



PANDEMIC HEALTH IMPACT PROJECTION TOOL (USER GUIDE AND EXCEL WORKBOOK)



PREPAREDNESS



RESPONSE

Before the pandemic, this tool will help you to:

- Estimate the number of influenza cases and deaths your municipality will experience
- Identify the peak pandemic period
- Plan for different pandemic severity scenarios

During the pandemic, this tool will help you to:

- Secure information to help you make decisions about the best use of scarce healthcare resources (once you have more up-to-date, accurate information about the pandemic illness)

Who will implement this tool:

- The mayor and the *municipal leadership team*
- Hospitals and healthcare providers
- Those already in charge of disaster triage planning and protocols
- Community healthcare organizations and volunteers
- Employers

WHAT YOU SHOULD KNOW BEFORE USING THIS TOOL

The Pandemic Health Impact Projection Tool (IPT) will not tell you exactly how many people will get sick or how many will die in your municipality. No one can accurately predict the impact because it takes time to understand the characteristics of a new virus, and viruses can change while a pandemic is underway. The tool simply calculates estimates of what you can expect, but these may change as more information becomes available. The estimates are based on the best available understanding of viruses and past pandemics.

NOTE: This User Guide provides instructions for using the Pandemic Health Impact Projection Excel Tool. For the Excel tool, please refer to the companion CD-ROM of this Toolkit.

HOW TO USE THIS TOOL

I. ENABLE MACROS

You need to enable macros to use this Excel tool. When you first open the tool, your computer should prompt you to “enable macros.” The tool will not function properly until you have done this. Each version of Excel is a little different, but there will be a setting to enable macros. If you have difficulty in using this Excel tool, please check your security settings or access the help function on your computer.

2. ENTER YOUR DATA ON THE HOME PAGE

After clicking one of the buttons to begin working in the Excel tool, you will see a home screen like the one shown on the following page of this toolkit, with some sample information already placed in the top three boxes. You will replace this sample information with your own data.

The only data you need to generate the impact projections is the number of people in the population that you are looking at.

The population can be any size, large or small, such as a single municipality, a district, the entire country, or a subset of a population (such as the number of children in a village or the number of workers in a business).

Impact Projection: The estimated number of deaths and seriously ill persons who will require care.

Type the population name in the first box.

Type the population size or estimate it in the second box. You must have a population size in order to be able to use this tool. If you do not know the size of your population, you can estimate it. Also, you can use the population size of a similar municipality or the population size of a district that represents a fraction of your country's population.

IPT 2.2

Pandemic Health Impact Projection Tool

Step 1: Enter Target Population Name

Step 2: Enter Population Size

Step 3: Select Pandemic Severity Category

Step 4: Click to View Impact Projections

Step 5: Click Here to View Additional Graphics and Information

La Paloma

50,000

Category 5

View Projections

[Graphic 1: Comparison of the Number of Cases by Level of Care for the Total Duration of the Pandemic and for the Peak Week](#)

[Graphic 2: Weekly Number of Cases](#)

[Graphic 3: Weekly Number of Deaths](#)

[Graphic 4: All Cases by Level of Care](#)

[Graphic 5: Peak Cases by Level of Care](#)

[Graphic 6: Percent of Cases in Each Level of Care](#)

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3. SELECT A PANDEMIC SEVERITY CATEGORY

Hold your cursor over the third box. A drop-down menu will appear with five choices of pandemic severity. Please select a category from the drop-down menu.

What is a pandemic severity category?

Not all pandemics are the same. They can vary, like hurricanes and other disasters, from mild to severe. The 1918 pandemic is considered by the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention (CDC) to be the most severe form of a pandemic that we need to plan for. In this tool, pandemics are graded from Category 1 (the mildest form) to Category 5 (the most severe, like 1918) based on the percentage of sick people who are expected to die from the illness, or the case fatality ratio (see “Case Fatality Ratios by Pandemic Severity Category” on page 5 for more details). For information on additional determinants of severity, see http://www.who.int/csr/disease/swineflu/frequently_asked_questions/levels_pandemic_alert/en/index.html.

How do I know which category to select?

For planning purposes, the recommendation is to plan for the worst: a Category 5 pandemic. Nonetheless, it is a good idea to look at the projections for the other categories as well, in order to get a sense of the range of possible impacts that a pandemic could have on your municipality.

4. VIEW RESULTS

Simply click on the gray button “View Projections” or select from a series of additional graphics. The graphics may be viewed separately or all together. You can view the results in any order, and you can move back and forth between the pages by using the “Home,” “Previous Page,” or “Next Page” buttons.

ILLUSTRATION OF STEPS TO ENTER INFORMATION AND GET RESULTS

The screenshot shows the 'IPT 2.2 Pandemic Health Impact Projection Tool' interface. It includes a list of steps on the left and a form on the right. Blue arrows point from numbered boxes to specific parts of the interface: Step 1 points to the 'Location' field (containing 'La Palma'), Step 2 points to the 'Population Size' field (containing '50,000'), Step 3 points to the 'Pandemic Severity' dropdown (showing 'Category 5'), and Step 4 points to the 'View Projections' button. Below the form, a list of links is visible, with an arrow pointing to the 'All Graphics' link.

IPT 2.2
Pandemic Health Impact Projection Tool

Step 1: Enter Target Population Name

Step 2: Enter Population Size

Step 3: Select Pandemic Severity Category

Step 4: Click to View Impact Projections

Step 5: Click Here to View Additional Graphics and Information

[Graphic 1: Comparison of the Number of Cases by Level of Care for the Total Duration of the Pandemic and for the Peak Week](#)

[Graphic 2: Weekly Number of Cases](#)

[Graphic 3: Weekly Number of Deaths](#)

[Graphic 4: All Cases by Level of Care](#)

[Graphic 5: Peak Cases by Level of Care](#)

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Step 1: Enter name of population here

Step 2: Put population size or estimate here

Step 3: Select a pandemic severity category from the drop down list

Step 4: Click on any of these options

NAVIGATING THROUGH THE PAGES

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Comparison of Wave and Peak Numbers for La Paloma, Category 3

La Paloma	50,000	
Severity	Category 3	
Cases	Entire Wave	Peak
Level 1 Care	3,750	750
Level 2 Care	3,750	750
Level 3 Care	4,500	900
Level 4 Care	750	150
Total	15,000	3,000
Total # Deaths	488	98

Use the Home button on each page to return to the main page, or the “Previous Page” or “Next Page” button to see additional graphics. There is also a button for the User Guide on each page.

5. UNDERSTANDING THE PROJECTIONS

Assumptions

While users may determine the population size and the category level, some assumptions are constant for all projections. These assumptions are:

1. **Attack rate.** For example, “30% attack rate.” This means that 30% of the population (30 out of every 100 people) will get the illness.
2. **Duration.** These projections are only for the first pandemic wave. While no one can say how long the first wave will last, experts suggest that a duration of 6 to 12 weeks is realistic; this tool assumes an 8 week duration. It is likely that one to two additional waves will occur, but they will probably have a different impact, since there will be partial immunity to the virus, and a vaccine may be available by then.

CLICK ON THE GRAY BOX ON THE HOME PAGE CALLED “VIEW PROJECTIONS”

Let’s look at an example of the table of projections that the tool will generate.

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PANDEMIC IMPACT PROJECTIONS		
Assumptions: Resource Poor Country or Highly Vulnerable Population 30% Attack Rate, 8 Week Duration		
La Paloma		
Population Size	50,000	
Category	Category 3	
Cases (total #)	15,000	
# of Cases by Level of Care *		
	Level 1 Care	6,000
	Level 2 Care	3,750
	Level 3 Care	4,500
	Level 4 Care	750
Case Fatality Ratio	3.25%	
# Deaths	488	
Peak week cases	3,000	
Peak week deaths	98	
*see link to definitions of the levels of care on the main page		

CASES

The total number of cases is provided as well as the number of cases expected for each of the four levels of healthcare, according to the size of the population and the severity category. If you change the population size or the category, you will see the numbers change.

LEVELS OF HEALTHCARE

Just as all pandemics are not the same, all cases of the influenza in a pandemic are not the same. There are four levels of healthcare, ranging from mild to severe, depending on the severity of the illness. Many pandemic influenza cases probably will be very mild, similar to a seasonal influenza case (Level 1). These people will be able to care for themselves at home and return to work or other activities within one to two weeks. Others will have a very severe form of the illness and may die despite intensive care (Level 4). Following are detailed definitions of the four levels of care:

Level 1: Unassisted Home Care

The Level 1 cases are the mildest cases, and most are expected to recover at home without complications. Level 1 includes both self care and care by a family member or other available caregiver. These cases do not require outside assistance.

Level 2: Assisted Home Care

Level 2 cases are uncomplicated cases that need the assistance of community resources (such as a trained community health worker) for their influenza or for other coexisting illnesses (such as TB or malaria). The most urgent needs of people falling in Level 2 of care probably will be oral hydration (taking liquids by mouth), and the continuation of pharmaceuticals (drugs) or of other treatments for coexisting illnesses. People who require significant assistance with the activities of daily living (such as bathing, doing errands, cleaning, cooking, and securing food) also fit into this level of care.

Level 3: Skilled Clinical Care Needed

Level 3 cases require care of moderate intensity on a daily basis. People who fall within this level may be cared for at home or at an alternate healthcare site in the community. Examples of skilled care include intravenous hydration, intravenous antibiotics, and respiratory treatments.

Level 4: Highest Available Level of Care Needed

These are the most severe cases, and they should be treated in a hospital if one is available. However, in areas with limited resources, these cases are not likely to survive even with the highest available level of care, and may be assigned to *comfort care* rather than provided with skilled health care resources. Policies for Level 4 care should be included in the municipal plan for *triage*. (See Tool 5, *Triage: Prioritizing Care to Reduce Deaths*).

CASE FATALITY RATIOS AND NUMBER OF DEATHS

The Pandemic Impact Projections table shows the total number of deaths expected according to the expected case fatality ratio in each severity category. Note that the case fatality ratio is different from a *mortality rate*: While the mortality rate is the percentage of the *total* population who dies from the illness, the case fatality ratio is the proportion of deaths *among the cases*. *For example, a 2% case fatality ratio means that 2% of all the people who get the illness will die from it. Using our assumption of a 30% attack rate, in a population of 100,000, there will be 30,000 cases. A 2% case fatality ratio would mean that 600 people will die from the illness. (The mortality rate for the entire population would be 0.6 %).*

This tool has been developed to assist resource-poor countries in their planning. The estimates for deaths used are higher than those projected for resource rich countries. Not every country or every local area within a country will experience the same rate of deaths. In fact, there are likely to be very different rates depending on how vulnerable a population is.

For example, a rural area that can grow its own food and is largely self-sufficient will likely experience fewer deaths than an urban, densely crowded and poor area that depends on outside assistance for food, water, and other basic goods.

Municipalities should view all the estimates generated by this tool in the context of their own situation and resources. Some areas may view the projected deaths as a minimum number expected, and others as a maximum number. Others will fall in between. Again, these estimates are only that—estimates—and should be used only as guidance in preparing your municipality. Once specific information is known about a virus, the estimates should be updated with that information. Information on how to generate estimates on your own, without using the tool, is provided at the end of this user guide.

Case fatality ratio: the proportion of people who get the illness (cases) and who die from it.

Mortality rate: the percentage of the total population who dies from the illness.

Case: person who gets sick from the illness

There is a link to the definitions of the Levels of Care on the Home Page of the tool.

The case fatality ratios used in the tool are shown in the table below:

CASE FATALITY RATIO (CFR) BY PANDEMIC SEVERITY CATEGORY

Category	CFR
1	0.6%
2	1.23%
3	3.25%
4	7.00%
5	9.10%

TOTAL WAVE VS. PEAK WEEK CASES/DEATHS

The impact of the pandemic will follow a bell-shaped curve (as shown in the charts below), with the greatest impact at the peak of the curve, usually around the fourth or fifth week (if one assumes a wave duration of eight weeks). The peak week is when the highest number of cases and deaths are likely to occur and all resources will be most severely overwhelmed. This is when the greatest number of workers—including doctors and nurses—will be absent from work, and it is also the time of the greatest need for healthcare.

While understanding the total impact of the first wave of the pandemic is important for overall planning purposes, knowing what to expect at the peak of the impact allows municipalities to plan for the maximum resources that may be needed at one time. Thus, planners and responders should set the peak week as their planning goal. This response, extended on either side of the peak, should provide for effective planning.

Note: It is very important to always be clear about whether you are using total wave or peak numbers.

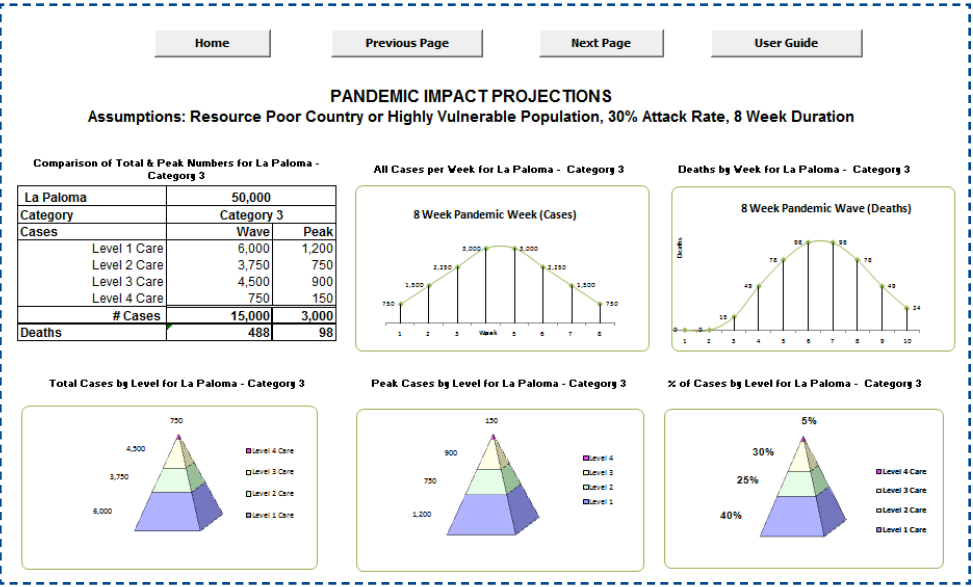
Click on the links for the graphics to see another table and several charts that compare the projections for the total number of cases during the entire pandemic wave and during the peak week.

Peak week: The worst week of a pandemic wave, when the greatest number of deaths will occur, usually around the fourth or fifth week of an eight-week wave.

CLICK ON ANY OF THE LINKS CALLED “GRAPHICS”

Let’s see what happens when you click on “All Graphics.” The information you already entered is used to generate these charts—there is no need to do anything else to get these charts.

For easier viewing, each of these charts also can be selected separately.



Graphic 1: The first graphic is a table comparing the *total and peak week cases and deaths*.

Graphics 2 and 3: These charts show the *week-by-week distribution of the cases and deaths across the pandemic wave*.

How to use this information: This information helps to demonstrate the importance of allocating resources across the duration of the wave. If resources, both human and other, are used up too early in the pandemic, this will result in higher **morbidity rates** and mortality rates later on.

Graphics 4 and 5: These charts show the numbers of *total and peak week cases for each level of care*.

How to use this information: Each level of care is dependent on the others—if the cases in Level 2 are not well cared for, some will become Level 3 cases, and so on. These charts highlight the importance of targeting healthcare resources to the cases that can be saved with available care. The goal is to maximize the number of cases at the base of the pyramid and minimize the number at the top of the pyramid.

Graphic 6: The final chart shows the *percentage of cases that are expected to fall into the four levels of care*. While the percentages change according to the pandemic severity category, they are the same for the total number of cases and the peak week number of cases. See Tool 5, *Triage: Prioritizing Care to Reduce Deaths* for more detailed information on how these projections can help you to use your resources to reduce deaths.

WHAT TO DO IF YOU DO CANNOT USE THE EXCEL TOOL

You can perform all the functions of the Excel tool with just a calculator and paper. In the previous examples we used the hypothetical population of La Paloma with a population of 50,000. For each step, the calculator method will be demonstrated.

To calculate the **number of cases** expected, multiply the total populations by the attack rate of .30. **Note:** The projected attack rate for a very mild pandemic, Category 1, is 15%. The attack rate for all other categories (2–5), is 30%.

Example: 50,000 X .30 = 15,000

To calculate the **number of deaths** expected, multiply the number of cases by the case fatality ratio (CFR) assigned to the severity category (see CFR table below). In this case, we have been projecting impacts for a Category 3 pandemic. Therefore, the calculation is 15,000 X .0325 = 488

CASE FATALITY RATIO (CFR) BY PANDEMIC SEVERITY CATEGORY

Category	CFR
1	0.006
2	.0123
3	.0325
4	.07

To calculate the **number of cases in each level of care**, multiply the number of cases by the percentage expected in each level for each severity category (see Level of Care by Pandemic Severity table below).

	Levels of Care by Pandemic Severity				
	1	2	3	4	5
LEVEL 1	.50	.45	.40	.32	.25
LEVEL 2	.25	.25	.25	.23	.25
LEVEL 3	.24	.28	.30	.34	.36
LEVEL 4	.01	.02	.05	.11	.14

Examples:

- The number of cases in La Paloma in Level 2 care in a Category 3 pandemic would be 15,000 X .30 = 4,500.
- The number of cases in La Paloma in Level 4 care in a Category 2 pandemic would be 15,000 X .02 = 300.
- The number of cases in La Paloma in Level 4 care in a Category 5 pandemic would be 15,000 X .14 = 2,100.

To calculate the cases and deaths per week, multiply the number of cases (population x attack rate – see the first example above) x the number expected in each week as follows:

Week	Percent of Cases and Deaths by Week for an 8 Week Wave									
	1	2	3	4	5	6	7	8	9	10
Cases	.05	.1	.15	.2	.2	.15	.1	.05	0	0
Deaths	0	0	.03	.1	.16	.2	.2	.16	.1	.05

Examples:

- The number of cases expected in La Paloma week 5 in a Category 3 pandemic would be 15,000 X .2 = 3,000
- The number of cases in Level 2 (see previous example) expected in La Paloma week 5 in a Category 3 pandemic would be 4,500 X .2 = 3,000
- The number of deaths expected in La Paloma in week 8 of a Category 3 pandemic would be 488 X .16 = 78.

Using these formulas, you can generate all the projections and create pyramids of care.

DISCLAIMER

This tool is an adaptation of the planning tool FluSurge 2.0, created by the U.S. Centers for Disease Control and Prevention (CDC). While FluSurge generates important pandemic planning information for developed countries, such as numbers of intensive care unit beds and mechanical ventilators needed, this tool has been created to assist municipalities in developing countries to most effectively utilize the resources they have.

The case fatality ratio for resource-poor and highly vulnerable populations, the levels of care, and the percent allocation of cases to the four levels of care used in this tool are based on CDC assumptions for attack rate, case fatality ratio, and hospitalization rate. However, they have been adapted for use in developing countries, urban areas, and other populations that carry greater risk from a pandemic. They are based on the expectation that urban and/or chronically poor populations with high rates of debilitating endemic disease, inadequate healthcare, and food insecurity will experience a greater impact. These are purely theoretical constructs, and while they have undergone review by technical experts, they have not been scientifically validated. Planners are advised to consider the impact projections generated through this tool as guidance for planning until further information or validated assumptions for these populations are identified.

SOURCES

- CDC (U.S. Centers for Disease Control and Prevention). 2009. CDC FluSurge 2.0. www.cdc.gov/flu/tools/flusurge/
- WHO (World Health Organization). 2009. Pandemic influenza preparedness and response: a WHO guidance document.
- WHO (World Health Organization). 2008. Pandemic influenza prevention and mitigation in low resource communities