

Economic evaluation of Australia's NSPs

Spending on NSPs

\$26.4 million was spent on NSPs around Australia in the financial year 2007/8, with \$17.8m spent on support for the NSP sector including \$15.9m on primary sites, \$1.2m on secondary sites and \$440,000 on vending machines. \$8.6m was spent on the provision of consumables including \$6.9 m on sterile injecting equipment, \$1.5m on disposal and \$290,000 on safe sex packs. See Table 4 for a summary of the spending on NSPs from 2000/1 to 2007/8. Results for individual jurisdictions are reported in the relevant sections.

Table 4: Expenditures made by financial year in 2008 Australian dollars (unadjusted financial expenditures and adjusted for consumer price index)

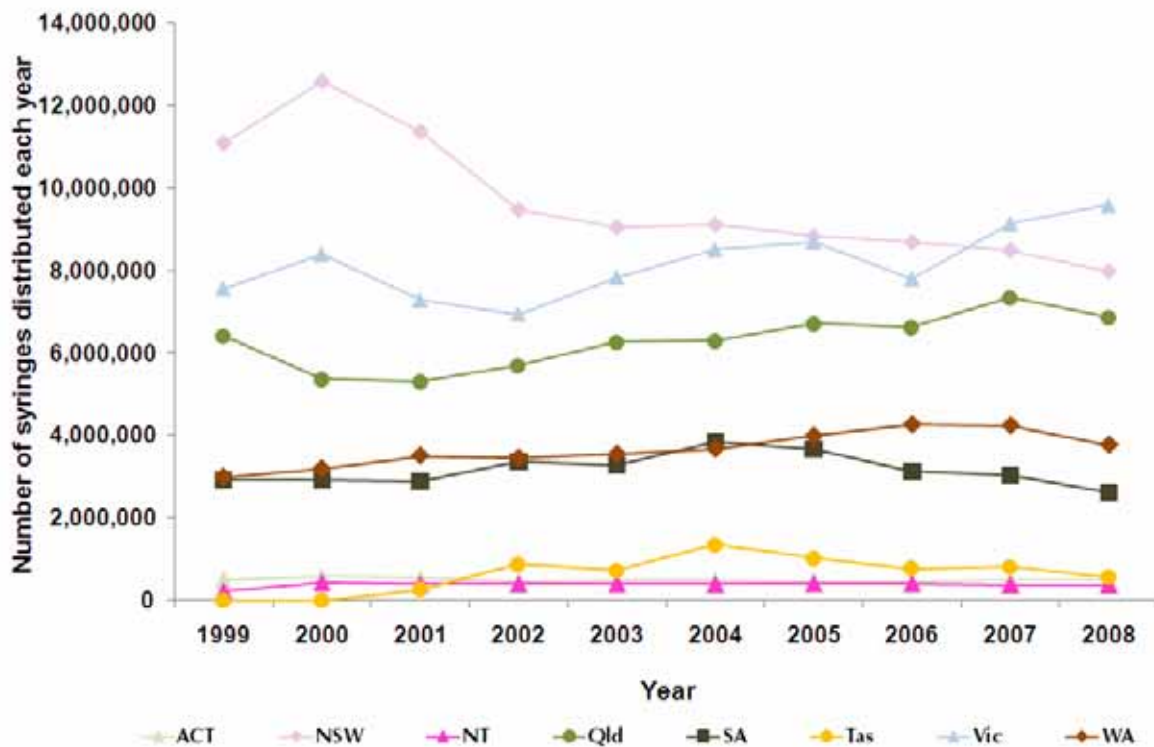
	2000/1	2001/2	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8
CONSUMABLES (\$'000)								
Sterile injecting equipment	5,658	5,140	5,633	6,677	6,928	6,571	7,404	6,857
Disposal equipment	911	884	952	941	1,184	1,122	1,274	1,474
Safe sex packs	15	52	70	69	246	245	289	293
Sub-total	6,583	6,076	6,655	7,686	8,358	7,938	8,968	8,624
NSP SUPPORT (\$'000)								
Primary NSP Operations	8,851	10,510	10,417	11,261	12,505	12,274	14,450	15,929
Support for Secondary NSPs	380	653	745	788	951	1,264	963	1,222
Transport	89	82	92	105	117	184	198	192
Vending Machines	10	0	0	0	0	19	246	441
Sub-total	9,331	11,245	11,254	12,154	13,573	13,742	15,856	17,783
TOTAL (\$'000)								
(unadjusted for CPI)	15,914	17,321	17,909	19,841	21,931	21,680	24,824	26,407
TOTAL (\$'000)								
(adjusted for CPI)	20,119	21,236	21,312	23,064	24,850	23,897	26,500	27,380
Total Client Costs (\$'000)	7,608	7,296	6,548	6,769	6,825	6,230	6,176	6,160

In 2008 dollar terms, expenditure on NSPs has increased by \$7m from 2000/1 to 2007/8 with near-doubling of funding for primary sites and a four-fold increase in support for secondary sites. Spending on sterile injection equipment has been stable in 2008 dollar terms, although numbers of units of equipment provided have increased by 15% (see Table 5 and Figure 1); rises have been greatest in Victoria and Queensland (Figure 21).

Table 5: Number of needles/syringes distributed in Australia during financial years (1999/2000-2007/8)

	1999/2000	2000/1	2001/2	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8
ACT ('000)	502	664	424	468	504	484	457	467	517
NSW ('000)	11,517	12,434	10,343	9,116	9,001	8,916	8,813	8,558	8,290
NT ('000)	460	397	396	398	399	388	407	407	379
QLD ('000)	5,820	5,554	5,239	5,887	6,368	6,216	6,739	7,231	7,069
SA ('000)	2,821	3,018	2,999	3,443	3,611	3,676	3,566	2,915	2,763
TAS ('000)	756	756	756	756	1,031	1,326	777	823	692
VIC ('000)	7,972	7,829	7,100	7,379	8,165	8,593	8,241	8,464	9,350
WA ('000)	3,040	3,184	3,601	3,563	3,496	3,788	4,196	4,273	4,039
NATIONAL ('000)	32,888	33,836	30,858	31,010	32,575	33,387	33,196	33,138	33,099

Figure 21: Number of needles/syringes distributed in each Australian jurisdiction during calendar years (1999-2008)



The per-capita rate of needle and syringe distribution in each state and territory among the entire population and the estimated size of the IDU population are shown in Table 6. It was estimated that the average IDU receives between 160 and 290 syringes every year.

Table 6: Per-capita rate of needle/syringe distributions in 2007/8 in each jurisdiction

	Population in jurisdiction (Dec 2008, ABS [53])	Per- capita rate of needle and syringe distribution (over whole population)	Per-capita rate of needle and syringe distribution among estimated IDU population
ACT	347,800	1.5	219.1
NSW	7,041,400	1.2	157.6
NT	221,700	1.7	211.1
QLD	4,349,500	1.6	179.8
SA	1,612,000	1.7	187.6
TAS	500,300	1.4	186.4
VIC	5,364,800	1.7	236.0
WA	2,204,000	1.8	204.3
NATIONAL	21,641,500	1.6	202.9

Funds spent on disposal have increased by 28%. Vending machines have been introduced into more jurisdictions since 2005. Safe sex packs have increased nationally from \$15,000 in 2000/1 to \$293,000 in 2007/8.

The number of NSPs has increased since 2000 (see Table 7). There has been a steady increase in the total number of all types of outlets.

Table 7: Number of national NSP outlets (NB: the number of sites in NSW prior to 2006/7 was taken as the number in 2002 since data were not provided)

	Primary	Secondary	Enhanced secondary	Vending machine sites
2007/8	85	732	22	118
2006/7	86	710	20	114
2005/6	83	714	17	64
2004/5	82	706	17	64
2003/4	77	697	17	57
2002/3	76	667	16	57
2001/2	75	654	16	57
2000/1	71	624	16	56

Cost of HIV and HCV disease

For the economic analysis, healthcare costs for HIV were estimated by CD4 strata and antiretroviral therapy (ARV). Cost per year without ARVs ranged from \$1,520 for CD4 count greater than 500 to \$5,500 for CD4 less than 200. First line ARVs cost \$14,600 per year, second line \$15,200 per year and third and subsequent line \$27,800 per year. HCV related healthcare costs were derived for seven health states (see Appendix C). Healthcare costs ranged from \$288 per year for diagnosed early disease to \$114,400 per year for patients requiring liver transplant (see Table 1). Patient/client and carer costs for HIV healthcare used in the secondary analysis were estimated to be \$1,020 per year for CD4 greater than 500 to \$3,500 per year for CD4 less than 200. For HCV, costs ranged from \$860 per year for early stage disease to \$13,700 for liver transplant. See brief methods section and Appendix C for detail about the cost of healthcare for both infections.

Productivity cost of HIV and HCV were estimated using the Friction Cost Approach assuming replacement of sick or deceased workers in three months with 3% discounting (see Appendix D). HIV and HCV were estimated to cost \$24,000 to \$25,600 per new infection respectively with uncertainty boundaries from \$13,000 to \$36,000. Since these estimates were based on relatively uncertain data of the impact of HIV and HCV on workforce participation by NSPs clients, they were used in a secondary analysis for illustration purposes only.

Analysis of current NSP provision compared to no government funded NSPs (2000-2009)

During the period 2000-2009, gross funding for NSP services was \$243m with healthcare costs saved of \$1.28 billion (\$1.12bn-\$1.45bn, IQR) compared to no program and more than 140,000 DALYs gained. The net financial cost-saving was \$1.03 billion (\$876m-\$1.98bn, IQR) undiscounted (see Table 8). NSP activities were cost-saving so the incremental cost-effectiveness ratios were not calculated.

The net present value allows a funder to assess an investment in an intervention from the perspective of the start of a time period, as if a decision was being made at a point in time (i.e. year 2000 about funding of NSPs for the period 2000-2009). Costs are valued to a specific year (2008) and then costs and outcomes are discounted from the time of the start of the intervention (see economic methods section) at 3% or 5%. The net present value at year 2000 of \$190m spent on NSPs over the period 2000-2009 (in year 2008 prices) was \$896m (discounted at 3%) and \$817m for \$172m spent (discounted at 5%). In other words, ***for one dollar invested in NSPs, more than four dollars would be returned in healthcare cost-savings in addition to the investment.***

The net monetary benefit of the intervention can be calculated in economic analyses: if one assumes that a government would be willing to pay \$50,000 per DALY gained through healthcare interventions, then the net monetary benefit of NSPs would be more than \$8 billion undiscounted and \$6.2 billion discounted at 3%.

The majority of the gain was related to the prevention of HCV disease. If the benefits of prevention of HCV disease were not included, the net cost of providing NSPs was \$94.8m over ten years, with a gain of 4,034 Disability-Adjusted Life Years. NSP funding was cost-effective for HIV alone in the time period, costing \$4,500 per DALY gained.

Table 8: Net cost of program and gains in DALYs (undiscounted) as well as net present value (discounted (3%) and undiscounted)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	SUM
Costs saved \$m (IQR)	66 (57-75)	192 (171-212)	137 (119-157)	98 (84-107)	96 (86-105)	106 (94-116)	119 (107-135)	134 (119-154)	153 (134-177)	176 (148-206)	
DALY gain (median)	4087	10825	12863	12799	13089	13705	15148	16922	19301	22386	
NPV current program \$m (IQR) (undisc.)	46 (37-55)	171 (149-191)	116 (98-136)	75 (61-84)	71 (61-80)	82 (70-93)	93 (80-108)	107 (92-127)	126 (107-150)	145 (118-174)	1.03bn (873m-1.98bn)
NPV current program \$m (IQR) (3% disc.)	46 (37-55)	166 (145-185)	109 (92-128)	69 (56-77)	63 (54-79)	70 (60-80)	78 (67-90)	87 (74-103)	99 (84-118)	110 (90-132)	896m (758m-1.04bn)

Analysis of increases and decreases in NSP provision compared to no government funded NSPs (2010-2079)

Data from the epidemiological transmission model were generated for a number of different scenarios in which provision and funding of NSPs was less or more than current levels. Each scenario was compared to the no-program scenario using the start date of 2010 for the intervention and discounting to take the position of a decision maker in 2009. Costs were valued in 2008 Australian dollars.

Expenditure on NSPs was cost-saving at all levels of NSP funding when analysed for the periods 2010-2019 (10 years), 2010-2029 (20 years), or 2010-2059 (50 years) with undiscounted cost savings for current levels of NSP of \$782m (10yrs), \$3.23bn (20yrs), \$17.75bn (50 years), and \$28.71bn (70 years). The cost savings or net present value increased with more spending on NSPs, although the incremental NPV started to reduce as spending increased beyond 50% above current levels of funding (see Table 9). Analyses with longer time horizons showed greater gains and increased returns for each dollar invested (Table 9; Figure 23).

An expansion pathway was plotted of NPV vs DALY over 2010-2019 (Figure 22), demonstrating that a greater saving can be made with further expansion of NSP provision. In the period 2010-2019, the maximum net present value was obtained when NSP funding was 150% of current funding. If funding was three times current funding, the net present value was equivalent to funding at 75%, although the expansion of funding by three-fold would be cost-effective at \$4,000 per extra DALY gained from current levels. If the time horizon was

2010-2029, the maximum NPV was obtained at 200% NSP or double funding and provision of NSP support and services (Table 10). If the economic analysis for the current scenario continued until 2079, when all lifetime costs and cost-offsets would accrue, the net financial saving would be \$28.71bn undiscounted and \$8.41bn discounted.

Decreases in funding from current level

Decreased funding from current levels would be associated with increases in HIV and HCV infections, with associated loss of health and life. The reduced return on investment would exceed any savings associated with reduced spending on NSPs: if funding was reduced by \$22m or 10% over the time period 2010-2019, 7,600 DALYs would be lost and the return on investment would be reduced by \$36m (Table 9 below). If funding was cut by 50%, over 36,000 DALYs would be lost with a reduction in the return on investment \$197m.

Table 9: Loss of life and reduced return associated with decreased funding period 2010-2019 (all discounted at 3%)

NSP funding	Reduction in NSP spending	Loss in DALY vs. current	Reduced return
50% of current levels	\$112m	36,370	\$197m
75% of current levels	\$56m	16,473	\$98m
90% of current levels	\$22m	7,607	\$36m

Table 10: DALYs and Net Present Value with changes in NSPs after ten years (2010-2019) and 20 years (2010-2029) discounted at 3%

Level of funding for NSPs	NSP investment	Gain in DALY	Net Present Value of NSPs	Return on investment
Period 2010-2019				
100% of current levels	\$225m	97,229	\$631m	current investment + 380%
110% of current levels	\$248m	98,562	\$633m	current investment + 360%
125% of current levels	\$282m	104,005	\$647m	current investment + 330%
150% of current levels	\$338m	111,254	\$656m	current investment + 290%
175% of current levels	\$395m	116,874	\$650m	current investment + 270%
200% of current levels	\$451m	121,303	\$635m	current investment + 240%
300% of current levels	\$676m	132,595	\$514m	current investment + 180%
Period 2010-2029				
100% of current levels	\$392m	365,703	\$2,273m	current investment + 680%
110% of current levels	\$431m	374,333	\$2,091m	current investment + 590%
125% of current levels	\$490m	389,043	\$2,362m	current investment + 580%
150% of current levels	\$588m	409,635	\$2,427m	current investment + 510%
175% of current levels	\$686m	426,538	\$2,464m	current investment + 460%
200% of current levels	\$784m	440,497	\$2,480m	current investment + 420%
300% of current levels	\$1,175m	478,262	\$2,390m	current investment + 300%

Figure 22: DALY gain versus Net Present Value after ten years (NB: DALYs start at 50,000 and net costs are expressed as negatives (i.e. are cost-savings) and discounted at 3%)

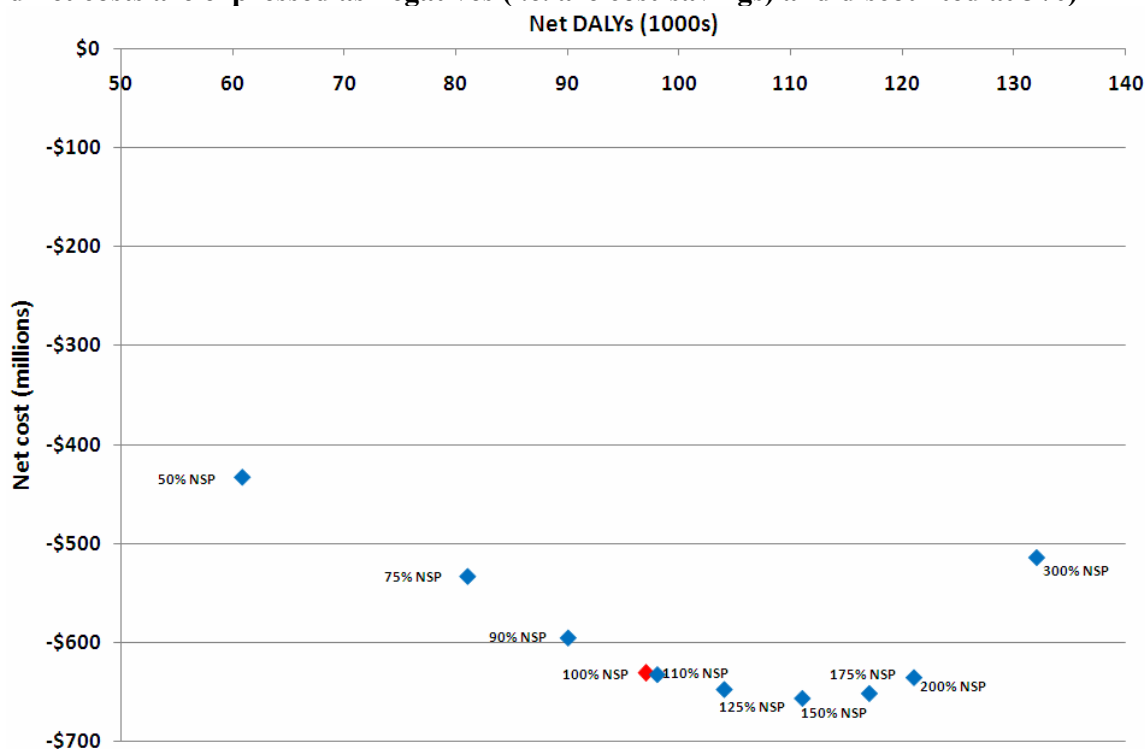
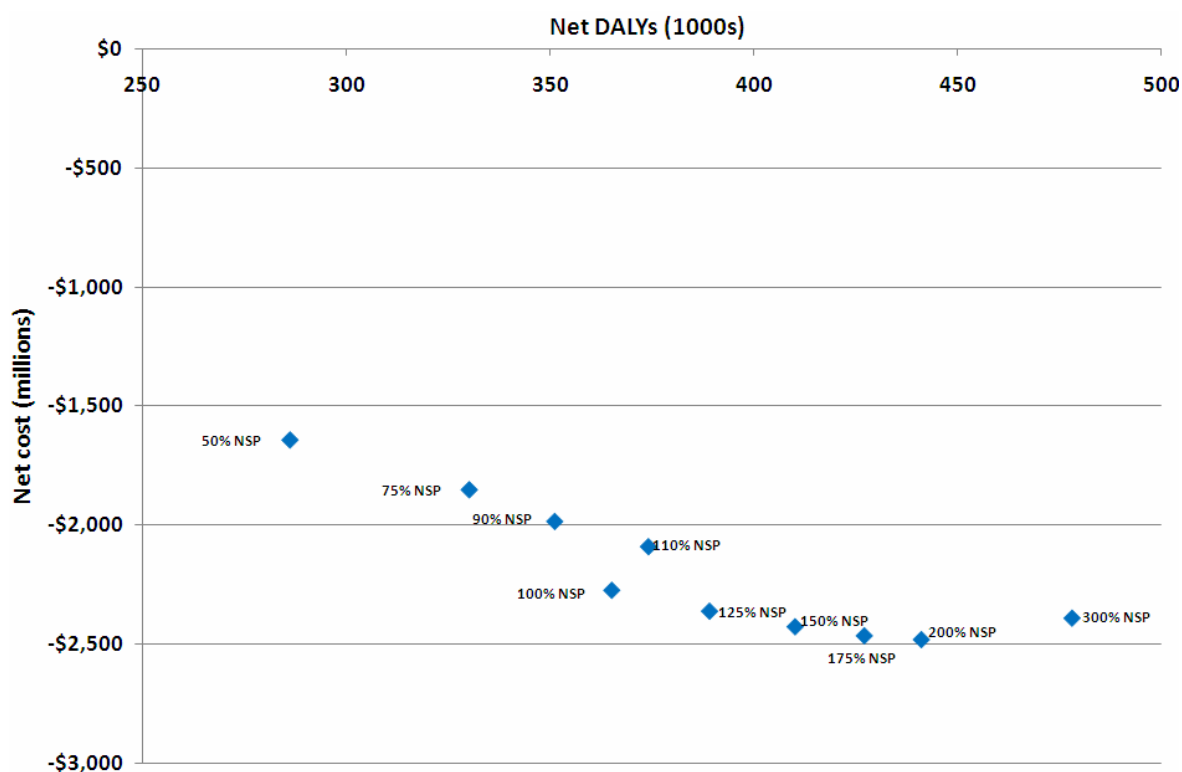


Figure 23: DALY gain versus Net Present Value after 20 years disc 3% (NB: DALYs start at 250,000)



Secondary analyses

Inclusion of patient/client costs, productivity gains and injection-related injuries and disease

Inclusion of patient/client costs in the economic analysis of current funding of NSPs from 2000 to 2009 increased the net cost-saving of current provision of NSP from \$128bn to \$2.48bn (undiscounted, see Table 11).

Table 11: Healthcare costs averted and net present value for current funding of NSPs (undiscounted)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Healthcare costs averted \$m (IQR, undisc)	103 (94-118)	322 (294-350)	292 (270-314)	250 (229-261)	247 (226-260)	258 (238-274)	278 (259-298)	298 (277-327)	323 (296-356)	351 (323-393)
NPV \$ m (current program)	83	300	271	227	222	234	251	271	296	324

Inclusion of productivity gains and losses (with patient costs) increased the net present value of current provision of NSP to \$5.85bn in the period 2000 to 2009. Most of the productivity gains were related to HCV disease. It should be noted that the Friction Cost approach to productivity losses was a conservative one, compared to the frequently used Human Capital approach. This finding was based on limited data on workforce participation rates of NSP clients and people living with HCV. The cost savings to society are shown in Table 12.

Table 12: Societal costs averted, including productivity losses, and net present value for current funding of NSPs (undiscounted)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Societal costs averted \$ m (IQR, undisc)	993 (931-1075)	949 (881-993)	410 (360-450)	348 (306-369)	380 (353-419)	448 (407-501)	521 (466-582)	580 (509-662)	676 (566-779)	783 (635-901)
NPV \$m (current program)	973	928	388	325	355	424	494	552	648	756

If no NSPs were available, one could speculate that there would be an increase in injection related injuries and disease (IRID). If NSPs prevented 50% of the IRID that might occur in their absence, then one might assume that the additional cost-saving with current levels of NSP would be more than \$20m a year or \$200m in ten years (undiscounted).

Return on investment of NSPs associated only with HIV

The benefit of preventing HIV alone was considered in a secondary analysis for increases in funding scenarios from 2010-2019. Current levels of NSPs funding would be \$226m (discounted) over the period 2010-2019 with healthcare costs saved of \$56m and a net cost of \$170m. 11,990 DALYs would be gained compared to no program for a cost of \$14,200 per DALY gained. In other words, current levels of NSPs were cost effective compared to no program if only gains related to the prevention of HIV were considered over a ten year time horizon.

150% of current NSP provision and funding would cost \$23,000 per DALY gained compared to no program, which would be considered cost-effective with a societal willingness to pay of \$50,000 per DALY. However, the incremental cost of provision of NSPs at 150% compared to current levels was \$444,000 per DALY gained when considering just the healthcare costs of HIV disease alone; in other words it would not be cost-effective to expand services on the basis of HIV alone in this ten year time horizon.

If both analyses were conducted at the 20 year time horizon, both current provision and 150% provision were cost-saving compared to no program for HIV alone, although the incremental cost per DALY gained comparing 150% with current program was \$55,000 per DALY gained.