From the BBC website (9/25/09) comes the following report:

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An experimental HIV vaccine has for the first time cut the risk of infection, researchers say. The vaccine - a combination of two earlier experimental vaccines - was given to 16,000 people in Thailand, in the largest ever such vaccine trial. Researchers found that it reduced by nearly a third the risk of contracting HIV, the virus that leads to Aids. It has been hailed as a significant, scientific breakthrough, but a global vaccine is still some way off. The study was carried out by the US army and the Thai government over seven years on volunteers - all HIV-negative men and women aged between 18 and 30 - in parts of Thailand.

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Half of the volunteers were given the vaccine, while the other half were given a placebo - and all were given counselling on HIV/Aids prevention. Participants were tested for HIV infection every six months for three years.

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Question 1: This study is what is called a Phase III Clinical Trial, but in terms of what you have learned in MA 2611, what kind of study is this?

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Answer: A controlled experiment.

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The data are:

Group	Infected	Uninfected	Total
Placebo	74	8124	8198
Vaccine	51	8146	8197

$\approx$

Question 2: How would you analyze these data using the estimation techniques you've learned in MA 2611?

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Let's use the 5-step method:

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1. **The Scientific Goal:** Determine if the vaccine is effective.
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   More specifically, since we are trying to see if the vaccine is effective, we would like to estimate their difference, $p_p - p_v$.

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As the interval estimate, let's construct a 95% confidence interval for $p_p - p_v$.

Note that we could use the large sample interval, since the numbers of HIV cases and non-cases are large in both groups, but I will construct an approximate score confidence interval, since it works for both large and small samples and is what I have asked you to use for all your MA 2611 work.

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For the confidence interval, we compute (recalling that $z_{0.975} = 1.96$),

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$$\tilde{p}_v = (51 + 0.25 \times 1.96^2)/\tilde{n}_v = 0.00634,$$

And the CI is

$$\tilde{p}_p - \tilde{p}_v \pm z_{0.975}\sqrt{\frac{\tilde{p}_p(1-\tilde{p}_p)}{\tilde{n}_p} + \frac{\tilde{p}_v(1-\tilde{p}_v)}{\tilde{n}_v}}$$

$$= 0.00914 - 0.00634$$

$$\pm 1.96\sqrt{\frac{0.00914(1-0.00914)}{8199.92} + \frac{0.00634(1-0.00634)}{8198.92}}$$

$$= (0.00012, 0.00548)$$

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   This means the vaccine could potentially prevent the infection of between $1 \times 10^9 \times 0.00012 = 120,000$ and $1 \times 10^9 \times 0.00549 = 5,490,000$ individuals over a seven year span.

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This means the vaccine could potentially prevent the infection of between $1 \times 10^9 \times 0.00012 = 120,000$ and $1 \times 10^9 \times 0.00549 = 5,490,000$ individuals over a seven year span.

That would be quite an achievement.

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