–
H influenzae meningitis	1	2	–	1
H influenzae septicaemia	1	–	1	2
Hepatitis A – acute viral	48	73	57	20
Hepatitis B – acute viral	3	1	1	–
Hepatitis B – chronic/carrier	43	47	31	15
Hepatitis B – unspecified	339	336	320	154
Hepatitis C – acute viral	2	–	5	–
Hepatitis C – unspecified	640	734	621	277
Hepatitis D – unspecified	1	1	4	–
HIV	23	48	46	38
Hydatid disease	1	–	–	2
Legionnaires' disease	3	15	6	–
Leptospirosis	1	1	–	–
Listeriosis	2	–	4	1
Malaria	14	9	1	1
Measles	265	96	47	40
Meningococcal infection (NOS)	2	3	1	1
Meningococcal meningitis	5	2	7	2
Meningococcal septicaemia	3	1	5	1
Mumps	1	2	–	–
Mycobacterial atypical	36	26	10	1
Mycobacterial infection (NOS)	9	10	4	2
Mycobacterial tuberculosis	31	32	10	–
Pertussis	79	80	50	17
Q fever	24	18	15	1
Rubella	9	8	12	3
Salmonella (NOS)	104	143	170	62
Syphilis infection	58	81	50	18
Typhoid and paratyphoid	–	3	11	–

TABLE 2

SUMMARY OF NSW INFECTIOUS DISEASE NOTIFICATIONS MARCH 1995

Condition	Number of cases notified			
	Period		Cumulative	
	Mar 1994	Mar 1995	Mar 1994	Mar 1995
Adverse reaction	2	2	11	6
AIDS	67	2	163	33
Arboviral infection	84	25	180	66
Brucellosis	–	–	–	–
Cholera	–	–	–	–
Diphtheria	–	–	–	–
Foodborne illness (NOS)	7	8	36	50
Gastroenteritis (instit.)	9	1	21	6
Gonorrhoea	35	12	98	72
H influenzae epiglottitis	5	1	8	1
H influenzae B – meningitis	2	1	3	3
H influenzae B – septicaemia	1	2	3	3
H influenzae infection (NOS)	1	–	4	1
Hepatitis A	53	20	157	150
Hepatitis B	388	169	1,054	905
Hepatitis C	760	277	2,201	1,637
Hepatitis D	2	–	5	5
Hepatitis E	–	–	–	–
Hepatitis, acute viral (NOS)	–	–	2	19
HIV infection	48	38	133	132
Hydatid disease	1	2	3	2
Legionnaires' disease	4	–	12	21
Leprosy	–	–	–	–
Leptospirosis	3	–	7	1
Listeriosis	–	1	4	5
Malaria	19	1	69	11
Measles	35	40	259	183
Meningococcal meningitis	6	2	14	11
Meningococcal septicaemia	2	1	5	7
Meningococcal infection (NOS)	–	1	1	5
Mumps	–	–	1	2
Mycobacterial tuberculosis	32	–	120	42
Mycobacterial – atypical	61	1	152	37
Mycobacterial infection (NOS)	5	2	9	16
Pertussis	116	17	441	147
Plague	–	–	–	–
Poliomyelitis	–	–	–	–
Q fever	32	1	82	34
Rubella	8	3	42	23
Salmonella infection (NOS)	139	62	387	375
Syphilis	111	18	292	149
Tetanus	–	–	–	–
Typhoid and paratyphoid	3	–	10	14
Typhus	–	–	–	–
Viral haemorrhagic fevers	–	–	–	–
Yellow fever	–	–	–	–

Abbreviations used in this Bulletin:
CSA Central Sydney Health Area, SSA Southern Sydney Health Area, ESA 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, NC North Coast Public Health Unit, ND Northern District Public Health Unit, WN Western New South Wales Public Health Unit, CW Central West Public Health Unit, SW South West Public Health Unit, SE South East Public Health Unit, 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.

TABLE 3

VACCINE PREVENTABLE AND RELATED CONDITIONS, NOTIFICATIONS FOR 1995 BY PUBLIC HEALTH UNIT, RECEIVED BY MARCH 31, 1995

Condition	CCA	CSA	CW	ESA	HUN	ILL	NC	ND	NSA	SE	SSA	SW	SWS	WEN	WN	WSA	Total
Adverse event after immunisation	–	–	–	–	–	–	–	1	–	–	1	3	–	1	–	–	6
Diphtheria	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
H. influenzae epiglottitis	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
H. influenzae infection (NOS)	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
H. influenzae meningitis	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	1	3
H. influenzae septicaemia	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	1	3
Measles	4	13	1	28	21	18	7	19	6	4	11	4	13	18	–	16	183
Mumps	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	2
Pertussis	6	4	5	8	7	7	26	2	21	4	8	16	6	10	2	15	147
Rubella	–	–	–	1	–	–	1	1	1	–	5	–	–	5	–	9	23
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4

INFECTIOUS DISEASE NOTIFICATIONS FOR 1995 BY PUBLIC HEALTH UNIT FOR NOTIFICATIONS RECEIVED BY MARCH 31, 1995

Condition	CCA	CSA	CW	ESA	HUN	ILL	NC	ND	NSA	SE	SSA	SW	SWS	WEN	WN	WSA	U/K	Total
AIDS	–	7	–	7	3	–	4	–	2	–	6	–	2	1	–	1	–	33
Arboviral infection	2	–	–	2	3	4	19	9	1	16	2	5	–	–	2	1	–	66
Gonorrhoea infection	2	11	2	27	2	1	6	4	1	3	4	–	3	–	2	4	–	72
Hepatitis B – acute viral	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–	2
Hepatitis B – chronic/carrier	6	–	2	54	–	–	2	3	–	–	1	–	–	3	1	21	–	93
Hepatitis B – unspecified	4	74	4	17	21	6	7	3	99	4	124	5	328	2	2	110	–	810
Hepatitis C – acute viral	–	–	–	1	–	–	–	–	–	–	–	–	–	2	1	1	–	5
Hepatitis C – unspecified	38	177	68	286	125	25	141	28	125	55	113	62	220	31	4	134	–	1,632
Hepatitis D – unspecified	–	–	–	–	–	–	3	–	–	–	–	–	2	–	–	–	–	5
Hepatitis E – unspecified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
HIV infection	1	18	–	46	–	3	2	–	1	–	2	–	7	1	1	1	48	132
Hydatid disease	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2
Legionnaires' disease	–	1	–	1	4	1	–	–	3	–	–	–	–	–	–	11	–	21
Leptospirosis	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
Malaria	2	–	–	1	1	–	1	–	1	–	–	–	1	1	–	3	–	11
Meningococcal infection (NOS)	1	–	–	1	1	–	1	–	–	–	–	–	1	–	–	–	–	5
Meningococcal meningitis	1	1	–	–	2	1	1	–	1	–	3	–	1	–	–	–	–	11
Meningococcal septicaemia	–	2	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–	7
Mycobacterial atypical	–	5	–	9	6	–	1	–	–	1	4	–	10	1	–	–	–	37
Mycobacterial infection (NOS)	2	2	–	–	2	–	–	–	5	–	–	–	5	–	–	–	–	16
Mycobacterial tuberculosis	1	3	–	1	2	–	–	1	7	–	13	–	6	–	–	8	–	42
Q fever	–	–	3	–	5	1	2	11	–	–	–	–	–	–	11	1	–	34
Salmonella infection	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
Syphilis	2	21	4	34	5	2	3	10	7	1	9	1	31	5	5	9	–	149

TABLE 5

FOODBORNE INFECTIOUS DISEASE NOTIFICATIONS FOR 1995 BY PUBLIC HEALTH UNIT, RECEIVED BY MARCH 31, 1995

Condition	CCA	CSA	CW	ESA	HUN	ILL	NC	ND	NSA	SE	SSA	SW	SWS	WEN	WN	WSA	Total
Foodborne illness (NOS)	10	–	–	–	–	–	–	1	–	–	1	–	18	–	6	14	50
Gastroenteritis (instit.)	–	1	–	–	2	–	–	–	–	–	–	–	–	–	–	3	6
Hepatitis A – acute viral	5	19	24	43	8	1	4	–	7	–	10	4	10	2	2	11	150
Listeriosis	–	–	1	1	–	–	–	–	1	1	–	–	–	–	–	1	5
Salmonella (NOS)	10	15	12	22	41	12	33	26	37	13	31	17	45	19	4	38	375
Typhoid and paratyphoid	–	1	–	3	–	–	–	–	1	–	3	–	3	1	–	2	14

TABLE 6

SURVEILLANCE OF NON-NOTIFIABLE SEXUALLY TRANSMITTED DISEASES JANUARY-MARCH 1995
(Diagnoses from sexual health centres unless otherwise stated in footnote.) Unlike tables of notifiable diseases, Public Health Unit Areas in this table refer to the location of the clinic, not the residence of the patient.

* First diagnosis
1. 01/01/95-31/01/95
2. 01/01/95-28/02/95
3. 01/01/95-31/03/95
4. No SHC in Region
5. No data yet received for 1994

AHS Infection		CSA[5]	SSA[5]	ESA[1]	SWS[5]	WSA[5] + WEN	NSA[3]	CCA[2]	ILL[1]	HUN[5]	NC[2]	ND[2]	WN[1]	CW[4]	SW[2]	SE[5]	Total
Chlamydia trachomatis	Male	–	–	10	–	–	–	–	1	–	–	–	–	–	–	–	11
	Female	–	–	9	–	–	–	1	–	–	–	3	–	–	2	–	15
	Total	–	–	**19**	–	–	–	**1**	**1**	–	–	**3**	–	–	**2**	–	**26**
Donovanosis	Male	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Female	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Total	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
*Genital herpes	Male	–	–	36	–	–	3	7	1	–	5	2	–	–	–	–	54
	Female	–	–	22	–	–	2	2	–	–	3	5	–	–	1	–	35
	Total	–	–	**58**	–	–	**5**	**9**	**1**	–	**8**	**7**	–	–	**1**	–	**89**
*Genital warts	Male	–	–	78	–	–	8	3	7	–	15	2	1	–	3	–	117
	Female	–	–	23	–	–	5	5	4	–	5	4	1	–	7	–	54
	Total	–	–	**101**	–	–	**13**	**8**	**11**	–	**20**	**6**	**2**	–	**10**	–	**171**
Nongonococcal urethritis	Male	–	–	67	–	–	3	2	3	–	2	3	1	–	1	–	82
	Female	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
	Total	–	–	**67**	–	–	**4**	**2**	**3**	–	**2**	**3**	**1**	–	**1**	–	**83**
Lymphogranuloma venereum	Male	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Female	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Total	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

STATEWIDE SENTINEL IMMUNISATION SURVEILLANCE

During 1995 PHUs are carrying out surveillance of immunisation status of children attending child care facilities. Under the Public Health (Amendment) Act 1992 directors of child care facilities are required to keep registers of the immunisation status of every enrolled child. A cluster sampling method has been developed, staggered throughout the year, to collect data on a total of 884 children aged 25-36 months, or about 1 per cent of the NSW population in that age range. Any child with missing immunisation records is taken as not immunised.

All the children in the group were born before the introduction of Hib vaccine on May 1, 1993, and were therefore not required to be vaccinated. However, a voluntary catch-up program was conducted for children under five years of age on May 1, 1993, and 15 children in the sample (9.1 per cent) were fully immunised with Hib vaccine as a result.

Table 7 shows immunisation rates of children up to six years of age in the 1989-90 National Health Survey to compare with the results of 1995 surveillance so far. The differences in the nature of the samples should be noted when comparing immunisation rates: one is a cluster sample of two-year-old child care centre attendees using immunisation records to measure immunisation status, while the other comprises randomly selected children up to six years of age for whom immunisation records were not necessary. Updated results from the 1995 surveillance will be published throughout this year.

TABLE 7

IMMUNISATION RATES IN NSW CHILDREN, 1989-90 AND 1995 (JAN-MAR)

	Vaccine	Per cent vaccinated
1995 (JAN-MAR) 2 years child care attendees (n=164)	DTP	87.2
	Sabin	93.3
	MMR	92.7
	All	84.8
1989-90 0-6 years National Health Survey	DTP	84.9
	Sabin	72.3
	Measles	84.6
	Mumps	78.2
	All	51.6

DTP: diphtheria, tetanus, pertussis.
Sabin: polio.
MMR: measles, mumps, rubella.