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.

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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

Team-based 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

Sanitary inspection forms – simplified assessments

WHO Sanitary Inspections for Sanitation Systems

I. GENERAL INFORMATION

A. Location

Provide the following information on the location of the toilet facility.

A1. Village/town	_____	A5. GPS coordinates	_____
A2. District	_____	A6. Householder name	_____
A3. Province	_____	A7. Contact no.	_____
A4. State	_____	A8. Inspector name/ID	_____

B. Setting

The following factors describe the potential for risks or challenges to be present in the local area surrounding the toilet. Select the appropriate level for each setting factor based on the descriptions provided.

Risk	Low	Med.	High
B1. Population density – Density of people living in the immediate area - **Low** – Rural or low-density settlement with significant open space between houses – sufficient space for a properly functioning pits or septic system with soak pit or leach field - **Medium** –neighborhood, small town or village center - dwellings are spaced far enough apart to accommodate pits or septic tanks but many are too close together for proper soak pit or leach field or space to dig additional pits to bury faecal sludge. - **High** – urban areas with multistory buildings and houses with minimal open land between them – not enough land area for a properly functioning septic system and soak away and no space to dig additional pits to bury faecal sludge	☐	☐	☐
B2. Difficulty accessing the toilet – How difficult is it for a service provider to access the toilet to remove sludge using a manual or motorized emptying method - **Low** – the pit / septic tank is easy to reach by truck or gulper device; access is available through a removable cover - **Medium** – the pit / septic tank can be reached but with some degree of difficulty due to the location or the design of the tank - **High** – household is difficult to reach by truck due to high density or narrow streets; or, the pit / septic tank itself is **difficult to** access due to its location on the property or lack of a removable cover	☐	☐	☐

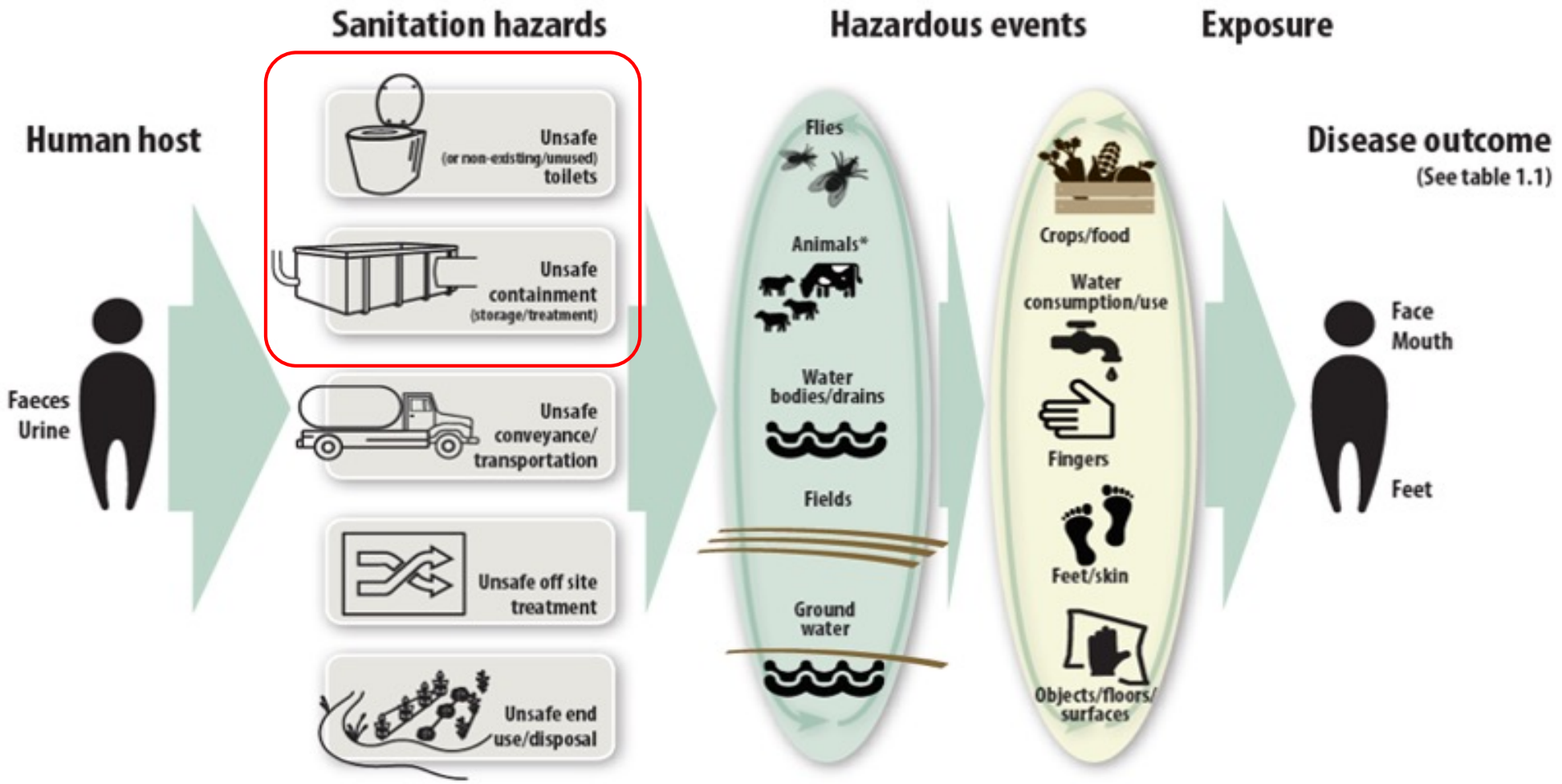
D. Toilet and containment risks

Category	Risk: None/ Low	Risk: Minor	Risk: Major	Corrective action (select all that apply)
D1. Security and privacy Ingress of rainwater may cause the pit to fill up and overflow. Animals, rodents, insects, etc. entering the toilet and/or pit can damage the facility and carry excreta to the community. A door lockable from the inside and a working light will help provide privacy and security to the user.				
1a. What is the condition of the toilet superstructure? The toilet superstructure or enclosure refers to the walls, roof, and door of the toilet. Ingress of rainwater may cause the pit to fill up and overflow. Animals, rodents, insects etc. entering the toilet and/or pit can damage the facility and carry excreta to the community.	○ No problems observed	*Household toilet* ○ Incomplete ○ Damaged	*Shared toilet* ○ Incomplete ○ Damaged ○ Absent or missing	○ None ○ Repair existing superstructure ○ Roof ○ Walls ○ Door ○ Other (specify)
1b. Does the design of the toilet prevent other people from seeing what someone is doing when they use it?	○ Yes	*Household toilet* ○ No ○ Don't know	*Shared toilet* ○ No ○ Don't know	○ None ○ Install visual barrier ○ Curtain/blind/shutter ○ Wall ○ Door ○ Other (specify)___
1c. Does the toilet provide security to the intended users? A door that can be locked from the inside and a working light will help provide security.	○ Yes	*Household toilet* ○ No ○ Don't know	*Shared toilet* ○ No ○ Don't know	○ None ○ Install lock ○ Install light ○ In assistance for users with physical disability ○ Handrail ○ Wheelchair access
D2. Toilet cleanliness If the toilet is not kept clean, the users may be exposed to excreta when using the toilet and/or this may discourage toilet use.				
2a. Is the toilet dirty with visible excreta on surfaces?	○ No	*Household toilet*	*Shared toilet*	○ None

It is a short-standardized observation checklist that can be adapted and used to assess risks and identify appropriate remedial actions to meet SMS definitions and protect public health.

STEP 3.3

Assess and prioritize the exposure risk



Source: Guidelines on sanitation and health. Geneva: World Health Organization, 2018

STEP 3.3

Assess and prioritize the exposure risk

BENEFITS

- ☑ User friendly – can be used by non-specialists
- ☑ Easy and quick hazard identification
- ☑ Suitable with limited amount of time and resources
- ☑ Can be easily adapted to different contexts

LIMITATIONS

- ⓧ Limited number of questions
- ⓧ Risks below ground and inside containment are not easily observed
- ⓧ Assumes every risk has an equal value
- ⓧ Requires adaptation to local context

World Health Organization

STEP 3.3

Assess and prioritize the exposure risk

WHO Sanitary Inspections for Sanitation Systems

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STEP 3.3

Assess and prioritize the exposure risk

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Tool 3.5
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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.

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Assess and prioritize the exposure risk

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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

World Health Organization

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.

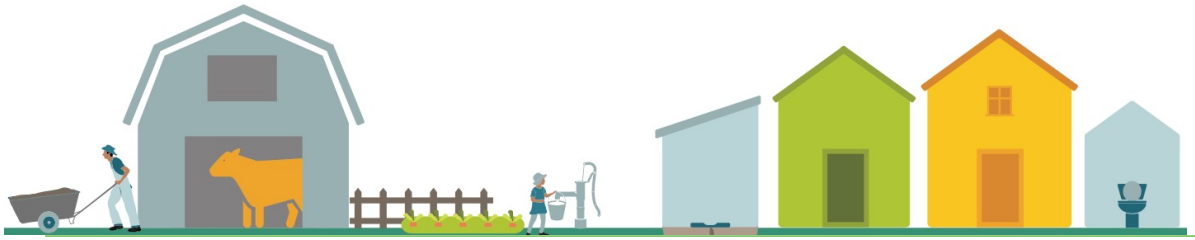
STEP 3.3

Assess and prioritize the exposure risk

Prioritization of hazardous events

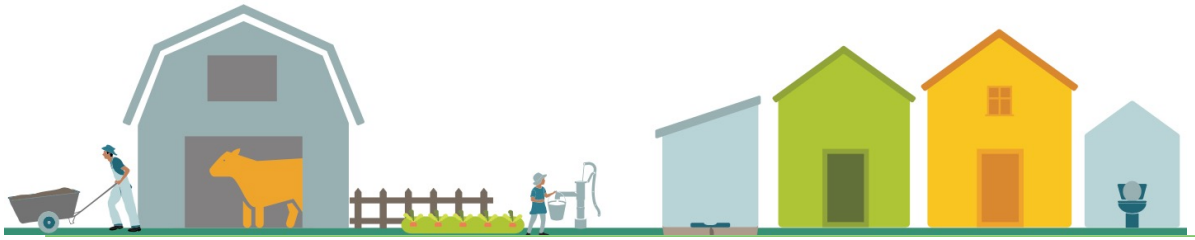
TOOL 3.8. Template to prioritize hazardous events according to results of semi-quantitative risk assessments

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

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.



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

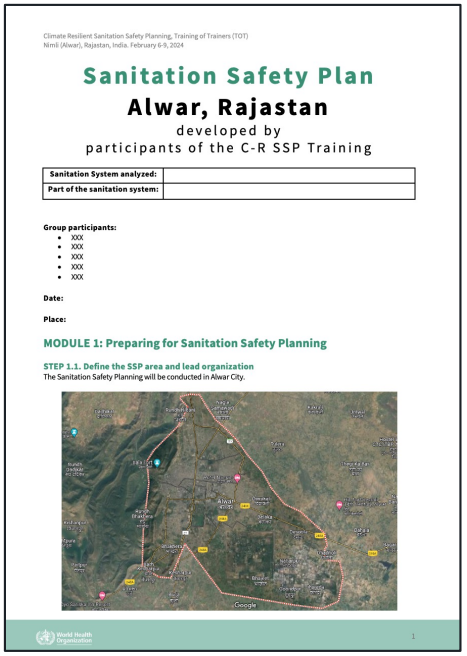
Sanitation step	Hazardous event	Exposure group	Number of people at risk	Risk	Projection of changes in risks with climate change scenarios	Priority given
P2 Disposal of liquid fraction by infiltration	Ingestion of contaminated groundwater due to leakage from soak pits and septic tanks into shallow groundwater	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 to our Alwar case study

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

- Assess risk under normal conditions
- Choose two climate change scenarios
- Assess risk under climate change scenarios
- After the assessment, make a list of the prioritised risks



Climate Resilient Sanitation Safety Planning, Training of Trainers (TOT)
Nimli (Alwar), Rajastan, India. February 6-9, 2024

Sanitation Safety Plan

Alwar, Rajastan

developed by
participants of the C-R SSP Training

Sanitation System analyzed:	
Part of the sanitation system:	

Group participants:

- XXX
- XXX
- XXX
- XXX
- XXX

Date:

Place:

MODULE 1: Preparing for Sanitation Safety Planning

STEP 1.1. Define the SSP area and lead organization
The Sanitation Safety Planning will be conducted in Alwar City.

World Health Organization 1

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments justifying risk assessment, under current conditions or climate change scenarios, or effectiveness of the control
							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		
Sanitation step	Hazardous event	Hazard	Exposure Groups	Number of persons at risk	Description of existing control	Validation of control	L	S	Score	R			

3 MODULE

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

SANITATION
SAFETY
PLANNING