Transcript: Module 3- Identify hazardous events, assess existing control measures and exposure risks

Welcome to Module 3 of the sanitation safety planning methodology. My name is Leonellha Barreto Dillon, and I will be your guide in this module called "Identify hazardous events, assess existing control measures and exposure risks". Here, we will be answering the questions:

- What could go wrong?
- What existing control measures are in place and how effective are they?
- How significant are the risks?

In this module, you will learn how to:
•Identify hazards and hazardous events.
• Identify and assess existing control measures.
• Assess and prioritize the exposure risks.

Ok, then, let's start.

In step 3.1, we identify hazards and hazardous events. This will help us to understand how the exposure to health risks may occur.

Before starting with this step, it is important to understand the difference between hazards and hazardous events:

A hazard is a biological, chemical or physical constituent that can cause harm to human health.

And a hazardous event is any incident or situation that:
-introduces or releases the hazard, for instance fecal pathogens, to the environment in which people are living or working,
-amplifies the concentration of the hazard in the environment in which people are living or working, or
-fails to remove the hazard from the human environment.

Let's see one example. Hazards in sanitation systems are biological, chemical or physical. For instance, in a wastewater channel, you will find pathogens, such as bacteria and viruses from fecal sources. The hazardous event is that workers are exposed to pathogens after contact with wastewater while entering into drains during maintenance. The health effects would then be diarrhea, fever, vomiting or skin irritation.

Hazardous events should describe how groups are exposed to hazards. This requires understanding of the exposure route. The exposure route for excreta-related pathogens may be:

- Ingestion after contact with wastewater or excreta
- Ingestion of contaminated water
- Consumption of contaminated produce
- Dermal contact with excreta or wastewater
- Vector-borne, via flies or mosquitoes
- Inhalation of aerosols and particles

Having explicit exposure routes in the description of the hazardous event aids understanding the risk and identification of controls that will break transmission.

The team should identify hazards and their associated hazardous events at each step along the sanitation chain. When doing this, consider hazardous events:

• that are associated with existing/normal operation of the system, such as faulty equipment;

• that are potential due to a system failure or accident, like equipment breakdown;

• that are related to seasonal factors, such as seasonal behavior changes by farm workers.

Also, we need to consider:

• indirect hazardous events, like hazards that potentially affect people not directly involved in the sanitation chain, like downstream communities;

• cumulative hazards, like accumulation of chemicals in soils.

• and those cause by climate related factors.

Climate change exacerbates the risks associated to sanitation. It alters the frequency and intensity of hazardous events and creates new hazardous events.

Many risks for sanitation come through extreme events and gradual changes to the hydrological cycle. These include:

•More intense or prolonged precipitation

•More variable or declining rainfall or run-off

•Sea-level rise

•More variable and increasing temperatures

•More frequent or more intense storms or cyclones

These changes in the local hydrological cycle creates effects that, in turn, exacerbates existing and potential hazardous events or creates new ones.

Let's think about climate-related causes of new hazardous events:

•Destruction and damage to sanitation infrastructure
•Declining water supply impeding function of water-reliant sanitation systems (e.g., flush toilets)
•Flooding of on-site systems causing spillage and contamination.
•Increased corrosion of piped sewers.
•Proliferation of algal blooms or microbes carried by vectors in water.
And many other.

Remember that the identification of hazards and hazardous events should be done at each step along the sanitation service chain.

For toilets, one hazardous event could be:
•Ingestion of pathogens after contact with excreta in toilets, due to lack of maintenance and cleaning.
One example of climate-related hazardous events is:
•Falling into the pit due to reduced soil stability during flooding.

An example of hazardous events at the containment/storage and treatment step is:
•Ingestion of groundwater contaminated with leachate percolating from pits or septic tanks
A climate-related hazardous even could be:
•Ingestion of pathogens after contact with fecal sludge during overflowing of on-site systems

At the conveyance step, a hazardous event could be:
• Ingestion of pathogens after contact with contaminated soil, caused by discharge of fecal sludge without treatment to open grounds
An example of a climate-related hazardous event is when:

•Workers inhale particles while cleaning of increasing solid deposits caused by reduced water flows in drought periods.

An example of hazardous events at the treatment step is:
• Ingestion of pathogens in incompletely treated effluent, resulting from discharge of fresh fecal sludge in wastewater treatment ponds, causing overload and failure.
A climate-related hazardous events at this step is:
• Ingestion of pathogens contained in untreated sewage during extreme weather events or floods damaging wastewater treatment systems.

Hazardous events at the reuse and disposal step include:
• Ingestion of pathogens in surface waters due to discharge of partially treated or untreated effluent.
A climate-related hazardous event at this step is:
• Ingestion after contact with raw sewage during farming activities, caused by increased freshwater scarcity.

While identifying hazards and hazardous events we will apply several tools, including desk reviews with field investigations, focus group discussions, key informant interviews and collection and testing of samples.

Step 3.2 is about identifying and assessing existing control measures.
For each hazardous event identified in step 3.1, we need to identify what control measures are already in place to mitigate the risks of that hazardous event. This tells us how well the system protects those at risk.

What is a control measure?
Control measures are any activity or barrier that can be used to reduce, prevent or eliminate a sanitation-related hazard, or reduce it to an acceptable level.

We need to determine how effective the existing control measure is at reducing the risk of that hazardous event. To do this, we need to consider how effective an existing control measure:
-could be, assuming it was working well at all times.
and
-how effective the existing control measure is in practice.

In Step 3.1 we identified a large number of hazards and hazardous events.
Now, in step 3.3 we will establish the risk associated to each event. This module provides a structure for prioritizing the highest risks for further attention. This helps us to identify which hazardous events represent the highest risks.

There are different risk assessment methods, however we will focus on semi-quantitative risk assessment.

This needs the participation of several individuals, helping to increase the objectivity of the results. This method requires the SSP team to assign a likelihood and severity to each identified hazardous event.

Likelihood refers whether the event is very unlikely, unlikely, possible, likely and almost certain.

And severity indicates if the consequences of the event are insignificant, minor, moderate, major or catastrophic.

The risk will be given by multiplying the likelihood times the severity. Using a risk matrix, the team arrives at a risk category or score.

Climate change and variability can change both the likelihood and severity of existing and new hazardous events.

The likelihood of that particular hazardous event occurring may increase or decrease due to climate change, for example under drought conditions, sewer overflow frequency may reduce or under storms or cyclones,

infrastructure may be damaged. Although it can be difficult to place firm values on the likelihood for future scenarios, it is necessary that the future likelihoods are considered in the risk assessment.

Similarly, the severity of the hazardous events may become both more or less severe. For example, the discharge of effluent to a river is more significant in drought conditions when receiving water levels are low, compared with high rainfall events when there is greater dilution.

Therefore, we need to draw on climate change projections to consider the potential for climate change to influence risk. When climate projections are not available, consider how different climate scenarios would affect the severity or likelihood score. The climate scenarios that result in the largest increase in risk should be prioritized.

Great! So, you have now completed Module 3 of the SSP methodology. You have learnt how to:
•Identify hazards and hazardous events.
• Identify and assess existing control measures.
• Assess and prioritize the exposure risk.

I recommend downloading the 2018 WHO Guidelines and learn more about hazardous events and control measures at each step of the sanitation system in chapter 3. Also, you should carefully read module 3 of your SSP manual.

In the following lecture, we will continue with the Sanitation Safety Planning methodology, in specific Module 4: Develop and implement an incremental improvement plan

Thanks for watching! And happy SSP!