CaseDrill

VIRAL OUTBREAK

Strategy
Public Sector

Medium difficulty
Interviewer-led case

This case investigates how an organization responsible for public health can prevent a virus outbreak in Country A.

It tests all areas of the scorecard and is particularly challenging to structure.

Problem definition

The World Health Organization has discovered a new strain of an airborne virus and warned that it can lead to an epidemic if countries are not prepared for it.

The Health Commission of the country A is very concerned about this news. The country has suffered a number of epidemics that have proven very damaging in the past. The organization has approached your team to help them prevent another outbreak from happening in the country.

You were hired to help the Health Commission to prevent the viral outbreak from happening.

Question 1 (Structuring)

How would you structure the problem?

Additional information

If asked, share the definition of an outbreak: a situation when the rate of infection is more than 15 cases per 100,000 people for two consecutive weeks

Possible answer

1. *Prevention*
   a. *Awareness about prevention methods and danger*
   b. *Accessibility of a vaccine (e.g., available, affordable)*
   c. *Accessibility of other prevention items (e.g. surgical masks)*
   d. *Plans to slow down spreading (e.g., home confinement, quarantines, travel bans)*

2. *Diagnosis*
   a. *Does a test exist?*
   b. *Is the test accessible? (e.g., available, affordable)*
   c. *Is there sufficient testing capacity?*
   d. *Can these tests be done fast enough to avoid spreading?*

3. *Treatment*
   a. *Does a treatment exist?*
   b. *Is the treatment accessible? (e.g., available, affordable)*
   c. *Is there sufficient treatment capacity?*

Question 2 (Judgement & Insights)

The client has shared these exhibits with information about infection rates and hospitalized viral patients for a typical flu (share Exhibits 1 and 2). Flu is a good proxy for projecting the potential infection rate of the new strain of airborne virus.

What can you conclude from this information?

Possible answer

- *We are experiencing higher infection rates compared to most our neighbors – there is a lot of room to improve the infection rates in our country*
- *Countries B and C are better able to manage the spreading of the flu virus – we should look at whether there are some best practices we can learn from*
- *There are specific groups that are more vulnerable and should be paid more attention in prevention (e.g. children without pre-existing conditions and seniors with pre-existing conditions)*
- *It would be interesting to see the distribution of number of hospitalized patients by age group, to see if certain age groups are more prone to hospitalization than others*

Exhibit 1: Comparative Total Infection Rates Du

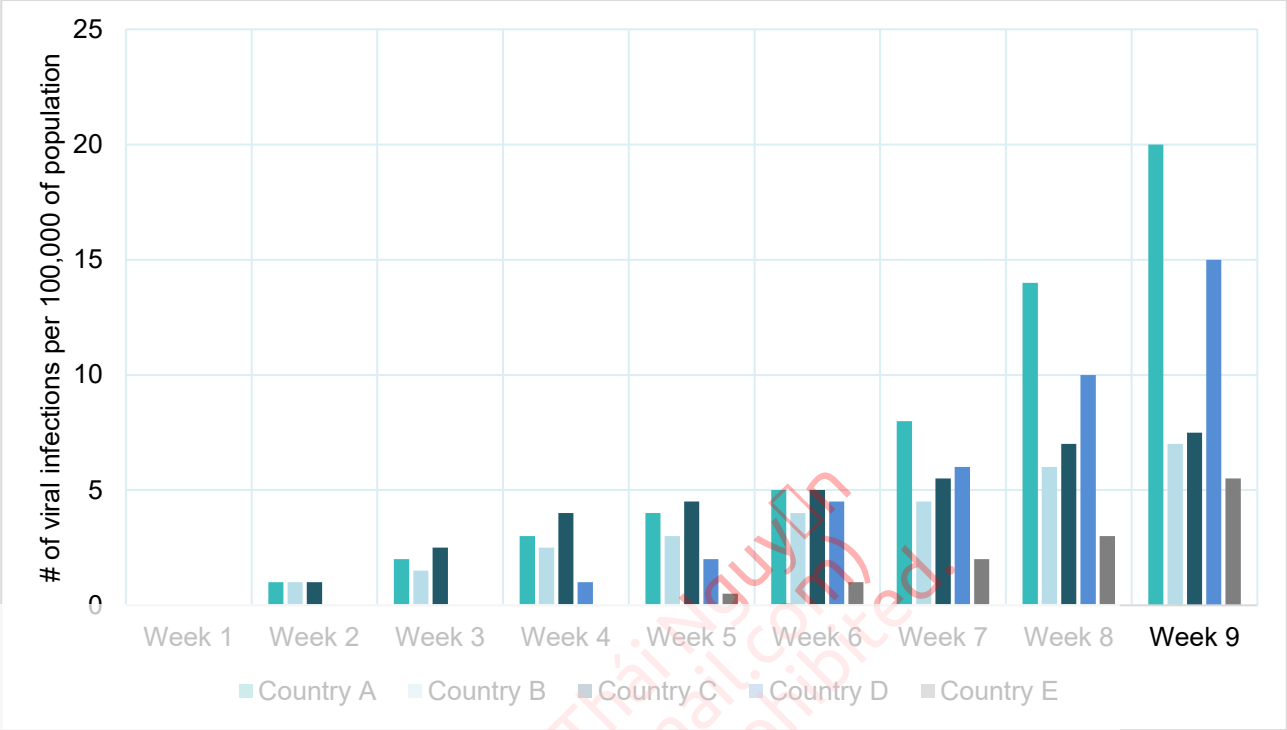
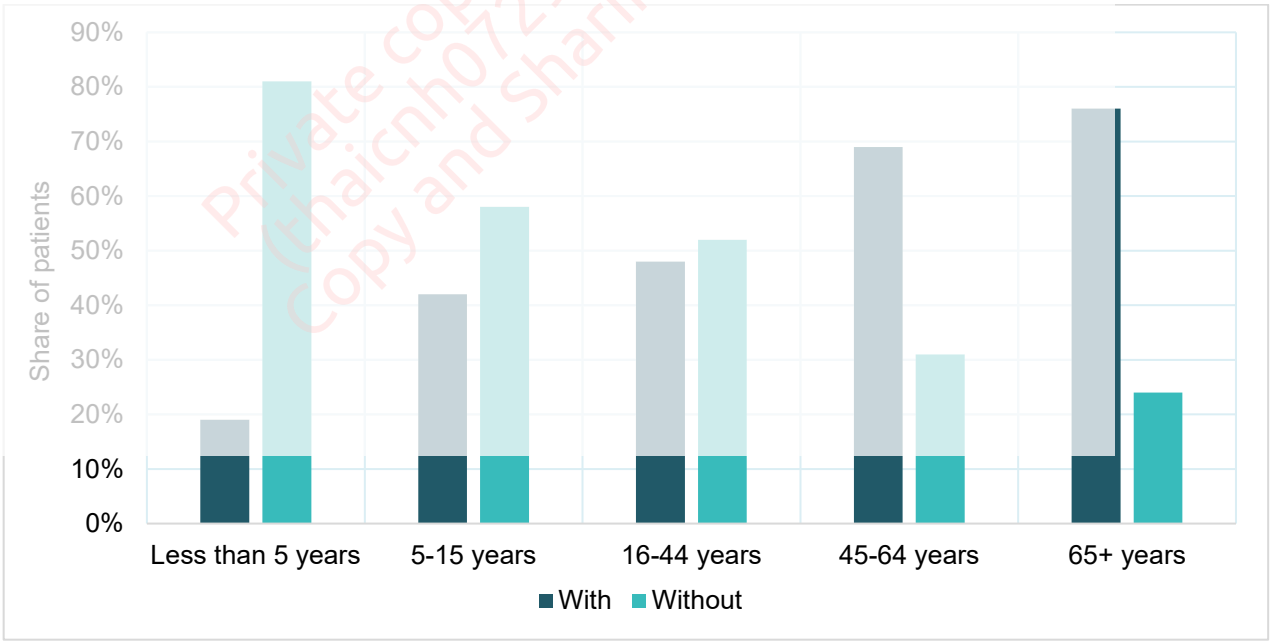


Exhibit 2: Hospitalized Flu Patients by Age – With and Without Pre-Existing[1] Conditions



1. A pre-existing condition is any condition where a person's immune system is weakened or compromised in any way

Question 3 (Numeracy)

One of the major drug companies has just released a new vaccine that can be taken as a pill rather than an injection. The Health Commission thinks that with this new vaccine they can cover 90% of the population, as compared to 60% with the injections. While easier to administer, the new vaccine is not as effective at preventing the infection – it's only effective in 99.95% of the cases (i.e., the chance of getting infected is 0.05%), compared to 99.99% with the injection. Without a vaccine, the chances of getting infected are 10%.

The Health Commission is wondering whether they should go ahead with the new vaccine?

Additional information

If needed share

- The population of the country is 500m

Possible answer

A decision of whether the client should go ahead with the new vaccine depends on the number of infected people after the use of the injection vs. pill vaccines

Injection

Infection rate
*= % population vaccinated * infection rate for vaccinated individuals + % population not vaccinated * infection rate for not vaccinated individuals*
*= 60% * 0.01% + 40% * 10%*
= 0.006% + 4%
= 4.006%

Pill

Infection rate
*= 90% * 0.05% + 10% * 10%*
= 0.045% + 1%
= 1.045%

Reduction in # of infected people
*= (Infection rate with pill - Infection rate with injection) * population*
*= (1% - 4%) * 500m*
*= -3% * 500m*
= -15m

Thus, almost 15m fewer people would get infected if the pill were used vs. the injection.

As next steps, we suggest confirming that we can make the pill accessible to the population and working on further ways to reduce the number of infected people.

Question 4 (Numeracy)

The Health Commission is really excited about the reduction in infections that they would see with the pill but is concerned about whether they would be able to afford it. The injections cost $0.10 to purchase and administer, and the pills are going to cost $0.25 to purchase and administer. At the same time, the Health Commission is expecting a change in hospital admittance numbers. From the people who are infected, 0.5% are expected to be hospitalized and each patient costs the system $1000.

What is going to be the difference in costs between the two methods?

Possible answer

	Pill	*Injection*
*Vaccination cost = Cost per vaccine * Population vaccinated*	*= $0.25 * 500m * 90% = $112.5m*	*= $0.10 * 500m * 60% = $30m*
*Hospitalization cost = Population infected * Hospitalization rate * Cost per hospitalization*	*= 1% * 500m * 0.5% * $1,000 = $25m*	*= 4% * 500m * 0.5% * $1,000 = $100m*
Total	*= $137.5m*	*= $130m*

Thus, the cost of opting for the pill method is going to be ~$7.5m greater than the injection method, including hospitalization savings.

This small increase in cost is easily justified by the dramatic decrease in the number of infected individuals. In addition, our analysis does not take into account positive ripple effects of the reduction in infections (e.g., lost labor and tax receipts).

Question 5 (Creativity)

The Health Commission Director is encouraged by all the findings so far. The focus has been on reducing infections internally, but now he is also concerned about the virus coming in from abroad.

What are the different ways the virus can enter the country, and in which areas would the Health Commission need to increase its monitoring?

Possible answer

We suggest focusing on the country's entry points:

Identify potentially sick individuals

- *Test (e.g., temperature)*
- *Questions (e.g., symptoms, areas visited, sick family members)*
- *Country of origin*

Handle potentially sick individuals

- *Refuse entry*
- *Quarantine*
- *Raise awareness about prevention and potential symptoms*

Question 6 (Synthesis)

The Health Commission Director is on his way to meet the Health Minister and wants to have a quick update on the findings before going to the meeting

Possible answer

You have asked us to identify how to prevent the viral outbreak.

Based on the current findings we recommend switching to the new pill vaccine, which would reduce the number of infected people by 15m. The cost of opting for this method is going to be $7.5m greater than the injection method, including hospitalization savings.

To further prevent virus outbreak, we suggest monitoring the country's entry points to identify potentially sick individuals and prevent them from spreading the virus.

As next steps, we suggest to:

- *Identify prevention methods beyond vaccines*
- *Check if we have the right testing capabilities*
- *Identify treatment options*
- *Learn best practices from countries B and C*