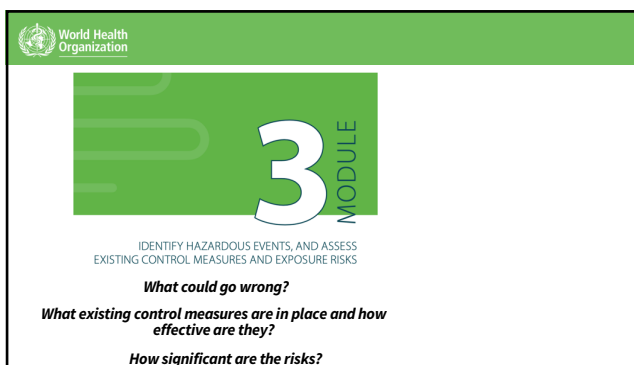
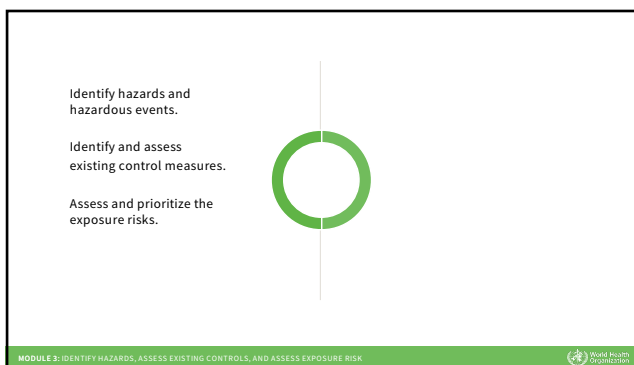




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STEP 3.1
Identify hazards and hazardous events


 **OBJECTIVE**
To ensure that the SSP addresses the greatest health risks.

Hazard ≠ **Hazardous Event (HE)**

Hazard
A biological, chemical or physical constituent that can cause harm to human health.

Hazardous Event (HE)
Any incident or situation that:

- introduces or releases the hazard,
- amplifies the concentration of the hazard in the environment,
- fails to remove the hazard from the human environment.


MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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STEP 3.1
Identify hazards and hazardous events

Example







Hazard(s)	+	Hazardous event	→	Health effects
Biological (e.g. bacteria, virus)	+	Workers are exposed to pathogens after contact with wastewater while entering into drains during maintenance	→	Diarrhoea
Chemical (e.g. toxins)	+		→	Fever
Physical (e.g. water)				Vomiting Skin irritation


MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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STEP 3.1
Identify hazards and hazardous events

6 exposure routes

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

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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STEP 3.1

Identify hazards and hazardous events

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

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.1

Identify hazards and hazardous events

Hazards and hazardous events must be identified at each step along the sanitation chain

- | | |
|--|---|
| Existing – normal operation | • e.g. faulty equipment |
| Potential – system failure or accident | • e.g. equipment breakdown |
| Seasonal factors | • e.g. seasonal behaviour changes by farm workers |

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.1

Identify hazards and hazardous events

- | | |
|------------|--|
| Indirect | • e.g. hazards that relates to people not directly involved such as effects on downstream communities. |
| Cumulative | • e.g. chemicals in soils. |

AND climate related factors

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.1

Identify hazards and hazardous events

Climate change:

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

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.1

Identify hazards and hazardous events

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

- ✓ More intense and prolonged precipitation
- ✓ More variable and declining rainfall or run-off
- ✓ Sea level rise
- ✓ More variable and increasing temperatures
- ✓ More frequent or intense storms or cyclones

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.1

Identify hazards and hazardous events

These changes in the local hydrological cycle create effects that:

- exacerbate existing and potential hazardous events
- create new ones.

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STEP 3.1
Identify hazards and hazardous events

Think about climate-related **causes** of new hazardous events

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STEP 3.1
Identify hazards and hazardous events

Toilet

Example of hazardous event:

- Ingestion of pathogens after contact with excreta in toilets, due to lack of maintenance and cleaning.

Example of climate change-related hazardous event:

- Falling into the pit due to reduced soil stability during flooding.

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STEP 3.1
Identify hazards and hazardous events

Containment-storage/treatment

Example of hazardous event:

- Ingestion of groundwater contaminated with leachate percolating from pits or septic tanks.

Example of climate change-related hazardous event:

- Ingestion of pathogens after contact with fecal sludge during overflowing of on-site systems.


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STEP 3.1
Identify hazards and hazardous events

Conveyance


Example of hazardous event:



- Ingestion of pathogens after contact with contaminated soil, caused by discharge of fecal sludge without treatment to open grounds.

Example of climate change-related hazardous event:

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


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STEP 3.1
Identify hazards and hazardous events

Treatment


Example of hazardous event:



- Ingestion of pathogens in incompletely treated effluent, resulting from discharge of fresh fecal sludge in wastewater treatment ponds, causing overload and failure.

Example of climate change-related hazardous event:

- Ingestion of pathogens contained in untreated sewage during extreme weather events or floods damaging wastewater treatment systems.


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STEP 3.1
Identify hazards and hazardous events

End use/ disposal


Example of hazardous event:



- Ingestion of pathogens in surface waters due to discharge of partially treated or untreated effluent.

Example of climate change-related hazardous event:

- Ingestion after contact with raw sewage during farming activities, caused by increased freshwater scarcity.

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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STEP 3.1

Identify hazards and hazardous events

Tools to identify **hazards** and **hazardous events**:

- Desk reviews
- Field investigation
- Focus group discussions
- Key informant interviews
- Collection/testing of sample

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



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STEP 3.2

Identify and assess existing control measures



OBJECTIVE

To determine how well the existing system protects those at risk.

What is a control measure?

A control measure is any action or activity (or barrier) that can prevent or eliminate a sanitation-related hazard or reduce it to an acceptable level.

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK



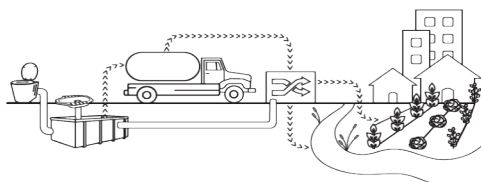
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STEP 3.2

Identify and assess existing control measures

How do we determine...

...how effective is a control measure?



MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK




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STEP 3.2
 Identify and assess existing control measures

Consider how effective the existing control measure:


- could be**, assuming it was always working well
- is in practice**, considering actual site conditions, enforcement of existing rules and regulations and operating practices.

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STEP 3.3
 Assess and prioritize the exposure risks

OBJECTIVE

 To provide a structure for prioritising the highest risks for further attention.

Helps to identify which hazardous events represent the highest risk.

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STEP 3.3
 Assess and prioritize the exposure risks

Risk assessment methods

- Team-based descriptive
- Semi-quantitative
- Quantitative methods

- Participation of several individuals
- Objectivity of the results
- Assign a **likelihood** and **severity** to each identified hazardous event.


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STEP 3.3
Assess and prioritize the exposure risks

Definitions of Likelihood (L)

LIKELIHOOD (L)	DESCRIPTOR	DESCRIPTION
1	Very unlikely	Has not happened in the past and it is highly improbable it will happen in the next 12 months (or another reasonable period).
2	Unlikely	Has not happened in the past but may occur in exceptional circumstances in the next 12 months (or another reasonable period).
3	Possible	May have happened in the past and/or may occur under regular circumstances in the next 12 months (or another reasonable period).
4	Likely	Has been observed in the past and/or is likely to occur in the next 12 months (or another reasonable period).
5	Almost certain	Has often been observed in the past and/or will almost certainly occur in most circumstances in the next 12 months (or another reasonable period).


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STEP 3.3
Assess and prioritize the exposure risks

Definitions of Severity (S)

SEVERITY (S)	DESCRIPTOR	DESCRIPTION
1	Insignificant	Hazard or hazardous event resulting in no or negligible health effects compared with background levels.
2	Minor	Hazard or hazardous event potentially resulting in minor health effects (e.g. temporary symptoms of irritation, nausea, headache).
4	Moderate	Hazard or hazardous event potentially resulting in self-limiting health effects or minor illness (e.g. acute diarrhoea, vomiting, upper respiratory tract infection, minor trauma).
8	Major	Hazard or hazardous event potentially resulting in illness or injury (e.g. malaria, schistosomiasis, food-borne trematodiasis, chronic diarrhoea, chronic respiratory problems, neurological disorders, bone fractures), and/or may lead to legal complaints and claims, and/or major regulatory non-compliance.
16	Catastrophic	Hazard or hazardous event potentially resulting in serious illness or injury, or even loss of life (e.g. severe poisoning, loss of extremities, severe burns, drowning), and/or will lead to major investigation by regulator, with prosecution likely.

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STEP 3.3
Assess and prioritize the exposure risks

Semi-quantitative risk assessment method

Likelihood (L) x Severity (S) = Risk (R)

		SEVERITY (S)				
		Insignificant	Minor	Moderate	Major	Catastrophic
LIKELIHOOD (L)	Very unlikely	1	2	4	8	16
	Unlikely	2	4	8	16	32
	Possible	3	6	12	24	48
	Likely	4	8	16	32	64
	Almost certain	5	10	20	40	80
Risk score R = L x S		<6	6-12	13-32	>32	
Risk level		Low risk		Medium risk	High risk	Very high risk

MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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STEP 3.3
Assess and prioritize the exposure risks

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

Likelihood of hazardous events may change...


- Under drought, sewer overflow frequency may reduce
- Under storms or cyclones, infrastructure may be damaged

Severity of hazardous events may change...

- 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:

- Consider climate change projections to estimate risk.
- When not available, consider different climate scenarios.
- Prioritize climate scenarios that result in the largest increase in risk.


MODULE 3: IDENTIFY HAZARDS, ASSESS EXISTING CONTROLS, AND ASSESS EXPOSURE RISK 

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Identify hazards and hazardous events.


Identify and assess existing control measures.

Assess and prioritize the exposure risks.




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