

Social Policy Committee

PANDEMIC INFLUENZA IMMUNISATION

PROPOSAL

1. New Zealand is likely to face further waves of pandemic influenza H1N1 (swine flu). The measures that we took during 2009 will be the basis of our response to future waves of similar severity, particularly encouraging people to practice good hygiene, staying away from school or work when ill, and treating people with tamiflu or relenza. For 2010 we will also have a vaccine which includes this strain of influenza.
2. The World Health Organization has recommended that next year's influenza vaccine include the pandemic strain. This means that the annual influenza immunisation will provide many people with some protection from pandemic influenza.
3. The Ministry of Health plans to extend the annual influenza immunisation programme as follows to be funded from within existing Vote Health immunisation baselines:
 - a. Greater uptake of subsidised seasonal influenza immunisation by 10% of the currently eligible population requiring an additional 160,000 doses in 2009/10, but dropping back to more normal levels in outyears [REDACTED] from within District Health Board baselines).
 - b. Extending eligibility for subsidised immunisations to pregnant women and people with morbid obesity, estimated to require 15,000 doses [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
 - c. Subsidising influenza immunisations for children under 5 who are enrolled in Access Primary Health Organisations, estimated to require 20,000 doses [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend
 - d. Additional safety monitoring [REDACTED] and changes to the patient management systems in general practices to record and monitor influenza immunisations [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
 - e. An influenza communication programme for 2010 to continue promoting hygiene messages and encourage immunisation by both private payers and the at risk group [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.

BACKGROUND

4. The first wave of the pandemic influenza H1N1 2009 virus (swine flu) is now on the wane in New Zealand. Although the disease was relatively mild for many people and most recovered at home, for some it was serious and even deadly with 18 confirmed deaths to date and further deaths likely to be attributed to the pandemic. The number of cases peaked in July and has eased significantly since then, though cases are still occurring around the country.
5. New Zealand's response relied on trying to slow the virus and on communicating to the public early and often, particularly emphasising how people could manage their own risks through good hygiene practices. Health officials consider that staying away from schools and workplaces when sick was one of the most effective measures for reducing the impacts of the pandemic. Some people were treated with tamiflu or relenza. The health sector also reorganised some services, managing the load on intensive care units and setting up flu centres in some places.
6. Health officials expect a future increase of pandemic H1N1 influenza, but the timing, size and severity are unknown. The northern hemisphere is currently experiencing extraordinary levels of influenza, ahead of their normal influenza season, so it is possible that another wave will occur in New Zealand before next winter. The health sector coped with the size of this year's pandemic peak, despite a relatively high proportion of hospitalised people requiring intensive care facilities. But some health services, particularly intensive care, might not cope if there are higher numbers of sick people in future waves. The virus could also change into a more severe form, which has happened in previous pandemics, but there is no evidence of this yet.
7. People at greater risk of more severe outcomes from pandemic influenza include pregnant women, people with morbid obesity, people with pre-existing health conditions, Māori and Pacific people, and children under four years old, particularly children under 1 year old. However, there were some young and otherwise healthy people who suffered severe illness, so it is not possible to be certain who will be severely affected by this strain of influenza.
8. Vaccines against pandemic influenza have been available since September and health officials estimate it provides protection for at least 6 months to 70% of people who receive it. The Ministry of Health expects that if large numbers of people were immunised, it would reduce the impact and size of the influenza pandemic in 2010.
9. On 19th September the World Health Organization recommended that the pandemic H1N1 strain be included in the influenza vaccine for the next southern hemisphere winter and is recommending immunisation to protect populations from this virus. New Zealand's two suppliers have assured us that they will be able to provide this vaccine, though it may be harder to secure a larger order than previous years.
10. New Zealand's annual influenza immunisation programme usually runs from 1 March to 30 June and is available to everybody either by paying for it themselves, having it paid for by their employers, or subsidised by the Government. The Government subsidises influenza vaccine for people 65 years and older and

those aged 6 months to 64 years with pre-existing health conditions, which costs about \$14 million a year.

11. From sales figures and immunisation claims data, officials estimate that up to 20% of the population under 65 was vaccinated in 2009, and 67% of the population aged 65 or more (Tables 2 and 3).

Table 2: Seasonal vaccine coverage rates 2009 (estimated)

Age Band	People Vaccinated	Vaccine coverage (% of total population in age band)
6months to 1yr	150	0%
01 - 04yr	2,100	1%
05 - 14yr	6,450	1%
15 - 44yr	350,250	20%
45 - 64yr	217,950	20%
65+	381,900	67%
Total	958,800	22%

Totals may not add due to rounding, children under 10 receive 2 doses, assumes no wastage

Table 3: Seasonal Influenza Vaccine (sales figures)

Year	Subsidised	Unsubsidised	Total
2007 Mar- June usual season	456,859 (61%)	288,736 (39%)	745,595
2008 Mar- June usual season	471,669 (62%)	284,221 (38%)	755,910
2009 Mar to 30 Sept extended season	574,167 (60%)	386,710 (40%)	960,877

12. During the pandemic, Australia purchased enough pandemic vaccine for its entire population and has now started the largest immunisation campaign ever attempted in Australia. The United States, Canada, and the United Kingdom are also undertaking large pandemic immunisation programmes.

IMMUNISATION OBJECTIVES AND STRATEGIES

13. Since the World Health Organization has recommended that the pandemic strain be included in next year's influenza vaccine New Zealand does not need a separate pandemic immunisation programme unless the pandemic becomes suddenly worse.
14. New Zealanders will be offered protection from the pandemic through the annual influenza immunisation programme though an emergency immunisation option is available as a contingency. This approach is consistent with World Health Organization recommendations for population groups to be targeted, but is a very different approach from Australia's. Officials have considered several options for extending the seasonal influenza immunisation programme for 2010 and beyond. The aim is to reduce the impact of pandemic influenza and protect those most at risk.
15. An immunisation programme could include one or more of the following objectives, with different target audiences.

Objective	Target populations
reduce transmission	'spreaders' who are usually children
protect those at risk of more severe outcomes	pregnant women, those with pre-existing medical conditions and morbid obesity, children under 5, Pacific and Māori
protect those most exposed to the virus	frontline healthcare workers, teachers and those caring for children
reduce the impact on critical services	frontline healthcare and emergency workers

16. A mass immunisation programme would cover all these objectives, but is not planned. The disease is not severe enough to justify the high cost and workload, and uptake is unlikely to be sufficient to achieve all the objectives.
17. An emergency immunisation programme, if a more severe wave occurred soon, would focus on protecting those most exposed and reducing the impact on critical services, though it could be extended to some at risk groups if there was sufficient vaccine (see paragraph 56). The annual influenza immunisation programme allows people to pay for immunisation and subsidises immunisation for those at risk of more severe outcomes, though the groups at greatest health risk from the pandemic strain are slightly different from the groups at risk from the usual seasonal strains.
18. An immunisation programme would begin only after a vaccine has been licensed by Medsafe. There are no plans to make pandemic immunisation compulsory or to exclude unimmunised children from schools.
19. The Ministry of Health has commissioned a study using blood tests to estimate the degree of exposure to the pandemic virus that occurred in 2009, and the pattern of immunity within the community. If the study finds very high exposure levels, then immunisation for at risk groups may not be necessary. However, officials expect the study will show a large proportion of the population are still susceptible. Confirming the level of susceptibility in this way will help people assess their own level of risk and may improve people's willingness to be immunised.
20. New Zealand routinely monitors adverse reactions to vaccines but also implemented an intensive monitoring system for the meningococcal immunisation programme. Although the vaccine safety profile is expected to resemble that of seasonal vaccine, the Ministry of Health plans to re-start this intensive monitoring system for this influenza vaccine, at a one-off cost ██████████ to be absorbed within immunisation baselines. This would be to provide additional assurance that adverse reactions are being identified, though it also may create the perception that this vaccine is somehow less safe than previous influenza vaccines. The Ministry of Health plans to record who has received these vaccines in the National Immunisation Register, which is not usually done for influenza immunisations. This will incur one-off costs ██████████ to incorporate into the patient management software systems used in most general practices.
21. Costs associated with increased safety monitoring and changes to the National Immunisation Register will be met from within Ministry of Health baselines using the HPV immunisation underspend (refer Table 6).

OPTIONS FOR SEASONAL IMMUNISATION

22. Officials have analysed the following options for extending and enhancing seasonal influenza immunisation (see Table 5 below):

- Option One: Status quo but with increased uptake expected
- Option Two: Add pregnancy and morbid obesity to eligibility criteria
- Option Three: Add children 6 months – 4 years in Access PHOs
- Option Four: Add all children 6 months – 4 years
- Option Five: Add all people enrolled in Access PHOs
- Option Six: Whole population

Table 5: Estimated populations in each option for extended funding (DHB Costs)

Option	Eligible Populations	Number of people in group	Of whom already eligible	Marginal effect of widening eligibility	Expected uptake in this group	Extra vaccine doses needed	Additional cost	Deaths averted	Hospital Admissions averted
Baseline (2009)	All >65 and Pre-existing conditions	1,211,000	1,211,000		47%	-	-		
1. Status Quo with increased uptake	All >65 and Pre-existing conditions	1,211,000	1,211,000	-	Children and people 65 and over +10%	160,000	█	2	65
					Working aged adults +15%				
DHB baselines									
2. Pregnant & morbidly obese	Morbid obesity	20,000	14,000	6,000	48%	15,000	█	0	5
	Pregnancy	30,000	5,000	25,000	48%				
3. Children 6mths-5yrs in Access PHOs	Children 6mths-5yrs enrolled in Access PHO	93,000	25,500	67,500	15%	20,000 (2 doses)	█	0	20
Ministry of Health baselines									
4. Children 6mths-5yrs	All children 6mths-5yrs	300,000	26,000	274,000	15%	82,200 (2 doses)	█	0	35
5. Access PHOs	Those enrolled in Access PHOs	1,090,000	329,000	761,000	32%	405,000	█	3	90
6. Whole population	Everyone	4,294,000	1,211,000	3,083,000	45%	1,104,000	█	5	145

23. All options would also include efforts to increase access to influenza vaccine for Maori, Pacific peoples and people on low incomes.
24. A simple economic model was used to estimate costs and benefits. The model is not as robust as normal cost-benefit analyses for vaccines and is likely to underestimate the benefits. It does not include the benefits from preventing other influenza related deaths and hospitalisations, or any other benefits from the increased vaccination against normal influenza. See Appendix Two for explanation and more details of the cost-effectiveness analysis.
25. In addition, officials recommend extending the eligibility dates for vaccines to be subsidised, from the time vaccines are available until they run out, rather than from 1 March to 30 June. Given the increase in pandemic influenza experienced in the United States in early autumn, starting the programme here as soon as vaccine arrives (usually mid – late February) will ensure immunity is acquired sooner rather than later. This does run the risk of breakthrough infections later in the season as immunity wanes after about six months.
26. New Zealand has agreed to supply vaccines to the Cook Islands, Niue and Tokelau in an emergency but those countries do not have annual influenza immunisation programmes.

Option One: Status quo with increased uptake

27. Officials are expecting greater uptake of influenza immunisation next year so there are likely to be higher costs without any further action. Under this option the current eligibility criteria remains the same but providers will be asked to focus promotion and delivery mechanisms to increase uptake in younger age groups with pre-existing conditions, particularly among Māori , Pacific and young children.
28. Officials estimate that increasing uptake in 2010 for working age adults by 15% and by 10% for children and people aged 65 and over, would increase the cost of the seasonal influenza programme [REDACTED] This cost increase will be funded from within District Health Board baselines.
29. Maximising immunisation uptake is an expected objective for District Health Boards who also gain the benefits from reduced pandemic related hospitalisations. If there was a similar increase in self-funded vaccination in the general population, preliminary modelling suggests it would also avert two pandemic related deaths and 7% of pandemic related hospitalisations.
30. Officials expect District Health Boards to absorb the increased costs associated with increased uptake. District Health Boards will gain the benefits of decreased hospitalisation rates of these at risk groups but this may not reduce costs overall as the beds are likely to be filled with other patients. Any additional costs to District Health Boards are likely to mean either reprioritisation or potential deficits.

Option Two: Add pregnancy and morbid obesity

31. Pregnant women are at greater risk of serious complications from all influenzas including the pandemic strain. The World Health Organization and New Zealand's Immunisation Technical Forum strongly recommend influenza vaccines for

pregnant women after 14 weeks gestation but this is only subsidised for those with pre-existing conditions. Take up rate in this group is relatively low and is likely to remain low.

32. People with morbid obesity have been shown to be at high risk of severe consequences of pandemic influenza. Most people with morbid obesity are eligible for subsidised influenza immunisation under existing criteria but a small number do not have other pre-existing health conditions.
33. Adding pregnancy and morbid obesity (BMI 40+) to the eligibility criteria for subsidised immunisations would add about 31,000 people to the eligible group [REDACTED] if take up was at the higher expected range (48%). Modelling suggests that it could prevent another pandemic influenza related death, and could reduce pandemic related hospitalisations by another 1%.

Option Three: Children 6 months to five years old enrolled in Access PHOs

34. Pandemic data show that children under five years are more likely to be hospitalised than older people. This is particularly notable in children of Māori and Pacific ethnicity (See Appendix 1 - Table A1). International evidence also shows a high mortality rate in this age group.
35. The annual influenza vaccine is licensed for use in children aged 6 months and older, though children usually need two doses to gain immunity. Take up rate in this age group has historically been very low.
36. Extending subsidies to this group at a take-up rate of 15% is estimated to add 10,000 children to the eligible group [REDACTED]
37. Costs associated with extending eligibility for subsidised immunisation as outlined in Options Two and Three will be funded from within Ministry of Health baselines via HPV immunisation underspend (refer Table 6).

Option Four: All children 6 months to five years

38. Extending subsidies to all children under five, regardless of their health status, would add 274,000 people to the eligible group [REDACTED]. This is not a favoured option at this stage as the majority of these children would be in a relatively low risk category and/or be more able to have their immunisation paid for privately.
39. The Ministry will continue to plan for how best to protect all young children from pandemic influenza.

Option Five: All those enrolled in Access Primary Health Organisations

40. Adding all those enrolled in Access Primary Health Organisations at a take-up rate of 32% would add another 761,000 people to the subsidised group [REDACTED]. It could avert four pandemic related deaths and 11% of pandemic related hospitalisations

41. Access Primary Health Organisations serve populations with a high proportion of Māori and Pacific people and others on lower incomes. Offering subsidised vaccines to people enrolled in these organisations is an administratively straightforward way to target subsidies to people who in general have greater health needs and lower family incomes. In addition, subsidies could be offered to people who are enrolled in the CarePlus programme or hold High-User Health Cards.
42. This option has considerable appeal as it would make seasonal vaccine more readily available to Māori, Pacific people and those in higher deprivation areas. It would reach about 50% of working-age Māori and 40% to 50% of working-age Pacific people, who appear to be at greater risk from pandemic influenza.
43. However, officials consider that on balance, the benefits do not warrant the high financial cost which would detract from other high need health areas. The current eligibility criteria associated with health status already covers those at most risk regardless of ethnicity or deprivation level.

Option Six: Whole population

44. This option offers subsidised vaccinations and delivery to the whole population through primary care. Employers who run workplace occupational health programmes will receive subsidised vaccine but continue to pay the cost of giving the injections. This option was in operation 1 July to 30 September 2009.
45. It could avert around 5 deaths and 14% of hospitalisations.
46. This is not a favoured option because it would subsidise those who already are prepared to pay for immunisation, around 300,000 people in most years, and would also shift significant funding from other more critical health areas. The Immunisation Technical Forum's advice is that a mass immunisation campaign is not warranted by the severity of the current pandemic.

RISKS

Vaccine Safety

47. All medicines have risks. Influenza vaccines are generally safe, with most adverse effects being minor and temporary. They can rarely cause more serious adverse reactions, including life threatening or disabling conditions. The frequency of these conditions combined is approximately 1-10 per million doses administered. The conditions include temporary or permanent paralysis and severe allergic reactions; although most of these are treatable, they can be life threatening.
48. Currently, the health sector relies on spontaneous reports of adverse reactions to monitor the safety of vaccines in adults but this has a number of limitations. A more intensive safety monitoring system was used for the meningococcal immunisation programme to address many of these limitations. The Ministry of Health plans to modify and re-start this system for the influenza immunisation program for 2010.
49. Associated changes to the patient management systems in general practices to record and monitor influenza immunisations [REDACTED] will be funded from within Ministry of Health baselines via HPV immunisation underspend (refer Table 6).

50. Medsafe will also ensure the Ministry, healthcare professionals and the public are well informed of any newly identified risks and any actions being taken to mitigate these risks.
51. In 1976 -1977 the US Government embarked on a mass vaccination campaign in anticipation of an expected 'swine flu 'outbreak. The vaccination programme was stopped prematurely when health authorities noticed increased rates of a temporary paralysing condition Guillain Barré syndrome. The estimates of increased frequency vary, but were approximately nine extra cases per million vaccine recipients. It is still not clear if the immunisation caused the condition or whether it was simply better detection. Vaccines have also improved significantly since then. Ministry of Health officials have looked into the review of that programme to avoid making the same mistakes.

Vaccine Supply

52. If supply of seasonal influenza vaccine is not sufficient for both the publicly funded and privately funded seasonal immunisations then there are several options:
 - a. use the pandemic influenza vaccine that has already been purchased
 - b. purchase some pandemic influenza vaccine from CSL Biotherapies Limited with whom the Ministry already has a supply agreement
 - c. focus on the at risk groups and delay or restrict privately purchased immunisations or remove the subsidies for those over 65.
53. Estimating vaccine requirements is difficult because it depends so much on the pandemic situation and resulting level of awareness and concern among the general public. There is a risk of over- or under- estimating, particularly because vaccines have to be ordered several months in advance and have short expiry dates.
54. If the pandemic resurges and deaths occur, public concern will be high and the demand for vaccine is likely to be significant. This carries a risk of the Ministry having insufficient stocks and/or the manufacturers unable to keep up with demand. Alternatively, if the pandemic does not resurge, and public concern is low, uptake of the seasonal vaccine may follow the usual seasonal pattern and the planned increased uptake may not happen. This would result in surplus vaccine.

61. Since the pandemic vaccine will become the seasonal vaccine, the usual seasonal influenza communications will need to be considerably modified. [REDACTED] This will be funded from within Ministry of Health baselines using the HPV immunisation underspend (refer Table 6).

Table 6: Ministry of Health Costs

\$(million)	2009/10
Extend eligibility to pregnant women and people with morbid obesity	[REDACTED]
Extend eligibility to children 6m – 4yrs in Access practices	[REDACTED]
Enhanced safety monitoring and GP patient recording systems	[REDACTED]
Influenza communication campaign	[REDACTED]
Total	[REDACTED]

62. Communications will include an information and education campaign for the general public as well as communications for employers and the health sector. It will incorporate multi-media advertising and the development of printed and online resources targeting groups most at risk of severe outcomes and priority audiences such as Māori and Pacific communities. The campaign is also likely to include elements to facilitate primary health care services actively targeting and recalling their high risk patient populations.

CONSULTATION

63. This paper has been drafted in consultation with the Treasury and Pharmac.
64. Other Departments which have had an opportunity to comment include: Department of the Prime Minister and Cabinet, New Zealand Customs Service, New Zealand Police, Ministry of Social Development, New Zealand Defence Force, Ministry of Foreign Affairs and Trade, State Services Commission, New Zealand Fire Service, Department of Labour, Ministry of Pacific Island Affairs, and Ministry of Agriculture and Forestry. Their comments have been included.
65. The Pandemic Influenza Advisory Group has commented on vaccine strategy, and the Immunisation Technical Forum will be consulted.

FINANCIAL IMPLICATIONS

66. I expect the estimated costs [REDACTED] will be met within existing Vote Health immunisation baselines. District Health Boards will absorb [REDACTED] and the Ministry of Health will absorb [REDACTED] using HPV immunisation underspend.

HUMAN RIGHTS

67. The immunisation programme will be voluntary, and will include informed consent. It will meet the ethical and legal requirements in the Health and Disabilities Commissioners Act 1994; Code of Health and Disabilities Services Consumers' Rights 1996; and the Privacy Act 1994.

LEGISLATIVE IMPLICATIONS

68. Not applicable.

REGULATORY IMPACT AND BUSINESS COMPLIANCE COST STATEMENT

69. Not applicable.

GENDER IMPLICATIONS

70. Pregnant women have been identified as a group at risk of more severe outcomes for all influenzas and would be offered subsidised immunisation for seasonal influenza in 2010.

DISABILITY PERSPECTIVE

71. There are no specific implications for people with disabilities associated with this paper.

PUBLICITY

72. A detailed communication plan will be prepared before a pandemic and/or seasonal influenza immunisation programme is implemented. This will convey that the programme is not mandatory and the objective is to protect people vulnerable to more severe outcomes and the integrity of the health-system. For an emergency immunisation programme, providers, particularly primary care, will require early warning in preparation for specialised emergency vaccination training.

73. A campaign against pandemic vaccines has already started, so there is an urgent need to communicate immunisation plans. I will invite officials to brief the other parliamentary parties.

RECOMMENDATIONS

74. I recommend that Cabinet:

- a. **Note** that pandemic influenza peaked in July in New Zealand and that one or more further waves of infection are expected, though there is no certainty about the timing, magnitude or severity.
- b. **Note** that the World Health Organization has recommended that the pandemic influenza strain be included in the 2010 influenza vaccine for the southern hemisphere.
- c. **Note** that the Ministry of Health plans to extend the influenza immunisation programme as follows to be funded from within existing Vote Health immunisation baselines.
 - i. Greater uptake of subsidised seasonal influenza immunisation by 10% of the currently eligible population requiring an additional 160,000 doses in 2009/10, but dropping back to more normal levels in outyears [REDACTED] from within District Health Board baselines.

- ii. Extending eligibility for subsidised immunisations to pregnant women and people with morbid obesity, estimated to require 15,000 doses [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
 - iii. Subsidising influenza immunisations for children under 5 who are enrolled in Access Primary Health Organisations, estimated to require 20,000 doses [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
 - iv. Additional safety monitoring [REDACTED] and changes to the patient management systems in general practices to record and monitor influenza immunisations [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
 - v. An influenza communication programme for 2010 to continue promoting hygiene messages and encourage immunisation by both private payers and the at risk group [REDACTED] from within Ministry of Health baselines via HPV immunisation underspend.
- d. **Direct** the Ministry of Health to develop and release publicity for the agreed immunisation programme and to publish information on its website, including this paper and previous 2009 Cabinet papers on pandemic immunisation.
- e. **Note** there are risks from ordering too many or too few vaccines and there may be higher or lower demand than expected, that costs will similarly reflect demand, and that there are options for accessing more vaccines if demand is high.
- f. **Note** that access to the Government contingency option being recommended by Treasury to Cabinet for a response to a further pandemic outbreak remains in place ready to be activated if the pandemic suddenly worsens or if demand for vaccines outstrips supply.
- g. **Note** that I will get back to Cabinet if the contingency option needs to be activated.

Hon Tony Ryall
Minister of Health
Date:

APPENDIX ONE

Table A1: Crude rates¹ of Ethnicity (prioritised) by age of cumulative hospitalised pandemic influenza (H1N1) 09 cases

Age group (years)	Maori	Pacific Peoples	Asian Rates	Other	European Rates
< 1	270.8	761.6	87.1	150.8	43.8
1 to 4	68.7	159.6	47.9	88.3	29.6
5 to 9	25.5	27.6	21.8	0.0	12.1
10 to 14	25.5	48.0	19.0	35.1	9.8
15 to 19	41.0	70.1	9.8	60.4	14.5
20 to 29	55.6	101.1	22.4	75.8	20.8
30 to 39	29.5	71.2	23.5	30.5	9.0
40 to 49	40.5	92.0	16.5	41.4	12.0
50 to 59	58.4	117.2	33.4	0.0	15.7
60 to 69	43.5	82.5	19.9	0.0	8.6
70+	7.7	87.7	33.5	0.0	8.2
Total²	43.0	95.6	24.8	34.4	13.9

¹ Rate per 100,000 population, calculated using 2006 usually resident census population. All cases notified since 01 April 2009

² Total rates are age standardised to the New Zealand population

From ESR Descriptive Epidemiology Update 51.

Table A2: Pre-existing Health Conditions Eligible for Subsidised Seasonal Immunisation

<p>Anyone aged 65 years or over.</p>
<p>Anyone under 65 years of age with the following conditions:</p> <ul style="list-style-type: none"> • Cardiovascular disease — ischaemic heart disease, congestive heart disease, rheumatic heart disease, congenital heart disease, cerebrovascular disease. • Chronic respiratory disease — asthma (if on regular preventive therapy), and other chronic respiratory disease with impaired lung function. • Diabetes. • Chronic renal disease. • Cancer (patient currently has cancer), excluding basal and squamous skin cancer if not invasive. • Other conditions — autoimmune disease, immune suppression, human immunodeficiency virus (HIV), transplant recipients, neuromuscular and central nervous system diseases, haemoglobinopathies and children on long term aspirin.

APPENDIX TWO – COST EFFECTIVENESS

Costs and Benefits of the different options

75. Officials have developed a simple model of the costs and benefits of the planned options for vaccinating against pandemic influenza. The model is calibrated to
- the deaths and hospitalisations recorded by officially notified cases (on ESR's EpiSurv system), assuming that over 80% of the influenza related deaths currently before the coroner were caused by the pandemic virus;
 - 2009 pandemic influenza infection rates implied by surveillance data;
 - 2009 seasonal influenza immunisation rates by age and health status; and
 - vulnerable populations measured in the Ministry of Health's Health Tracker database.
76. The EpiSurv data as used in the model suggests that people with prior health conditions (including pregnancy and obesity) are 3.4 (95%CI: 3.1 – 3.9) times more likely to be hospitalised and 11 (95%CI: 5 - 23) times more likely to die from the pandemic virus than are 'healthy' people. The effects vary by age, with young unhealthy children being even more likely to be hospitalised, but most deaths occurring in adults between 15 – 64 years of age.
77. The model estimates the number of deaths and hospitalisations that might be averted in 2010 if immunisation is delivered before the next wave of the pandemic. It underestimates the benefits, and therefore the cost-effectiveness of immunisation, as it does not include a number of effects such as:
- reduced incidence and severity of pandemic influenza in people who do not need hospitalisation;
 - reduced incidence of non-pandemic influenzas;
 - prevention of detrimental effects on other health conditions (for example when health services may be overwhelmed and unable to treat all patients); and
 - benefits to quality of life and economic productivity
 - all averted costs for the health system that might be saved
- Actual cost-effectiveness ratios are therefore likely to be lower than those presented below.
78. In the base case, we assume that 10% of the population was infected during 2009, and half of people over 65 have immunity from exposure before the year 1957. The model also assumes that the next wave of the pandemic will be like the previous one in terms of its infection rate and its severity, and that the vaccine prevents infection in 75% of people who receive it.

Sensitivity analysis

79. The incremental cost of each saved fully-discounted life year saved is about \$70,000 in Option Two.
80. If infection rates are higher in the next pandemic wave, the cost-effectiveness ratios will be lower (better value for money).

81. The cost-effectiveness ratios are particularly sensitive to assumptions about the proportion of the population that have already been exposed to the virus (and therefore probably immune), and the likely infection rate in the future. These affect the cost-effectiveness in opposite directions.
82. The baseline assumption is that 10% of the population has already been exposed to (infected with) the pandemic influenza virus. If in fact this number is higher, then more people will already be immune and there is less capacity to benefit from immunisation. This would make the cost-effectiveness ratios bigger – ie. more dollars are required to save one year of life, which gives less value for money.
83. The estimate that 10% of the population has been infected already is taken from a peer-reviewed publication by researchers at the Wellington School of Medicine¹. If current population exposure has in fact been around 20%, the incremental cost-effectiveness of offering subsidised vaccine would rise from around \$70,000 per life year saved (for option 2) to around \$95,000 per life year saved.
84. If there is a greater level of influenza activity in the second wave (bigger wave, with higher infection rate), then cost-effectiveness ratios will fall – ie. the immunisation options give better value for money. For example, if infection rates are double in the next wave, the incremental cost-effectiveness of offering subsidised vaccine would fall from around \$70,000 per life year saved (for option 2) to below \$40,000 per life year saved.

Quality-adjusted life years (QALYs)

85. An estimate of quality-adjusted life years saved could be lower. Firstly, the figure counts only deaths averted. No impact on quality of life is assigned to hospitalisations or ICU stays averted. Secondly, benefits from reduced infections from other strains of influenza are left out entirely.
86. To convert the results to cost per QALY, officials applied Dutch Burden of Disease weights to the 30,000 milder cases of pandemic influenza that might be prevented by increased use of the vaccine, and to hospitalisations and ICU stays due to pandemic H1N1 2009 infections.
87. Using these weights, the model indicates that the figure of \$70,000 per life year saved for extending vaccination eligibility to pregnant women and the morbidly obese would be equivalent to \$9,000 per QALY gained for vaccination against the pandemic influenza strain only. This is within the range of pharmaceutical investments made by Pharmac in recent years. Offering vaccination to the whole population might cost \$26,000 per QALY, which is still reasonable compared to many alternative uses of health funds.

¹ Baker, Wilson et al (2009). Pandemic influenza A(H1N1)v in New Zealand: the experience from April to August 2009. *Eurosurveillance* 2009 Aug 27;14(34).