unicef
for every child

World Health Organization

Welcome to the
Sanitation Safety Planning
Training of practitioners

Step-by-step risk management for safely managed sanitation systems

SANITATION
SAFETY
PLANNING

World Health Organization

Please give us your feedback of day 2!

Access our formular
through this QR code!

SANITATION
SAFETY
PLANNING

MODULE 3

IDENTIFY HAZARDOUS EVENTS, AND ASSESS EXISTING CONTROL MEASURES AND EXPOSURE RISKS

SANITATION
SAFETY
PLANNING

SSP Manual
Pages
37 to 61

SSP Modules

Page 37 of your SSP manual

MODULE 3

Identify hazardous events, and assess existing control measures and exposure risks

Module 3 answers the question:

“How significant are the risks?”

Module 3

Ensures that the following efforts and investments in improvements respond to highest health risks first.

Module 3 helps us understand how well the hazardous events are already controlled in the system.

MODULE 3

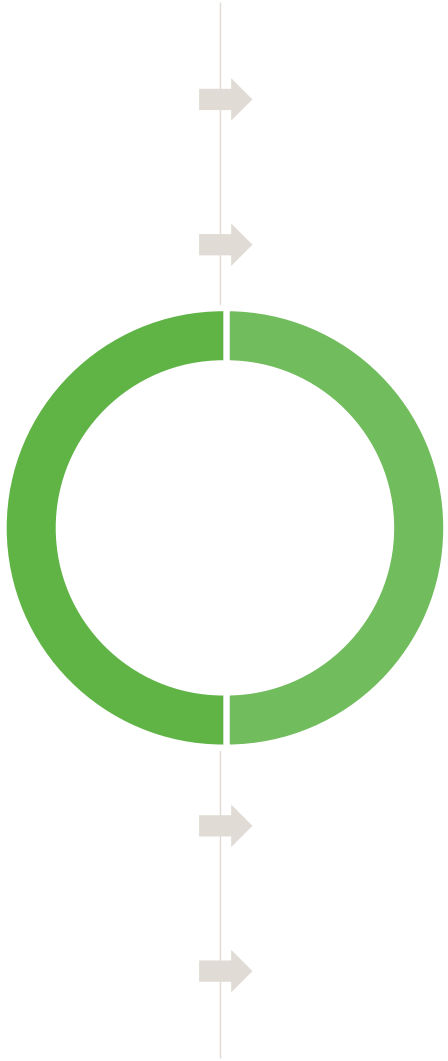
Overview

STEPS

3.1 Identify hazards and hazardous events.

3.2 Identify and assess existing control measures.

3.3 Assess and prioritize the exposure risk.



OUTPUTS

- A risk assessment table
- A prioritized list of hazardous events.

MODULE 3

Identify hazardous events, and assess existing control measures and exposure risks

Output 1: Risk assessment table

COMPONENT	HAZARD IDENTIFICATION				EXISTING CONTROLS		RISK ASSESSMENT						COMMENTS JUSTIFYING RISK ASSESSMENT (Under current conditions, climate change scenarios, or effectiveness of the control)
							Under current conditions (L = likelihood; S = severity; R = risk (H = high; M = medium; VH = very high)				Under the most likely climate change scenarios (+ means increased risk, – means decreased risk, = means the same risk)		
Sanitation step	Hazardous event	Hazard	Exposure group	Number of people at risk	Description	Validation	L	S	Score (LxS)	R	Drought	More intense precipitation	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U1**	30 000	Flush toilets and water supply	Visual and survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there also is not enough water to flush toilets.
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to infiltration from soak pits and septic tanks into shallow groundwater	Faecal pathogens	**L1**	20 000	In some cases, safe distance from wells has been considered.	Field visits	5	4	20	H	+	+	High prevalence of diarrhoea is reported among among young children, especially during the dry season. Likelihood of groundwater use is expected to increase during drought periods. Severity will increase with more and prolonged flooding due to climate change. Consideration should be given to vulnerable communities that may have a reduced ability to find alternative water sources.
		Nitrates and nitrates	**L1** (children less than 5 years old)	8000	Awareness-raising campaigns among mothers	Interviews with mothers	5	8	40	VH	+	+	

A summary of:

- hazards
- hazardous events
- exposure groups
- exposure routes
- existing control measures
- and their effectiveness

STEP 3.1

Identify hazards and hazardous events

OBJECTIVE

This step lists circumstances of how the risk occurs during **use**, **operation** and **maintenance** of the sanitation system for the exposure groups.

Hazard ≠ **Hazardous Event**

STEP 3.1

Identify hazards and hazardous events

What is a hazard?

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

Biological

Microbiological pathogens:

- Bacteria
- Viruses
- Protozoa
- Helminths

Chemical

- Heavy metals
- Compounds found in industrial effluents

Physical

- Sharps (e.g. needles)
- Physical injury from equipment

STEP 3.1

Identify hazards and hazardous events

Environmental transmitted pathogens

- We are continuously exposed to microorganisms
- Only a small proportion cause infection and disease.

Pathogens: microorganisms that cause disease

Enteric pathogens: Microorganisms transmitted by the fecal-oral route and infect the gastrointestinal tract.

To cause illness, the pathogen must usually first grow within or on the host.

STEP 3.1

Identify hazards and hazardous events

Organism	Per Gram of Feces
Protozoan parasites	10^6–10^7
Helminths	
Ascaris	10^4–10^5
Enteric viruses	
Enteroviruses	10^3–10^7
Rotavirus	10^{10}
Adenovirus/Norovirus	10^{11}
Enteric bacteria	
Salmonella spp.	10^4–10^{10}
Shigella	10^5–10^9
Indicator bacteria	
Coliforms	10^7–10^9
Fecal coliforms	10^6–10^9

At any time during infection the pathogen may be released into the environment by the host in faeces, urine or respiratory secretions.

The concentration of organisms released into the environment varies with the type of organism and the route of transmission.

Excreta related pathogens

WHO Guidelines
Chapter 6
Pages 100-124

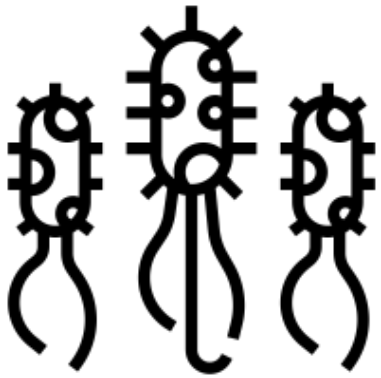
20 – 100 nanometers

Viruses

- Smallest enteric pathogen.
- Infectious microbe consisting of a segment of nucleic acid (DNA or RNA) surrounded by a protein coat.
- They cannot replicate alone.
- They can be excreted in very high numbers and are transported long distance in water.
- They cannot metabolize in the environment.
- Predominantly cause gastroenteritis (rotovirus and norovirus diarrhoea), hepatitis A&E, viral meningitis.

Excreta related pathogens

WHO Guidelines
Chapter 6
Pages 100-124



0.2 – 3 micrometers

Bacteria

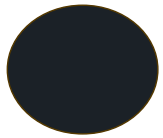
- They are very small single celled organisms.
- Many are capable of multiplication outside a host under favourable conditions
- Cause gastroenteritis, salmonellosis, typhoid, E. coli diarrhoea
- Cause severe health outcomes and long-term effects.

Excreta related pathogens

WHO Guidelines
Chapter 6
Pages 100-124

Protozoa

3 – 20 micrometers



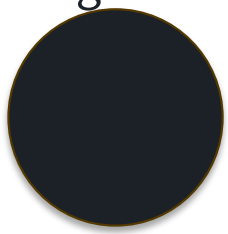
hair

- Complex and (relatively) large single celled organisms.
- They cannot replicate outside the host but are very persistent in the environment in cyst stage.
- Enteric, cause gastroenteritis, Amoebic dysentery, giardiasis.

Excreta related pathogens

WHO Guidelines
Chapter 6
Pages 100-124

<1 cm to >10 m in lenght



Visible

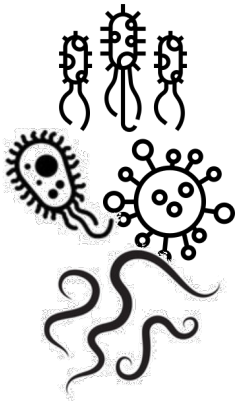
Helminths

- Also known as parasitic worms, include tapeworms, flukes and roundworms.
- They are multi-cellular, complex organisms.
- Soil-based and water based-worms.
- Ingestion of eggs or skin penetration.
- Cause ascariasis, hookworms infections.
- Mild to serious effects: chronic abdominal pain and diarrhoea, anaemia, intestine obstruction, malnutrition.
- Ascaris eggs can survive in the environment for years.

Excreta related pathogens

Environmental transmission of pathogens in faecal waste

WHO Guidelines
Chapter 6
Pages 114-119



Occurrence

Pathogens must be excreted into the environment in sufficient quantities by infected people

Persistence

Pathogens must survive on surface, water, sewage and soil, and remain infectious

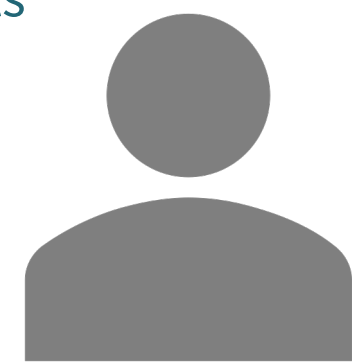
Infectivity

Specific strain and virulence

How do we detect pathogens in the environment?

Vector or hosts

Presence and abundance of any required vectors or intermediary hosts



Individual's susceptibility to infections

Immune status, nutritional status, age, pre-conditions

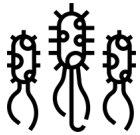
World Health Organization

Excreta related pathogens

Environmental transmission of pathogens in faecal waste

WHO Guidelines
Chapter 6
Pages 114-119

How do we detect pathogens in the environment? (Chapter 6.3.1 WHO Guidelines)



- bacteria

- viruses

- protozoa

Indicator of faecal contamination

E. coli as combined indicator

Also enterococci and bacteroides phage

Not perfect indicators!

But

- Useful
- Feasible
- Economical

In some circumstances, it might be important to identify the source and movement of a specific pathogen.

Excreta related pathogens

Table 6.1

WHO Guidelines
Chapter 6
Pages 105-113

Table 6.1 Excreta-related pathogens (main source: Mandell, Bennett & Dolin, 2000)

Pathogen	Health significance	Transmission pathways	Important animal source	Likely importance of sanitation for control†	Concentration excreted in faeces	Duration of excretion	Additional references
BACTERIA							
Campylobacter spp.	Most common	Predominantly	Poultry	Low	106 – 109 / g	Up to 3 weeks	
VIRUSES							
Adenoviruses	A large group of distinct viruses	Person-to-person, through both	None – strict human	Low	10^{11}/g (lower with	Months after	
PROTOZOA							
Cryptosporidium spp.	One of the most common causes	Person-to-person, and	Of the two main species, C. parvum	High	—	—	Hunter & Thompson, 2005
HELMINTHS							
Ascaris lumbricoides (roundworm)	One of the most common human helminth infections globally. Largely asymptomatic. Can lead to bowel/ intestine obstruction,	Via consumption of contaminated soil and food, and hand contamination.	No (animal roundworm species not thought to be pathogenic to human).	High	10^5 eggs/g	While infection persists	Bethony et al., 2006

Excreta related pathogens

Environmental transmission of pathogens in faecal waste

Helminths

It is important to understand which helminth are endemic in the locality of the SSP.

This is because:

- Helminth infections are context specific.
- Species and concentrations of Helminth eggs in waste influence the control measures.

Examples of helminth infections

Schistosomiasis

Eggs infect snail that lives in standing waters.

Cercarie will swim and penetrate the skin of humans in the water.

Ascariasis

Transmitted by the faecal-oral route.

Contamination of produce grown with contaminated water and faecal sludge.

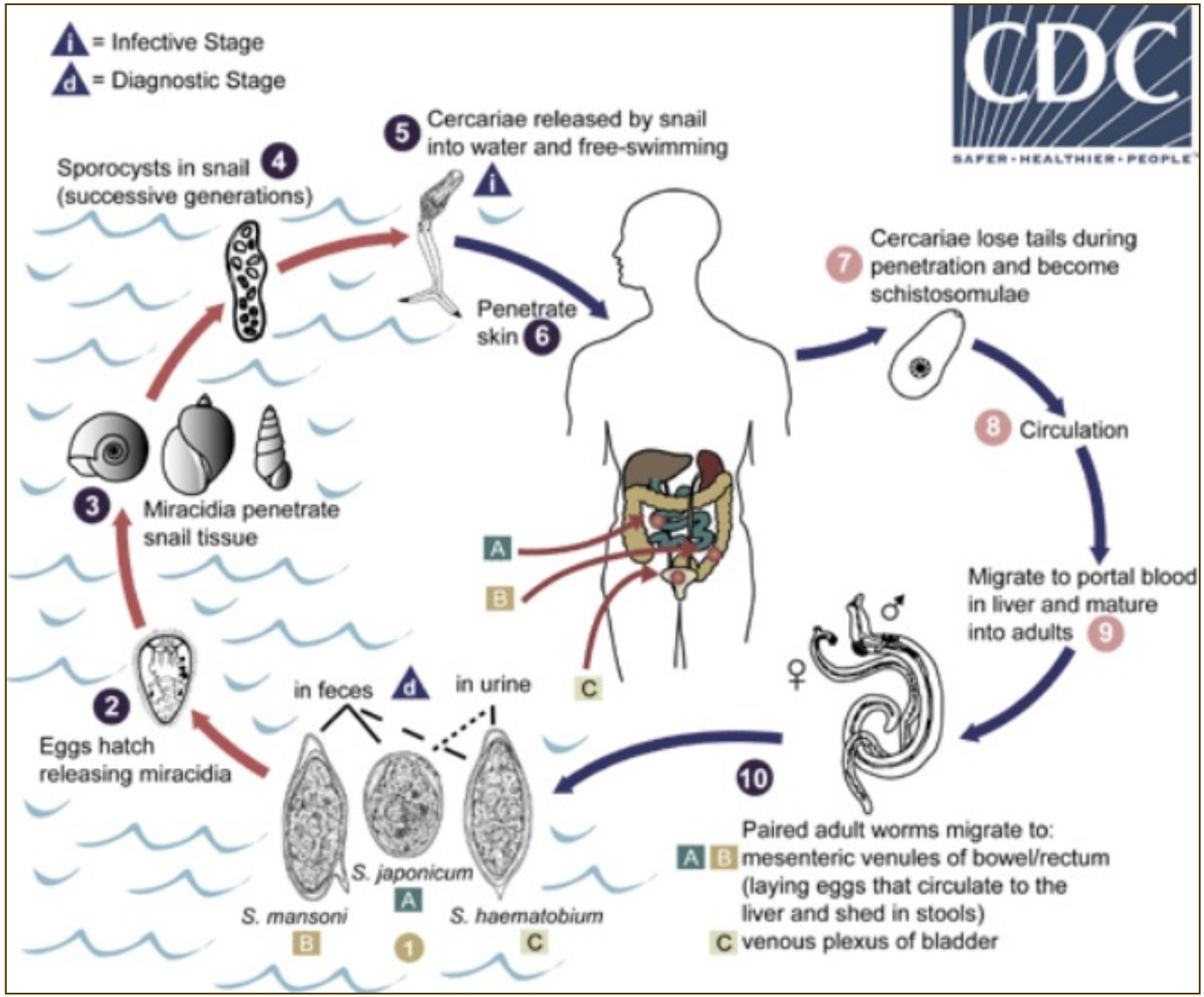
Hookworm infection

Eggs shed via faeces and the larvae penetrates the skin, usually at the feet.

Transmission route affects risk and required control measures

Excreta related pathogens

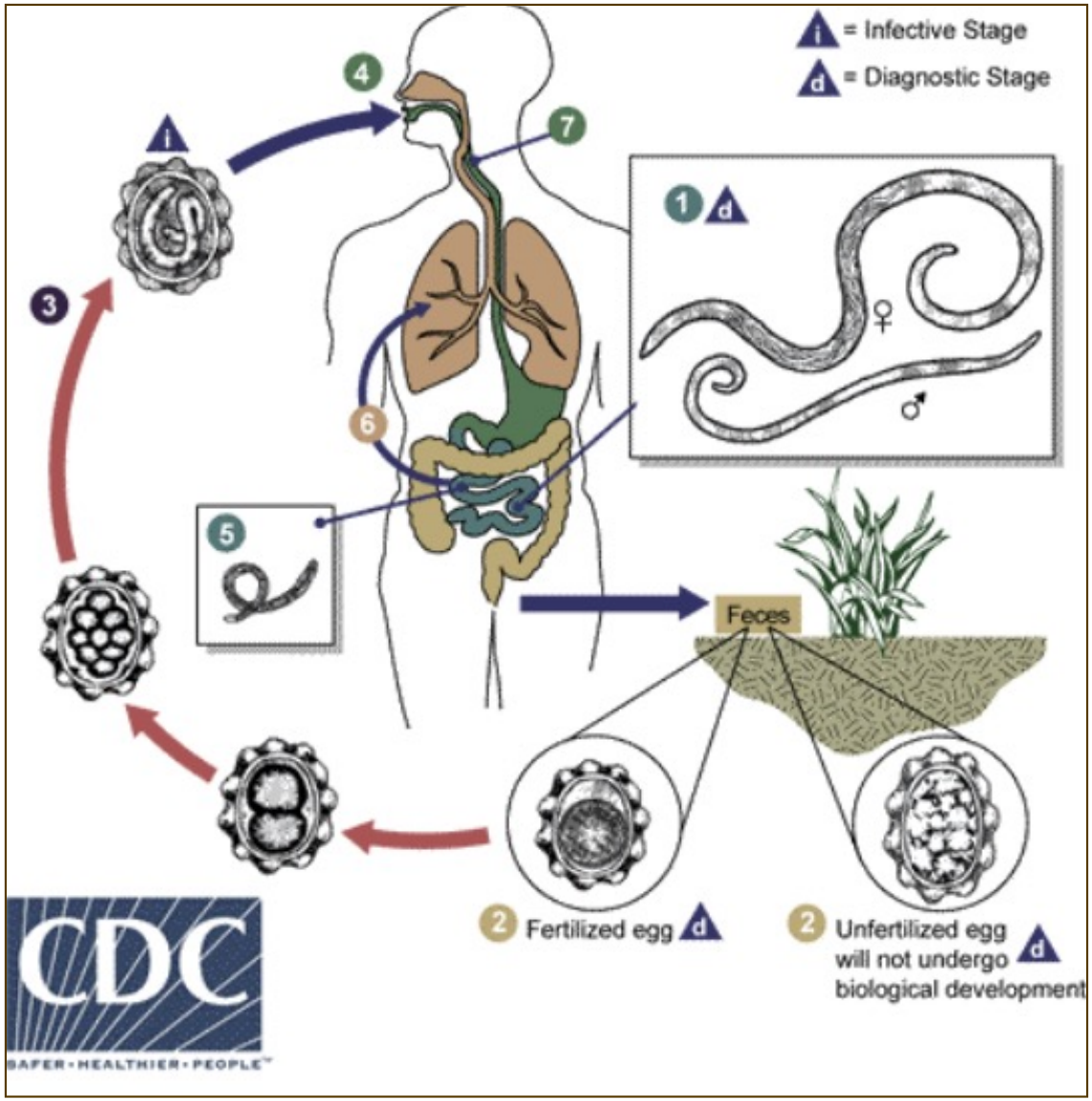
Helminths: transmission of Schistosomiasis (Bilharzia or Snail Fever)



World Health Organization

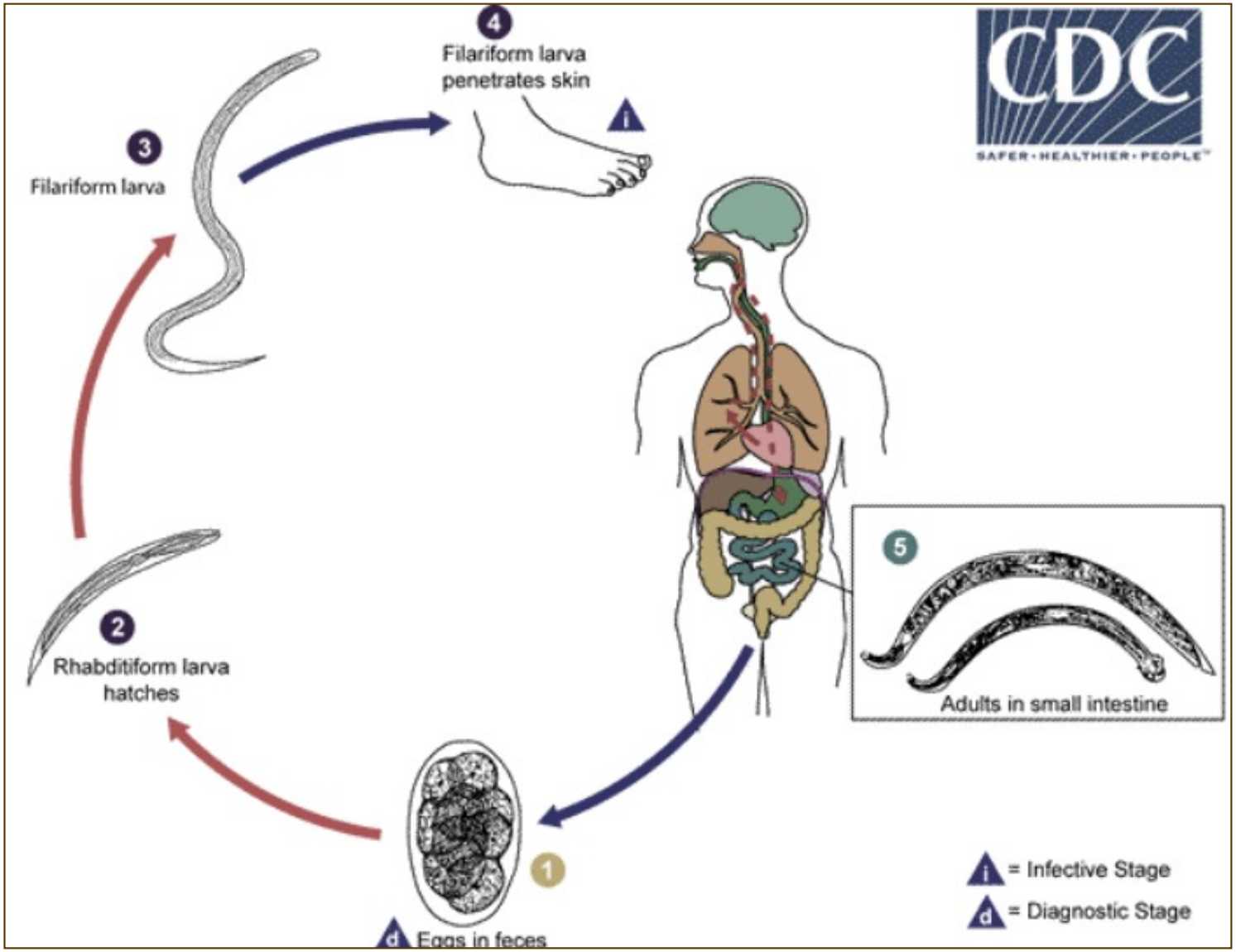
Excreta related pathogens

Helminths: transmission of Ascariasis (*Ascaris lumbricoides*)



Excreta related pathogens

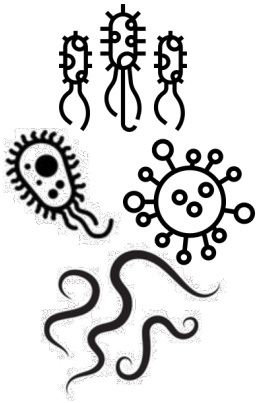
Helminths: transmission of Hookworm infection



Excreta related pathogens

Environmental transmission of pathogens in fecal waste

WHO Guidelines
Chapter 6
Pages 114-119



Occurrence

Pathogens must be excreted into the environment in sufficient quantities by infected people

Infectivity

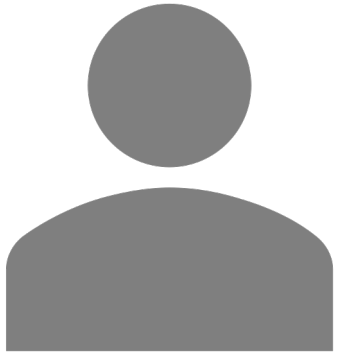
Specific strain and virulence

Persistence

Pathogens must survive on surface, water, sewage and soil, and remain infectious

Vector or hosts

Presence and abundance of any required vectors or intermediary hosts



Individual's susceptibility to infections

Immune status, nutritional status, age, pre-conditions

Why do we need to consider vectors in SSP?

World Health Organization

STEP 3.1

Identify hazards and hazardous events

What is a hazardous event?

Any incident or situation that:

- **introduces or releases the hazard** (i.e. faecal pathogens) to the environment in which people are living or working, or
- **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.

STEP 3.1

Identify hazards and hazardous events

Hazard, hazardous event, effect, risk, ...!?

Hazard(s) + **Hazardous event** → **Health effects**

Example: wastewater channel

Biological = pathogens (e.g. bacteria, virus and protozoa) + Ingestion of pathogens after contact with wastewater while entering into drains during maintenance → e.g. diarrhoea, fever, vomiting

STEP 3.1

Identify hazards and hazardous events

Hazard ≠ **Hazardous Event (HE)**

A good hazardous event tells a short story.

The **villain** is the **hazard** and the hazardous event (the story) says what happens - how the **villain** causes harm.

For example:

*Workers are **exposed** to **pathogens** in raw sewage in open drains during maintenance activities* ➡ **How exposed?**

STEP 3.1

Identify hazards and hazardous events

SSP Manual Guidance note 3.2, page 42

Hazardous events should describe how groups are exposed to hazards. Common exposure routes to consider in SSP:

- Ingestion after contact with wastewater/ excreta

- Ingestion of contaminated water

- Consumption of contaminated produce

- Dermal (skin) contact with excreta and wastewater

- Vector-borne with flies/mosquitoes/ cockroaches

- Inhalation of aerosols and particles

World Health Organization

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, system overloading, lack of maintenance
Potential – system failure or accident	• e.g. treatment failure (full or partial), power failures, equipment breakdown
Seasonal factors	• e.g. seasonal behaviour changes by farm workers, seasonal farm workers
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

STEP 3.1

Identify hazards and hazardous events

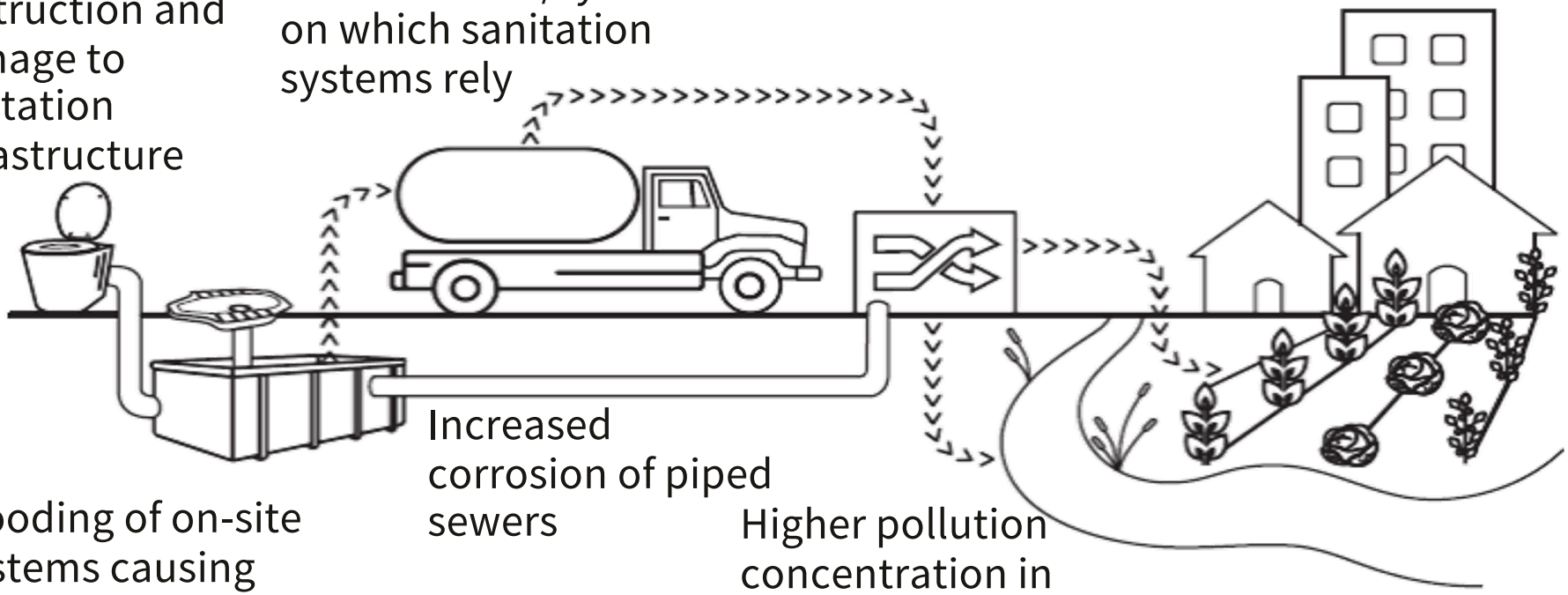
SSP Manual Guidance note 3.4, page 45

Think about climate-related **effects** that affect the sanitation system:

Declining water supply impeding function of water-reliant sanitation systems (e.g., flush toilets, sewerage, treatment)

Damage to other infrastructure/systems on which sanitation systems rely

Destruction and damage to sanitation infrastructure



Increased corrosion of piped sewers

Flooding of on-site systems causing spillage and contamination

Overflow and/or obstruction of sewerage and septic systems

Higher pollution concentration in wastewater and reduced capacity of receiving water bodies to dilute wastewater

Proliferation of algal blooms or microbes carried by vectors in water

World Health Organization

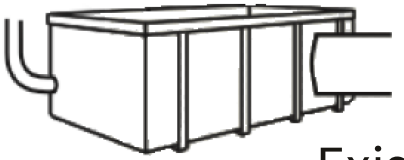
STEP 3.1

Identify hazards and hazardous events

SSP Manual
Example 3.2
Page 42

WHO Guidelines
Chapter 3
Page 34-38

Containment-storage/treatment



Hazardous events:

Existing and potential:

- **Ingestion** of groundwater contaminated with leachate percolating from pits or septic tanks.
- **Ingestion** of groundwater contaminated with leakage from cracked/damaged septic tanks.

TIPS

WHO Guidelines

Table 3.6 – climate change potential impact on septic tanks

Page 55

Climate change related:

- **Ingestion** of pathogens caused by structural damage to tanks during floods.

World Health Organization

STEP 3.1

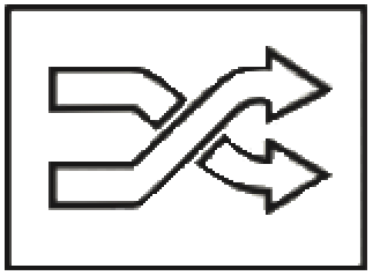
Identify hazards and hazardous events

SSP Manual
Example 3.2
Page 42

WHO Guidelines
Chapter 3
Page 44-49

Hazardous events:

Treatment



WHO Guidelines

Table 3.6 – climate change potential impact on treatment

Page 55

Existing and potential:

- **Inhalation** of aerosols while manual handling of the dried faecal sludge.
- **Ingestion** of pathogens in incompletely treated effluent, resulting from discharge of fresh faecal sludge in wastewater treatment ponds, causing overload and failure.

Climate change related:

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

OBJECTIVE

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

What is a control measure?

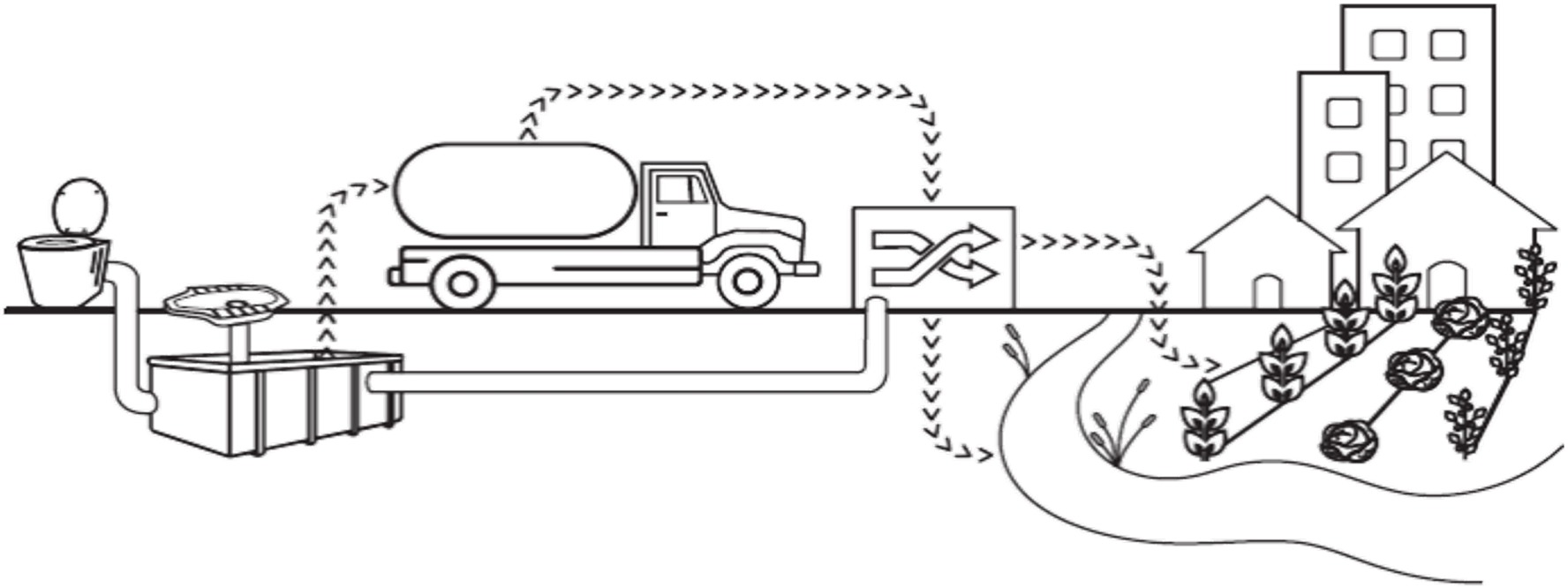
A control measure is any action or activity (or barrier) that can prevent or eliminate a sanitation-related hazard or reduce it to an acceptable level.

STEP 3.2

Identify and assess existing control measures

How do we determine

how effective is a control measure?



STEP 3.2

Identify and assess existing control measures

SSP Manual Guidance note 3.5, page 47

Consider how effective the existing control measure:

1. **could be**, assuming it was always working well (known as CM validation).

    - checking system loading against its design capacity;
    - checking historical performance under unusual conditions;
    - checking the credited reductions of pathogens for control measures.

2. **is in practice**, considering actual site conditions, enforcement of existing rules and regulations and operating practices.

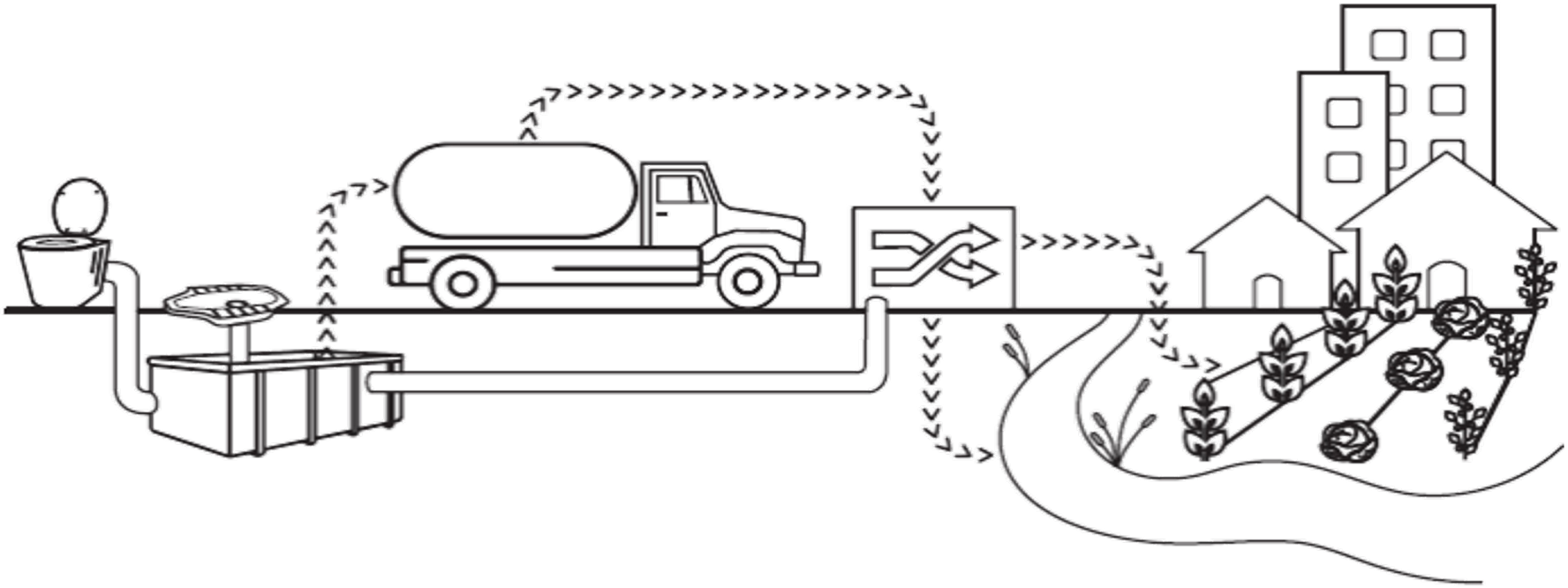
World Health Organization

STEP 3.2

Identify and assess existing control measures

SSP Manual
Guidance note
3.6, page 51

Control measure validation at each step of the sanitation system

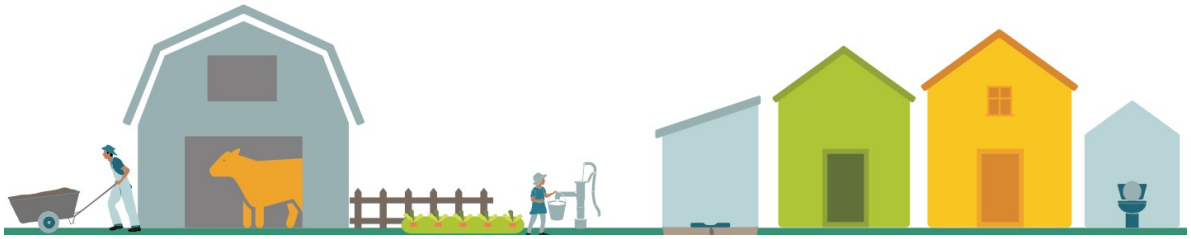


World Health Organization

STEP 3.2

Identify and assess existing control measures

Emptying and transport	Control measure	How effective is it in practice?
	• Preventive emptying • Use of protective personal equipment (PPE)	• Do HHs really call the emptying trucks before the holding tanks are full? • Do the sanitation workers really use the PPE?



Worked example: SSP IN NEWTOWN

COMPONENT	HAZARD IDENTIFICATION				EXISTING CONTROLS		RISK ASSESSMENT						COMMENTS JUSTIFYING RISK ASSESSMENT (Under current conditions, climate change scenarios, or effectiveness of the control)
							Under current conditions L = likelihood; S = severity; R = risk (H = high; M = medium; VH = very high)				Under the most likely climate change scenarios + means increased risk, – means decreased risk, = means the same risk)		
Sanitation step	Hazardous event	Hazard	Exposure group	Number of people at risk	Description	Validation	L	S	Score (LxS)	R	Drought	More intense precipitation	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U1**	30 000	Flush toilets and water supply	Visual and survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there also is not enough water to flush toilets.
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to infiltration from soak pits and septic tanks into shallow groundwater	Faecal pathogens	**L1**	20 000	In some cases, safe distance from wells has been considered.	Field visits	5	4	20	H	+	+	High prevalence of diarrhoea is reported among among young children, especially during the dry season. Likelihood of groundwater use is expected to increase during drought periods. Severity will increase with more and prolonged flooding due to climate change. Consideration should be given to vulnerable communities that may have a reduced ability to find alternative water sources.
		Nitrates and nitrates	**L1** (children less than 5 years old)	8000	Awareness-raising campaigns among mothers	Interviews with mothers	5	8	40	VH	+	+	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with wastewater from overflowing on-site systems due to damage or blockage	All microbial pathogens	**U1**	30 000	Septic tanks and soak pits present problems.	Interviews and field visits	4	4	16	H	-	+	Likelihood and severity will increase with heavy rainfall and flooding.
			L2	50 000			3	4	12	M	-	+	The localized problem of septic tank damage becomes a community problem with flooding, affecting others in the vicinity.
P5 Flush toilets discharging in open drains	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U2**	5000	Flush toilets and water supply	Visual survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there is also not enough water to flush toilets.

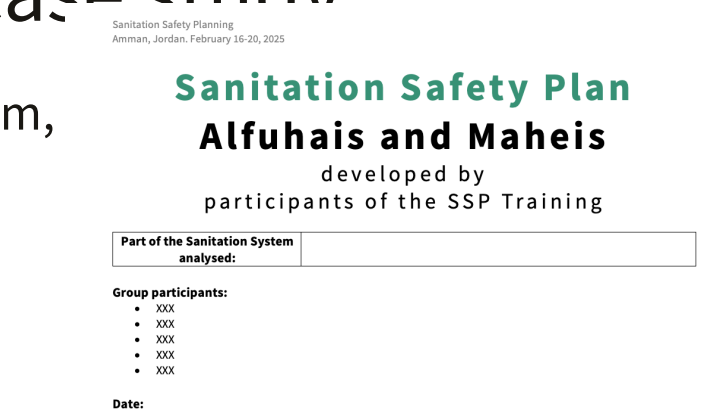
World Health Organization

GROUP WORK

Applying Steps 3.1 and 3.2 to our case study

In your SSP Document, for your assigned sanitation system, identify:

- Hazardous events
- Hazards
- Exposure groups and number of persons in risk
- Existing control measures



Sanitation Safety Planning
Amman, Jordan. February 16-20, 2025

Sanitation Safety Plan

Alfuhais and Maheis

developed by
participants of the SSP Training

Part of the Sanitation System analysed:	

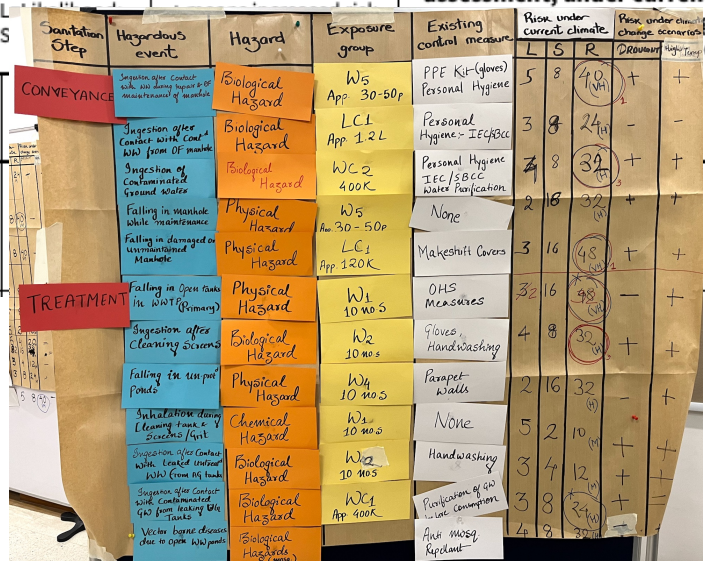
Group participants:

- XXX
- XXX
- XXX
- XXX
- XXX

Date:

Component	Hazard Identification				Existing Control(s)	
Sanitation step	Hazardous event	Hazard	Exposure Groups	Number of persons at risk	Description of existing control	Validation of control

Risk Assessment		
Under current conditions	Under the most likely climate change scenarios:	Comments justifying risk assessment, under current
L S=S L		



In your brown papers, copy the information in colour cards:

Sanitation step	Hazardous event	Hazard	Exposure group	Existing control measure

World Health Organization

MODULE 3

IDENTIFY HAZARDOUS EVENTS, AND ASSESS EXISTING CONTROL MEASURES AND EXPOSURE RISKS

SANITATION
SAFETY
PLANNING

SSP Manual
Pages
37 to 61

SSP Modules

Page 37 of your SSP manual

How significant are the risks?

STEP 3.3

Assess and prioritize the exposure risk

OBJECTIVE

This step uses a structured approach to identify and prioritize the highest risks for which system improvements are needed.

Helps to identify which hazardous events are serious and which are moderate or insignificant.

SSP Manual

Page 50

STEP 3.3

Assess and prioritize the exposure risk

Risk assessment methods

Simple sanitary inspection

- Suited for simple sanitation systems (on-site)

Team-based descriptive

- Limited data

Semi-quantitative

- More experienced and more resourced teams

Quantitative methods

- Specialized studies
- Not used by SSP teams

- Depend on the judgement of the SSP team.

Choose a method that you are comfortable with and that is feasible

STEP 3.3

Assess and prioritize the exposure risk

SSP Manual
Tool 3.5
Page 55

Semi-quantitative risk assessment

- More rigorous risk assessment.
- Appropriated for more well-defined regulatory environments.
- Teams who are familiar with the WSP methodology.

Likelihood (L) x Severity (S) = Risk

	DESCRIPTOR	DESCRIPTION
Likelihood (L)		
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).
Severity (S)		
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 trematodiases, chronic diarrhoea, chronic respiratory problems, neurological disorders, bone fracture), and/or may lead to **legal complaints** and concern, and/or major **regulatory noncompliance**.
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.

STEP 3.3

Assess and prioritize the exposure risk

SSP Manual
Tool 3.6
Page 56

Semi-quantitative risk assessment matrix

Likelihood (L) x Severity (S) = Risk

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

STEP 3.3

Assess and prioritize the exposure risk

COMPONENT	HAZARD IDENTIFICATION				EXISTING CONTROLS		RISK ASSESSMENT: Under current conditions (L = likelihood; S = severity; R = risk (H = high; M = medium; VH = very high))				RISK ASSESSMENT: Under the most likely climate change scenarios (+ means increased risk, – means decreased risk, = means the same risk)		COMMENTS JUSTIFYING RISK ASSESSMENT (Under current conditions, climate change scenarios, or effectiveness of the control)
Sanitation step	Hazardous event	Hazard	Exposure group	Number of people at risk	Description	Validation	L	S	Score (LxS)	R	Drought	More intense precipitation	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U1**	30 000	Flush toilets and water supply	Visual and survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there also is not enough water to flush toilets.
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to infiltration from soak pits and septic tanks into shallow groundwater	Faecal pathogens	**L1**	20 000	In some cases, safe distance from wells has been considered.	Field visits	5	4	20	H	+	+	High prevalence of diarrhoea is reported among among young children, especially during the dry season. Likelihood of groundwater use is expected to increase during drought periods. Severity will increase with more and prolonged flooding due to climate change. Consideration should be given to vulnerable communities that may have a reduced ability to find alternative water sources.
		Nitrates and nitrates	**L1** (children less than 5 years old)	8000	Awareness-raising campaigns among mothers	Interviews with mothers	5	8	40	VH	+	+	

Record the risk assessment for every hazardous event and exposure group

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

STEP 3.3

Assess and prioritize the exposure risk

SSP Manual Guidance note 3.8, page 59

Climate change considerations when assessing risk

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 during drought as the concentration of pollutants would be high

Therefore, we need to:

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

STEP 3.3

Assess and prioritize the exposure risk

SSP Manual Guidance note 3.8, page 59

Example: Hazardous event: Ingestion of contaminated groundwater due to leakage from sewers and drains into shallow groundwater

Exposure group: local community

Risk assessment
under current conditions

Likelihood 4 (likely) x Severity 4 (moderate)= Risk 16 (medium)

Under drought/dry conditions scenario	Under floods/wet conditions scenario
+ risk increases	+ risk increases
Under drought, the likelihood of collecting water for drinking from shallow sources increases.	Under flooding scenarios, the quality of groundwater is affected by pollutants.

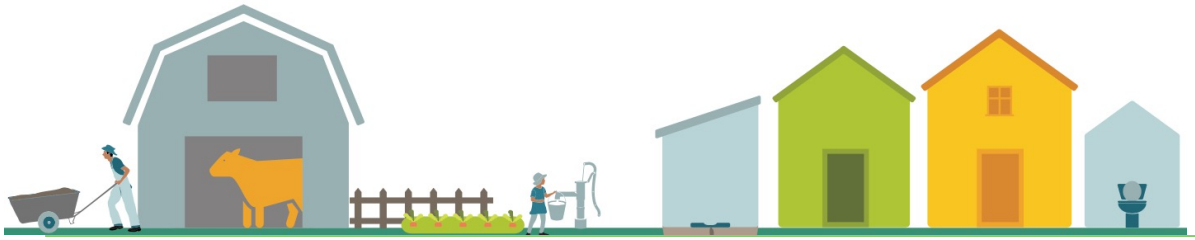
STEP 3.3

Assess and prioritize the exposure risk

SSP Manual Guidance note 3.8, page 59

Risk assessment for climate change and climate variability

COMPONENT	HAZARD IDENTIFICATION				EXISTING CONTROLS		RISK ASSESSMENT						COMMENTS JUSTIFYING RISK ASSESSMENT (Under current conditions, climate change scenarios, or effectiveness of the control)
							UNDER CURRENT CONDITIONS, ALLOWING FOR THE EXISTING CONTROLS (L = likelihood; S = severity; R = risk level (e.g. high))				UNDER THE MOST LIKELY CLIMATE CHANGE SCENARIOS (In the cells below, record two scenarios, e.g. drought, heavy rainfall. + means increased risk, – means decreased risk, = means the same risk)		
Sanitation step	Hazardous event	Hazard	Exposure groups	Number of people at risk	Description of existing control measure	Validation of control	L	S	Score (LxS)	R	Scenario 1	Scenario 2	
											Drought	More intense precipitation, floods	
Conveyance	Ingestion of contaminated groundwater due to leakage from sewers into shallow groundwater	All pathogens	Local community	50 000	Awareness-raising campaigns to encourage families to use household water treatments (HWTS) such as filters and chlorination	Not effective – household-level surveys show that families are not using HWTS	4	4	16	H	+	+	Under drought, the likelihood of collecting water for drinking from shallow sources increases. Under flooding scenarios, the quality of groundwater is affected by pollutants.



Worked example: SSP IN NEWTOWN

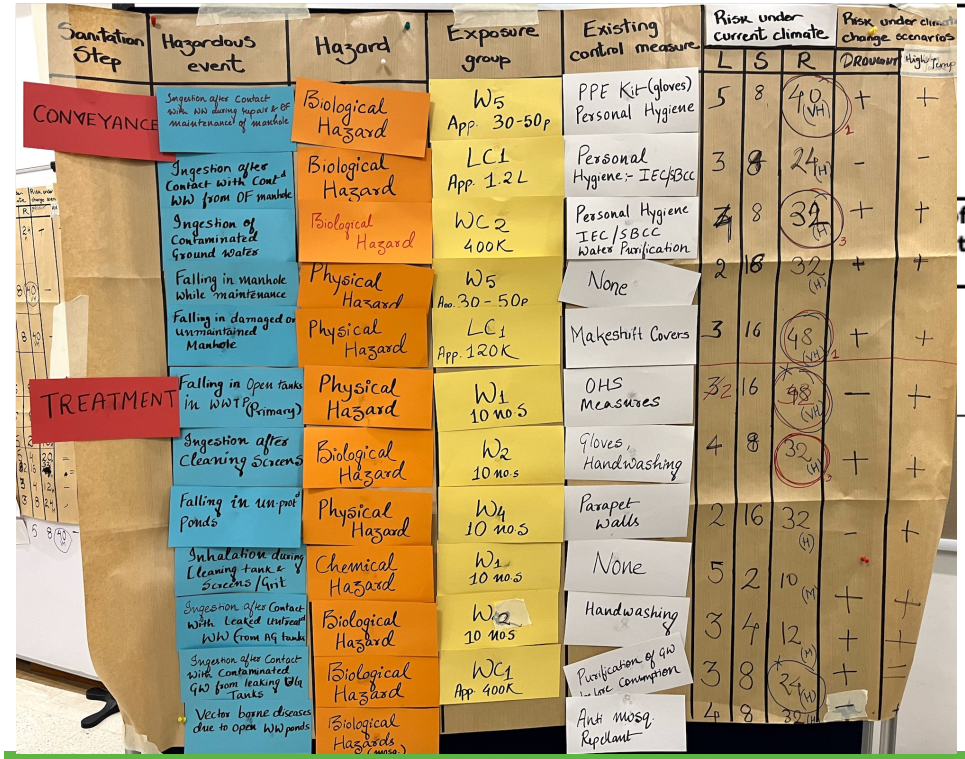
COMPONENT	HAZARD IDENTIFICATION				EXISTING CONTROLS		RISK ASSESSMENT						COMMENTS JUSTIFYING RISK ASSESSMENT (Under current conditions, climate change scenarios, or effectiveness of the control)
							Under current conditions L = likelihood; S = severity; R = risk (H = high; M = medium; VH = very high)				Under the most likely climate change scenarios + means increased risk, – means decreased risk, = means the same risk)		
Sanitation step	Hazardous event	Hazard	Exposure group	Number of people at risk	Description	Validation	L	S	Score (LxS)	R	Drought	More intense precipitation	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U1**	30 000	Flush toilets and water supply	Visual and survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there also is not enough water to flush toilets.
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to infiltration from soak pits and septic tanks into shallow groundwater	Faecal pathogens	**L1**	20 000	In some cases, safe distance from wells has been considered.	Field visits	5	4	20	H	+	+	High prevalence of diarrhoea is reported among among young children, especially during the dry season. Likelihood of groundwater use is expected to increase during drought periods. Severity will increase with more and prolonged flooding due to climate change. Consideration should be given to vulnerable communities that may have a reduced ability to find alternative water sources.
		Nitrates and nitrates	**L1** (children less than 5 years old)	8000	Awareness-raising campaigns among mothers	Interviews with mothers	5	8	40	VH	+	+	
P1 Toilet and containment–storage/ treatment with soak pits and septic tanks	Ingestion after contact with wastewater from overflowing on-site systems due to damage or blockage	All microbial pathogens	**U1**	30 000	Septic tanks and soak pits present problems.	Interviews and field visits	4	4	16	H	-	+	Likelihood and severity will increase with heavy rainfall and flooding.
			L2	50 000			3	4	12	M	-	+	The localized problem of septic tank damage becomes a community problem with flooding, affecting others in the vicinity.
P5 Flush toilets discharging in open drains	Ingestion after contact with excreta in nonfunctional toilets	All microbial pathogens	**U2**	5000	Flush toilets and water supply	Visual survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions, and there is also not enough water to flush toilets.

GROUP WORK

Applying Steps 3.3 to our case study

In your SSP Document, for your assigned sanitation system:

- Assess risk under normal conditions
- Choose two climate change scenarios
- Assess risk under climate change scenarios



Existing Control(s)			Risk Assessment						
			Under current conditions L=Likelihood; S=Severity; R=Risk				Under the most likely climate change scenarios: + means increased risk - means decreased risk = means the same risk		Comments justifying risk assessment, under current conditions or climate change scenarios, or effectiveness of the control
	Description of existing control	Validation of control	L	S	Score	R			

In your brown papers, using black markers, fill in the risk assessment table

Sanitation Safety Planning
Amman, Jordan. February 16-20, 2025

Sanitation Safety Plan
Alfuhais and Maheis
developed by
participants of the SSP Training

Part of the Sanitation System analysed:	

Group participants:
- XXX
- XXX
- XXX
- XXX
- XXX

Date:

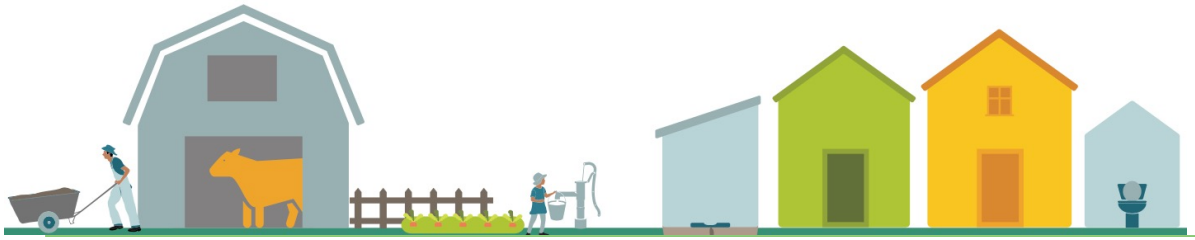
STEP 3.3

Assess and prioritize the exposure risk

Prioritization of hazardous events

TOOL 3.8. Template to prioritize hazardous events according to results of semi-quantitative risk assessments

Sanitation step	Hazardous event	Exposure group	Number of people at risk	Risk (Low, medium, high or very high)	Projection of changes in risks with climate change scenarios	Priority (Low, medium, high or very high)



Worked example: SSP IN NEWTOWN

Newtown's prioritized hazardous events with very high risk

Sanitation step	Hazardous event	Exposure group	Number of people at risk	Risk	Projection of changes in risks with climate change scenarios	Priority given
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to leakage from soak pits and septic tanks into shallow groundwater	L1 (children less than 5 years old)	8000	Very high	Increases during drought and heavy rains	Very high
P4 Disposal of faecal sludge in open drains	Ingestion after contact with faecal sludge discharged without treatment to open drains	L2	50 000	Very high	Increases with flooding	Very high
P6 Use of wastewater in agriculture	Ingestion after contact with raw sewage from open drains during farming activities	F	150	Very high	Increases during drought	Very high

Newtown's prioritized hazardous events with high risk

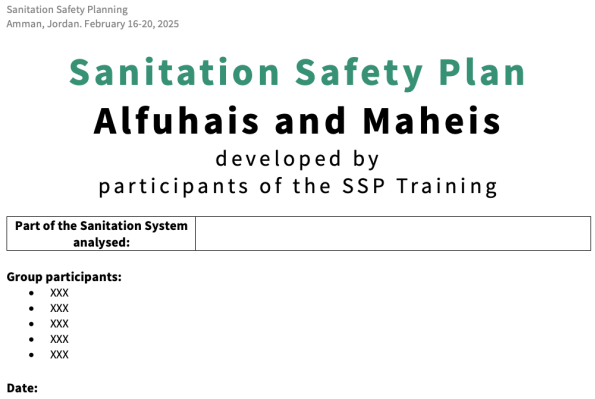
Sanitation step	Hazardous event	Exposure group	Number of people at risk	Risk	Projection of changes in risks with climate change scenarios	Priority given
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to leakage from soak pits and septic tanks into shallow groundwater	L1	20 000	High	Increases during drought and heavy rains	High
T1 Conveyance by vacuum trucks	Injury to the body, possible asphyxiation, caused by entering or falling into soak pits or septic tanks	W1	60	High	Stability of the tanks can be affected by flooding	High
T2 Open drains	Ingestion after contact with raw sewage in open drains during maintenance activities	W2	6	High	Remains high	High
T2 Open drains	Ingestion after contact with raw sewage in open drains	L2	50 000	High	Increases in both scenarios	High
T2 Open drains	Enhanced transmission of malaria caused by mosquito (vector) breeding in stagnant water	L2	50 000	High	Increases in heavy rains	High
P6 Use of wastewater in agriculture	Dermal contact with raw sewage (hookworm) in open drains during farming activities	F	150	High	Increases in both scenarios	High
P6 Use of wastewater in agriculture	Dermal contact with wastewater (hookworm) in areas near farming plots	L3	750	High	Increases in both scenarios	High
P6 Use of wastewater in agriculture	Enhanced transmission of malaria caused by mosquito (vector) breeding in stagnant water	L3	750	High	Increases in heavy rains	High
P7 Consumption of agricultural products	Consumption of contaminated produce grown with raw sewage in open drains	C	1000	High	Increases in drought	High

GROUP WORK

Applying Steps 3.3 (cont.) to our case study

In your SSP Document, for your assigned sanitation system:

- After the assessment, make a list of the prioritised risks



Sanitation Safety Planning
Amman, Jordan. February 16-20, 2025

Sanitation Safety Plan

Alfuhais and Maheis

developed by
participants of the SSP Training

Part of the Sanitation System analysed:	

Group participants:

- XXX
- XXX
- XXX
- XXX
- XXX

Date:

After discussions with your team, write in the following table which are the hazardous events that you will prioritize.

Sanitation step	Hazardous event	Exposure Group	Number of persons at risk	Risk	Projection of changes in risks with climate change scenarios	Priority given

World Health Organization

MODULE 3

IDENTIFY HAZARDOUS EVENTS, AND ASSESS EXISTING CONTROL MEASURES AND EXPOSURE RISKS

SANITATION
SAFETY
PLANNING

World Health Organization