

Senior High School

Department of Education
National Capital Region

**SCHOOLS DIVISION OFFICE
MARIKINA CITY**

Disaster Readiness and Risk Reduction

First Quarter-Module 7

Hazard, Exposure, Vulnerability, and Disaster Risk

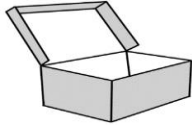


Maybele L. Roa



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What I Need to Know

This module was designed and written with you in mind. It is here to help you master the vulnerability of different sectors and elements. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course.

The module has one lesson which is hazard, exposure, vulnerability, and disaster risk.

After going through this module, you are expected to **demonstrate understanding of various elements that may be exposed to hazards. DRR11/12-Id-13**

Specifically, students should be able to

1. differentiate among hazards, exposure, and vulnerabilities; and
2. explain the relationship of the three to disaster risk.



What I Know

Read each statement carefully. Then, encircle the letter of the correct answer.

1. Which of the following statements is **TRUE** about hazard?
 - A. It is a series of events that can cause harm or danger.
 - B. It is a sudden event that causes more damage to human life and property.
 - C. It is a situation or chance involving exposure to danger, harm or loss of lives.
 - D. It is a condition determined by several factors that increase a person, community or system's weakness.
2. Which of the following is an example of hazard that can turn into disaster?
 - A. Rusting iron in the corner
 - B. Insecticides under the sink
 - C. Slippery floors in a cemented corridor
 - D. Dripping water from the roof during rainy days



3. Which of the following is **NOT** likely to happen if household chemicals like insecticides are not stored safely?
 - A. Fire
 - B. Cuts
 - C. Explosion
 - D. Poisoning

4. Which of the following disasters **DOES NOT** resulted from illegal cutting of trees in the mountains?
 - A. Earthquake
 - B. Flooding
 - C. Landslide
 - D. Sink hole

5. Which of the statements below is **TRUE** about vulnerability?
 - A. It is a series of events that can cause harm or danger.
 - B. It is a sudden event that causes more damage to human life and property.
 - C. It is a situation or chance involving exposure to danger, harm or loss of lives.
 - D. It is a condition determined by several factors that increase a person, community or system's weakness.

6. To what kind of danger are children with parents that are cook or chef are exposed to?
 - A. Falls from slippery floors
 - B. Poisoning from chemicals
 - C. Cuts from pointed objects
 - D. Drowning from excess water

7. All of the following disasters may result from exposed electrical wires at home **EXCEPT** for what?
 - A. Fire
 - B. Burn
 - C. Explosion
 - D. Poisoning

8. Which of the following statements is **TRUE** about exposure?
 - A. It is a series of events that can cause harm or danger.
 - B. It is a sudden event that causes more damage to human life and property.
 - C. It is a condition determined by several factors that increase a person, community or system's weakness.
 - D. It refers to situation of a people, infrastructure, and other elements found in hazard-prone areas.

9. Which of the following statements best describe disaster?
 - A. It is a series of events that can cause harm or danger.
 - B. It is a sudden event that causes more damage to human life and property.
 - C. It is a condition determined by several factors that increase a person, community or systems weakness.
 - D. It refers to situation of a people, infrastructure, and other elements found in hazard-prone areas.



10. Coronavirus disease (COVID-19) is a contagious disease caused by a newly discovered coronavirus. It spreads through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. What kind of hazard does COVID-19 manifest before it becomes a pandemic?
- A. Physical hazard
B. Chemical hazard
C. Biological hazard
D. Environmental hazard
11. Mac's dad, Alfredo, just turned 85 years old and he is staying with Mac's family. Alfredo is weak and cannot stand or walk steadily on his feet. Mac see to it that his home is safe for his father. Mac bought new rubberized mats for his father's bathroom and makes sure that there are plenty of rails and grab holds in the shower and around the toilet. What kind of hazard is Mac preventing to happen to his father?
- A. Fall
B. Burn
C. Choking
D. Poisoning
12. Who among the following is most vulnerable to poisoning if household chemicals are left under the sink without lock?
- A. Children
B. Deaf people
C. Senior citizens
D. Persons in wheelchair
13. Adults advised young people not to use mobile phones when in gas stations. What kind of disaster is likely to happen in the said situation?
- A. Cuts
B. Choking
C. Explosion
D. Poisoning
14. Toy manufacturers should put age recommendation for every toy they make. For example, toys with small parts like robots or dolls should not be given to children from ages 0-4. What kind of hazard is being prevented here?
- A. Fall
B. Fire
C. Choking
D. Explosion
15. Which of the following statements is **NOT TRUE** about the following equation?
- DISASTER RISK = HAZARD x EXPOSURE x VULNERABILITY
- A. The risk of disaster grows as global hazards increases.
B. The higher chance of exposure, the higher the disaster risk will be.
C. As people's vulnerability increases, the disaster risk will be higher.
D. Disaster risk is independent of hazard, exposure and vulnerability.

Lesson

Hazard, Exposure, Vulnerability, and Disaster Risk

The Philippines is consisted of almost more than 7000 islands. Our country is also located in the part of the world where it is prone to different hazards. What makes these hazards turn into disaster? How can these hazards be prevented by the kind of exposure and vulnerability of elements present?

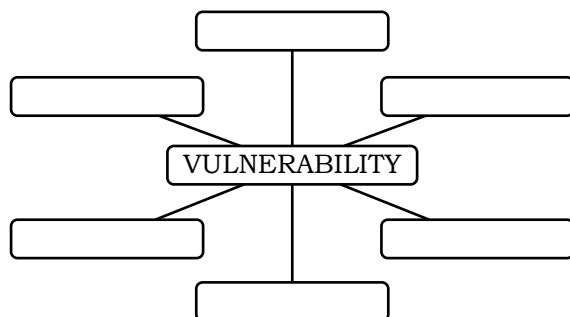
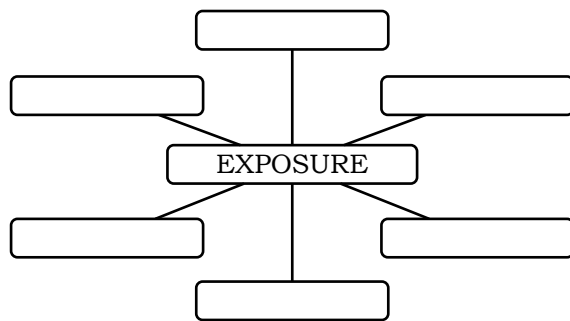


What's In

In your previous modules, you have learned about the concepts of exposure and vulnerability. Can you still remember the idea or set of ideas related to exposure and vulnerability?

Activity 1. Exposure and Vulnerability: A Recap

Write down word or words that is/are connected to the concept of EXPOSURE and VULNERABILITY. Place your answers on the space provided.



? What's New

Now, we will relate how exposure and vulnerability determine the impact of hazard. Before we proceed, take a look at four of the Philippine's historical disasters. Can you match the pictures to its event? Place your answers on the space provided below each image.

Activity 2. Mix and Match



1. _____



2. _____



3. _____



4. _____

Events:

- a. Typhoon Ondoy (Ketsana)
- b. 1990 Luzon Earthquake

- c. 1990 Eruption of Mt. Pinatubo
- d. Typhoon Yolanda (Haiyan)

Source:

Destroyed church after Philippine Earthquake. Wikimedia Commons. Accessed September 5, 2020.

https://commons.wikimedia.org/wiki/File:Loon_2_earthquake.JPG

Flooding from Typhoon Ondoy (Ketsana). Wikimedia Commons. Accessed on September 5, 2020.

[https://commons.wikimedia.org/wiki/File:Flooding_from_Typhoon_Ondoy_\(Ketsana\),_Philippines_2009._Photo_AusAID_\(10695644264\).jpg](https://commons.wikimedia.org/wiki/File:Flooding_from_Typhoon_Ondoy_(Ketsana),_Philippines_2009._Photo_AusAID_(10695644264).jpg)

Ashes Eruption. Needpix. Accessed September 5, 2020.

<https://www.needpix.com/photo/807765/ashes-eruption-landscape-outdoors-smoke>

Tacloban Typhoon Haiyan. Wikimedia Commons. Accessed on September 5, 2020.

https://commons.wikimedia.org/wiki/File:Tacloban_Typhoon_Haiyan_2013-11-14.jpg





What Is It

Based on what you have learned, the Philippines experienced some historical disasters that also became notable to other countries, like the examples given on the previous page. Before these disasters happened, what are the hazards present? How do exposure and vulnerability of different elements increase the impact of hazards? What is a risk? Try to look at the following concepts:

- **HAZARD** - refers to a process, activity, or series of events that can cause harm or danger that pose a threat to human life, destruction of properties, and other disruption and degradation
- **DISASTER** – a short but sudden event that completely causes more damage to human life and property
- **RISK** – a situation or chance involving exposure to danger, harm or loss of lives
- **EXPOSURE** – refers to situation of a people, infrastructure, and other elements found in hazard-prone areas
- **VULNERABILITY**- are the conditions determined by several factors (physical, social, economic, and environmental) that increases a person, community or system's susceptibility to impact of a hazard
- **DISASTER RISK** – refers to possible loss of life, injury, or destruction in a specific period of time because of hazard present, exposure, and vulnerability

For you to better understand how these terms are related to one another, let's cite some example:

Earthquake is a natural event that we cannot control, but it becomes a hazard if it happens in a city where tall infrastructures pose a threat to people. It's a risk for the people outside to pass by these buildings during earthquake. Moreover, people inside the building are more vulnerable because they are more exposed to harm than those outside the building. All these present elements of hazard, exposure, and vulnerability result to disaster risk. We can show their relationship through the diagram below.



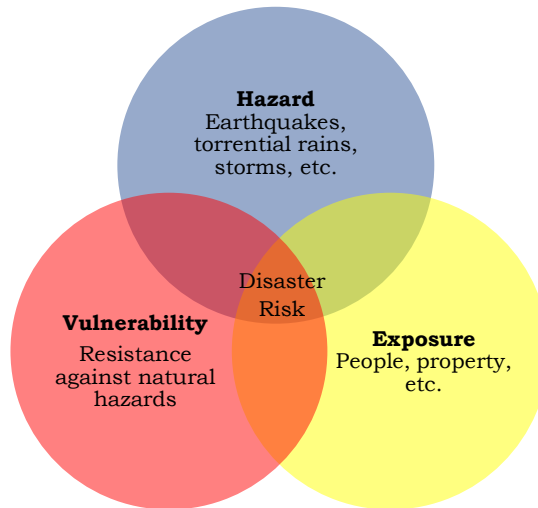
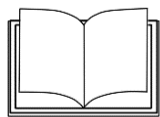


Figure 1. The relationship between hazard, exposure, vulnerability, and disaster risk

This model shows that the degree of disaster depends on the following factors: (1) intensity of the hazard / natural event; (2) the amount of exposure of the elements at risk like lives and properties; (3) vulnerability level and factors (physical, social, economic and environmental) of the exposed elements. Simply put:

$$\text{DISASTER RISK} = \text{HAZARD} \times \text{EXPOSURE} \times \text{VULNERABILITY}$$

If there is no hazard present, there will be no risk, as there are no exposed and vulnerable elements. The incidence of natural events, like earthquakes, cannot be prevented, but reducing the exposure and eventually the vulnerability of the elements can minimize the impact of disaster.



What's More

Since you already know the relationship between hazard exposure, vulnerability, and disaster, try to answer the following activity.

Activity 3. Describe the Disaster

Using the previous events in Activity 1, fill up the following table, stating the type of hazard, what are the elements exposed, vulnerability (potential effects), and why it became a disaster. You may answer in bullet form. You can search the internet for additional information. The first one (Baguio earthquake) is done as an example.

Disaster	Hazard/s	Exposed Elements	Vulnerability/ Potential Effects	Why event resulted in a disaster
1) 1990 Luzon Earthquake (Baguio)	- Earthquake-induced Landslides	- Roads - Buildings - Houses - People - Agriculture	- Road blocks - Collapsed buildings and houses - Injured or dead people - Destroyed crops	- It happened during a busy time of day - Many people were not able to evacuate immediately
2) Typhoon Yolanda or Haiyan (Tacloban)				
3) 1990 Eruption of Mt. Pinatubo (Zambales)				
4) Typhoon Ondoy				



What I Have Learned

Activity 4. Fill Me In

Complete the following statements of what you have learned about hazard, exposure, vulnerability, and disaster risk. Place your answers on the space provided for each item.

1. I now know something about



2. First, _____

3. Second, _____

4. Further, _____

5. Finally, _____



What I Can Do

Activity 5. Hazard Prevention

Fill up the following table with your recommended adaptation strategies, prevention, or mitigation on how you can prevent the possibility of the given hazard turning into disaster. Give at least (3) strategies for each hazard.

Hazard	Recommended Strategies
Falling debris or fragments resulting from earthquake-induced landslides	1. 2. 3.



Flood risk due to storm surges	1. 2. 3.
Collapse of structures due to ash fall from volcanic eruption	1. 2. 3.
Hazard of flash flooding	1. 2. 3.

CRITERIA FOR GRADING:

CRITERION	4 (EXCEEDS EXPECTATIONS)	3 (MEETS EXPECTATIONS)	2 (NEEDS IMPROVEMENT)	1 (NOT VISIBLE)
Presented adaptation strategies, prevention or mitigation in preventing hazard turn into disaster.	Presented 9 and above adaptation strategies, prevention or mitigation in preventing hazard turn into disaster.	Presented 6-8 adaptation strategies, prevention or mitigation in preventing hazard turn into disaster.	Presented 3-5 adaptation strategies, prevention or mitigation in preventing hazard turn into disaster.	Did not presented adaptation strategies, prevention or mitigation in preventing hazard turn into disaster.





Assessment

Read each statement carefully. Then, encircle the letter of the correct answer.

1. Coronavirus disease (COVID-19) is a contagious disease caused by a newly discovered coronavirus. It spreads through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. What kind of hazard does COVID-19 manifested before it becomes a pandemic?
 - A. Physical hazard
 - B. Chemical hazard
 - C. Biological hazard
 - D. Environmental hazard

2. Which of the following statements is **NOT TRUE** about the following equation?
$$\text{DISASTER RISK} = \text{HAZARD} \times \text{EXPOSURE} \times \text{VULNERABILITY}$$
 - A. The risk of disaster grows as global hazards increases.
 - B. The higher chance of exposure, the higher the disaster risk.
 - C. As people's vulnerability increases, the disaster risk will be higher.
 - D. Disaster risk is independent of hazard, exposure and vulnerability.

3. Which of the following statements is **TRUE** about hazard?
 - A. It is a series of events that can cause harm or danger.
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 - C. It is a situation or chance involving exposure to danger, harm or loss of lives.
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4. Which of the following is an example of hazard that can turn into disaster?
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5. Which of the following is **NOT** likely to happen if household chemicals like insecticides are not stored safely?
 - A. Fire
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6. To what kind of danger are children with parents that are cook or chef are exposed to?
- | | |
|-------------------------------|-------------------------------|
| A. Falls from slippery floors | C. Cuts from pointed objects |
| B. Poisoning from chemicals | D. Drowning from excess water |
7. Which of the following disasters **DOES NOT** resulted from illegal cutting of trees in the mountains?
- | | |
|--------------|---------------|
| A. Flooding | C. Landslide |
| B. Sink hole | D. Earthquake |
8. Which of the statements below is **TRUE** about vulnerability?
- It is a series of events that can cause harm or danger.
 - It is a sudden event that causes more damage to human life and property.
 - It is a situation or chance involving exposure to danger, harm or loss of lives.
 - It is a condition determined by several factors that increase a person, or systems weakness.
9. All of the following disasters may result from exposed electrical wires at home **EXCEPT** for what?
- | | |
|---------|--------------|
| A. Fire | C. Explosion |
| B. Burn | D. Poisoning |
10. Which of the following statements best describe disaster?
- It is a series of events that can cause harm or danger.
 - It is a sudden event that causes more damage to human life and property.
 - It is a condition determined by several factors that increase a person, community or system's weakness.
 - It refers to situation of a people, infrastructure, and other elements found in hazard-prone areas.
11. Which of the following statements is **TRUE** about exposure?
- It is a series of events that can cause harm or danger.
 - It is a sudden event that causes more damage to human life and property.
 - It is a condition determined by several factors that increase a person, community or system's weakness.
 - It refers to situation of a people, infrastructure, and other elements found in hazard-prone areas.

12. Toy manufacturers should put age recommendation for every toy they make. For example, toys with small parts like robots or dolls should not be given to children from ages 0-4. What kind of hazard is being prevented here?
- A. Fire
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13. Adults advised young people not to use mobile phones when in gas stations. What kind of disaster that is likely to happen in the said situation?
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- A. Fall
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 - D. Poisoning





Additional Activities

During this time of COVID-19 pandemic, several problems occurred as a result of this disease, though the pandemic itself is considered a hazard already. These problems are hazardous and can lead to a disaster if not resolved or given adaptation plans.

Imagine that you are one of the Philippine Senators that is tasked to give adaptation plans to the following issues due to the outbreak of COVID-19. Choose at least (3) issues from the list below. For each issue, make a 3-frame comic strip as if you are speaking in the Senate House to present your plans and strategies to solve the chosen issues. See to it that your plans follow the S.M.A.R.T* objectives, and be guided by the rubrics below. Keep in mind also that your plans should be efficient so it will be approved by the government body. *(**S**pecific, **M**easurable, **A**ttainable, **R**ealistic, **T**ime-bound)

List of issues related to COVID-19:

1. No available mass testing
2. No available vaccine against the virus yet
3. No public transport
4. Work from home (WFH)
5. Online classes
6. Not following social distancing
7. High unemployment rate
8. Low demand for tourism industry
9. Mental health issues
10. High utility bills (electricity, water)

RUBRICS FOR GRADING:

CRITERION	20 (EXCEEDS EXPECTATIONS)	15 (MEETS EXPECTATIONS)	10 (NEEDS IMPROVEMENT)	5 (NOT EVIDENT)
Presented practical and realistic plans and strategies to solve the chosen issues.	Presented 9 and above practical and realistic plans and strategies to solve the chosen issues.	Presented 6-8 practical and realistic plans and strategies to solve the chosen issues.	Presented 3-5 practical and realistic plans and strategies to solve the chosen issues.	Did not presented practical and realistic plans and strategies to solve the chosen issues.





References

- (1) “Emergency and Disaster Risk Management Framework.” Accessed July 15, 2020. <https://www.who.int/hac/techguidance/preparedness/health-emergency-and-disaster-risk-management-framework-eng.pdf?ua=1>.
- (2) “Home Hazards and Household Safety Guide & Tips.” MortgageLoan.com, April 15, 2020. <https://www.mortgageloan.com/homehazards>.
- (3) “Mt-Pinatubo: Global News.” Global News mtpinatubo Comments. Accessed July 15, 2020. <https://globalnation.inquirer.net/100047/filipinos-pinatubo-photo-named-among-greatest-of-all-time/mt-pinatubo>.
- (4) “Q&A On Coronaviruses (COVID-19).” World Health Organization. World Health Organization. Accessed July 15, 2020. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses>.
- (5) “Safety at Home: 10 Common Safety Hazards around the House.” StaySafe.org. Accessed July 15, 2020. <https://staysafe.org/safety-at-home-10-common-safety-hazards-around-the-house/>.
- (6) BusinessMirror. “Marikēños in Guarded Triumph 10 Years after Tragedy from Ondoy.” BusinessMirror, September 26, 2019. <https://businessmirror.com.ph/2019/09/26/marikenos-in-guarded-triumph-10-years-after-tragedy-from-ondoy/>.
- (7) Houston, Brandon. “Recap Recap What the Following Terms Mean Natural Hazard Disaster Risk - Ppt Video Online Download.” SlidePlayer, August 27, 2017. <https://slideplayer.com/slide/10306076/>.
- (8) Joselito Guianan Chan, Managing Partner. COMMISSION ON POPULATION (POPCOM), REPUBLIC OF THE PHILIPPINES - CHAN ROBLES VIRTUAL LAW LIBRARY. Accessed July 15, 2020. <https://www.chanrobles.com/legal3popcom.html>.
- (9) Richard CollinsConsultant & Director at SafetiHi. “What Is a Hazard? Examples of Hazards & 10 Ways to Spot Them!” Safeti, June 23, 2020. <https://safeti.com/podcast/what-is-a-hazard-helpful-examples-hazards-symbols/>.
- (10) Written by Rebecca Edwards | Updated June 18, Rebecca Edwards, and Written by Rebecca Edwards Rebecca is the lead safety reporter and in-house expert for SafeWise.com. She has been a journalist and blogger for over 25 years. “9 Common Safety Hazards Around the Home & How To Prevent Them.” SafeWise, June 23, 2020. <https://www.safewise.com/blog/safety-hazards-to-watch-out-for-around-the-house/>.



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