Building climate-resilient WASH services in health-care facilities

Guide for players and facilitators
Abstract
This instruction manual describes scope, purpose and provides instructions on how to conduct tabletop simulation on building climate-resilient WASH services in health-care facilities. The aim of the tabletop simulation is to improve knowledge and skills for the development of WASH services at the health-care facility level, including in resource-limited settings, and enhance the capacity of health-care facilities to protect and improve the health of their target communities in an unstable and changing climate. The tabletop simulation is designed for public health professionals, WASH specialists and hospital administration.

Keywords
WATER, SANITATION AND HYGIENE
CLIMATE-RESILIENT SERVICES
TABLETOP SIMULATION


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**Contents**

Acknowledgments .................................................................................. 2

Contents of a tabletop simulation ......................................................... 3

Video instruction to facilitation .............................................................. 3

Description .......................................................................................... 4

Introduction to game ........................................................................... 5

Simulation setup .................................................................................. 6

Simulation phases ................................................................................ 7

Simulation domains ............................................................................ 9

Income generation ............................................................................... 11

Winning points calculation ................................................................. 11

Alternative gameplay variations/difficulty settings ............................. 12

Dispute resolution .............................................................................. 13

Annex 1. Cost of cards (including discounts) ...................................... 14

Annex 2. Specific cards ....................................................................... 16

Annex 3. Gameplay example ................................................................. 17
Acknowledgments

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The tabletop simulation was developed using funding from the United States of America Centers for disease control.
Contents of a tabletop simulation

Climate cards: 4
Domain cards: 16 (4 per each domain)
Electricity cards: 6 (5 development; 1 action)
Water supply cards: 18 (7 development; 11 action)
Sanitation cards: 13 (11 development; 2 action)
Waste management cards: 18 (17 development; 1 action)
Health-care facility cards: 1
Personnel cards: 9
d6 dice: 1
Water pipes: 10 pieces
Sanitation pipes: 10 pieces
Cubes: 100 pieces (four colours: water – blue; sanitation – green; waste management – red; energy – yellow)
Currency: 1, 2, 5 and 10 credits (20 cards are available for each)
Facilitator’s notes: 1

Video instruction to facilitation can be found via the QR-code:
Description

Fully functioning water, sanitation, hygiene (WASH) and health-care waste management services are a critical aspect of infection prevention and control (IPC) practices, and ensuring patient safety and quality of care. Such services are essential for creating an environment that supports the dignity and human rights of all care seekers, especially mothers, newborns, children and care providers. WASH and waste services are also critical for preventing and effectively responding to disease outbreaks.¹

As the climate continues to change, risks to health systems and facilities including hospitals, clinics and community care centers are increasing, reducing the ability of health professionals to protect people from a range of climate hazards.²

The aim of this simulation game is to improve knowledge and skills for the development of WASH services at the health-care facility level, including in resource-limited settings, and enhance the capacity of the staff of health-care facilities to protect and improve the health of their target communities in an unstable and changing climate.

This document is a guide that provides a description of the simulation game to participants and step-by-step instructions to facilitators on how to use the simulation for knowledge and skills improvement.

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Introduction to game

You are a WASH team in a newly constructed health-care facility. The layout of the facility is displayed in Fig. 1. There are seven units: an intensive care unit, a surgical unit with operation theaters, a maternity unit with delivery rooms, a therapeutic unit, an emergency unit, a kitchen, and other services (e.g. laundry, central sterile unit).

As a WASH team, you are responsible for four WASH domains: water, sanitation, waste management, and energy. Currently all the domains have no appropriate services. For water, the facility is using a lake 750 metres away; for sanitation, there are non-functioning pit latrines; there is no waste separation and treatment, and disposal is happening near the facility; and there is no electricity. Each of the domains can be improved to a “Limited”, “Basic” or “Advanced” level through the procurement of development cards.

You have 250 credits at the start of the simulation and will receive an additional 75 or 100 credits each round of the simulation. In total, you will receive from 550 to 475 credits during the simulation.

The simulation consists of four rounds. Each round consists of four consecutive stages: the development phase, quality control phase, action phase, and calculation phase. During the development phase, you should request actions that you would like to implement, and the facilitator will tell you the cost of the actions and provide you with a specific card for credits. Also, you can procure personnel cards that will help you to improve WASH domains and respond to climate changes. Once you have decided to stop the development of the health-care facility for this round, based on your knowledge and skills, you should notify the facilitator.

During the quality control phase, the facilitator will conduct quality control (described in the quality control phase) and inform participants about outcomes.

During the action phase, the facilitator will reveal a climate event (in case it is still unknown) and respond to the climate event by procuring additional cards.

After you have managed the climate event, the outcome of the climate event will be recorded and credits will be given to you, which is the calculation phase. You can start a new round and new improvement of WASH domains. After you have improved one of the domains for all the departments in the facility, the facilitator will change the level of WASH domain to “Limited”, “Basic” or “Advanced”.

Each of the WASH domain levels gives you points: no services means −2 points; limited is −1; basic is 0; and advanced is 1. A penalty of −1 point will be given for bad water quality each round and points will be calculated for the management of climate events. At the end of the simulation, you should have 1 or more points. If you have 0 or less, you have failed to improve WASH services and build a climate-resilient health-care facility.

Enjoy!
Simulation setup

The setup in Fig.1 provided below should be used to prepare for the start of the simulation and provides information on the placement of cards at the beginning of the simulation.

Fig. 1: Example of a simulation setup
Player’s notes

If you are a participant in this simulation, this step-by-step guide will help you to:

• familiarize yourself with the layout of the health-care facility;
• familiarize yourself with the four domains of WASH you will be responsible for;
• familiarize yourself with personnel cards and decide whom you would like to hire (you can hire personnel at any point of the simulation);
• familiarize yourself with the development and activity cards (for easy mode only);
• request the facilitator (person who leads the simulation) to provide you with information about the availability and cost of any specific actions for WASH improvement you would like to implement;
• inform the facilitator once you decide to stop development for a specific round (after the development phase is ended, other phases will be initiated);
• feel free to ask any questions you want; and
• ensure that you have consensus on decisions before communicating them to the facilitator.

Enjoy the simulation!

Simulation phases

The simulation consists of four rounds. Each round consists of four consecutive phases:

1. Development phase
2. Quality control phase
3. Action phase
4. Calculation phase

Development phase

Participants procure development, action and personnel cards during this phase. Cards represent the procurement of various advancements and upgrades within the facility.

Information about a card’s cost can be provided by the facilitator only upon request, and a card can be issued to the participants only if there is consensus in the team; a card can be procured using the credits that participants receive at the beginning of the simulation.

The four WASH domains include water, sanitation, waste management, and energy. When any of these is improved for a specific unit (e.g. maternity unit or kitchen) at a health-care facility, the colour cube with the respective colour (Water – blue;
Sanitation – green; Waste management – red; Energy – yellow) should be placed immediately on the unit card. The lack of a cube represents no services for a unit, one cube represents limited services, two cubes is basic services, and three cubes is advanced services. Once improvements for all departments are achieved, according to the requirements of WASH domains (each department has one, two or three cubes for a specific domain), the domain card is changed to the respective level immediately.

During this phase, all types of cards can be procured. When participants notify the facilitator that they have finished development, the quality control phase starts.

Quality control phase

If, during the development phase, the participants tested water for the presence of bacteria (with the coliforms test card), the facilitator does not make a test and uses the result of the participants’ test. If, during the development phase, the participants tested water for the presence of residual chlorine (with the water test on residual chlorine card), the facilitator does not make a test and uses the result of the participants’ test. If tests were not done, the facilitator rolls the six-sided die (d6 die) to determine the presence of coliforms:

- `• •` – represents absence
- `• •` – is 1-10 coliforms
- `• •` – is more than 100 coliforms.

Similarly, the facilitator rolls a d6 die to determine the presence of residual chlorine:

- `• •` – represents less than 0.2 mg/L
- `• •` – is 0.2-0.5 mg/L
- `• •` – is more than 0.5 mg/L.

(if chlorination was not done, then residual chlorine is absent).

If there are no bacteria in the water OR the residual chlorine level is normal during the quality control phase, participants receive 0 points. If there are bacteria in the water AND the residual chlorine level is below normal during the quality control phase, participants receive –1 point.
Action phase

The facilitator opens the climate event card (if not opened previously) and they determine the intensity of the event by rolling a d6 die:

- low,
- medium,
- high,

Add all the modifiers on development, action, personnel and domain cards. The final result of a die roll plus all modifiers determines the intensity of the climate event. If intensity is more than 3 (high), climate events occur with high intensity. If intensity is less than 1 (low), climate events occur with low intensity (a “Disease outbreak” climate event has a unique “minimal” intensity that can only be achieved via player actions). If the “Hydrometeorologist” and/or “Adaptation planner expert” personnel cards are played, the intensity of the event is determined by a d6 die roll at the beginning of the developmental phase or once the card is played; however, the effects of modifiers are added only at the beginning of the action phase.

During the action phase, participants cannot procure personnel or development cards but can procure action cards.

Additional water testing for bacteria should be conducted if water contamination is mentioned on the climate event card.

After participants notify, the facilitator that they have finished the management of a climate event, the calculation phase starts.

Calculation phase

The facilitator reviews the outcome of the climate events and records points for management, including points from the quality control phase. The facilitator defines the number of credits that participants will receive: 100 credits if 4, 5 or 6 are rolled with a d6 die, and 75 credits if 3, 2 or 1 are rolled. Players receive 100 credits each round immediately if the personnel card called “WASH leader” was procured. A new round can now be started.

Simulation domains

There are four levels of each domain:

- no services
- limited
- basic
- advanced.

Players always start the simulation with the level “no services” in all domains. The level of domain can be changed only if the condition of level (written on the card)
is applied to all units in the health-care facility. If the conditions for improvement of a domain were achieved for a specific unit, then it should be reflected by adding a cube on the unit card:

- 0 cubes means no service
- 1 cube is limited
- 2 cubes is basic
- 3 cubes is advanced.

When all units reach a certain level of domain (e.g. limited, meaning 1 cube on each card), then the domain card should be changed for the entire health-care facility, reflecting the current level of the domain.

**Water**

The four levels for water are shown here:

- No service: water is available from a lake (750 metres away from the hospital).
- Limited: water is available from a protected water source (written on development and action cards).
  - Basic: piped water is from a protected source available in all units.
  - Advanced: piped water is from a protected source available in all units, including hot water and a shower in all units.

**Sanitation**

The four levels for sanitation are shown here:

- No service: a pit latrine is not functioning.
- Limited: improved sanitation is available (written on development and action cards).
  - Basic: improved sanitation is available (written on development and action cards) and there is access to menstrual hygiene (card) and accessibility for people with limited mobility (card).
  - Advanced: sanitation with flush to piped sewer system is available with appropriate treatment facility.

**Waste management**

The four levels for waste management are shown here:

- No service: there are no waste separation or treatment practices.
- Limited: there is waste separation for at least one category but not for all three (general waste, sharp waste, infectious waste), and there is availability of basic treatment and disposal methods (written on development and action cards).
  - Basic: there is waste separation for three categories and availability of basic treatment and disposal methods (written on development and action cards).
  - Advanced: there is waste separation for the three categories, availability of advanced treatment and disposal methods (written on development and action cards),
and safe handling practices (i.e. personal protective equipment (card) and a trolley for waste movement (card)).

**Energy**

The four levels for energy are shown here:

- No service: no electricity is available.
- Limited: electricity exists for at least 12 hours but not 24 hours, in each unit.
- Basic: electricity exists for 24 hours in each unit.
- Advanced: electricity exists for 24 hours in each unit and a back-up source (additional source or generator) is available for surgery, maternity and intensive care units.

**Income generation**

At the beginning of a simulation, participants receive 250 credits. During the calculation phase of each round, the facilitator defines the number of credits, as noted above. During the simulation, participants will receive in total from 475 to 550 credits. Players can receive additional income by procuring playing cards with different impacts. Once cards are procured, income is provided immediately, and only one time per simulation.

If participants have credits at the end of the round, these will be transferred to the next round.

**Winning points calculation**

Players receive winning points for: i) the level of development of the four simulation domains (water, sanitation, waste management, electricity); ii) the outcome of response to climate events; and iii) penalties for water quality.

For each level of development of the four simulation domains at the end of the game, participants can receive: \(-2, -1, 0\) or 1 points based on the level that was achieved.

If there are no bacteria in the water OR the residual chlorine level is normal during the quality control phase, participants receive 0 points. If there are bacteria in the water AND the residual chlorine level is below normal during the quality control phase, participants receive \(-1\) point.

For each climate event management, players can receive \(-1, 0\) or 1 point based on performance and the climate event outcome (detailed information is provided on the cards).

**Simulation results**

- If the final score is 0 or below, participants failed to improve WASH services and build a climate-resilient health-care facility.
If the final score is 1 and above, participants were able to improve WASH services and build a climate-resilient health-care facility.

The maximum score of the game is 8 points.

**Example**

Points for development of WASH domains include:

- water development level: limited water supply = −1 points
- sanitation development level: basic sanitation = 0 points
- waste management development level: no service = −2 points
- electricity development level: advance electricity = 1 point.

Penalties for water quality include:

- after round one: bacteria in water and low chlorine = −1 point
- after second round: no bacteria in water = 0 points
- after third round: normal chlorine = 0 points
- after fourth round: normal chlorine = 0 points.

Outcome of response to climate events include:

- flood: unmanaged bacterial contamination of water = −2 points
- drought: patients in non-critical units are without water for 1 day maximum = 0 points
- disease outbreak: spread of diseases prevented = 1 point
- temperature extreme: all departments with electricity and water = 1 point.

Total:

−1 + 0 + (−2) + 1 + (−1) + 0 + 0 + 0 + (−2) + 0 + 1 + 1 = −1 (total game result).

In this example, participants failed to improve WASH services and build a climate-resilient health-care facility.

**Alternative gameplay variations/difficulty settings**

The simulation can be played in two modes: easy and advanced.

**The easy mode** is preferable for non-WASH experts and for the general public, if the simulation has the main purpose of raising awareness about WASH and climate resilience. To use this mode, all development and action cards should be provided to participants to choose from, so that they know what the options are. Cards become active only after procurement.

**The advanced mode** is appropriate for WASH experts. For the advanced mode, all development and action cards should remain undisclosed by a simulation facilitator. Only upon a request from the participants about which item or action they would like to have or conduct, does the facilitator provide the cost of the card or inform them that such an action is not possible (in case there is no such card in the deck). The facilitator can increase the complexity of the game by requesting
technical details or standards that participants would like to have or achieve by purchasing cards.

There are three variants on how climate events can be used during the simulation:

• standard
• random for four different climate events
• completely random.

For the “Standard” variant, climate cards are put in the following order:

• flood in the first round
• drought in the second round
• disease outbreak in the third round
• temperature extremes in the fourth round.

Climate events are not visible for participants unless they have a personnel card that can reveal the climate event.

For the “Random for four different climate events” variant, four different climate cards are located randomly for each round, so for each round there will be a new climate card. Climate events are not visible for participants unless they have a personnel card that can reveal the climate event.

For the “Completely random” variant, climate events cards are selected randomly before each round from the joint pool (where all climate events are pooled together), so there is a chance that the same climate event will happen several times during the simulation. Climate events are not visible for participants unless they have a personnel card that can reveal the climate event.

It is recommended to use the “Standard” variant for the initial simulation and to use other variants if the simulation is repeated.

Requirements for advanced services in WASH domains may be different for different countries and can be adjusted to the country context.

**Dispute resolution**

If there is no direct explanation in the rules, all disputes are resolved by simulation facilitators. Keep in mind that the main aim of the simulation is to improve knowledge and skills rather than score the maximum number of points.
Annex 1. Cost of cards (including discounts)

Table A1.1 provides information on the cost of cards that are used for the simulation.

**Table A1.1: Cost of cards (including discounts)**

<table>
<thead>
<tr>
<th>Card name</th>
<th>Card cost</th>
<th>Card cost with discount</th>
<th>Application</th>
<th>Condition for discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatologist</td>
<td>10</td>
<td>-</td>
<td></td>
<td>For the entire simulation</td>
</tr>
<tr>
<td>Hydrometeorologist</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality specialist</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil protection expert</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptation planner expert</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water resources specialist</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste management specialist</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitation specialist</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WASH leader</td>
<td>10</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical grid</td>
<td>5</td>
<td>-</td>
<td>12 hours</td>
<td>for 1 unit</td>
</tr>
<tr>
<td>Solar energy</td>
<td>6</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy for pumping water</td>
<td>1</td>
<td>-</td>
<td>For 1 pipe</td>
<td></td>
</tr>
<tr>
<td>Energy for a water heating station</td>
<td>5</td>
<td>-</td>
<td>For 1 unit</td>
<td></td>
</tr>
<tr>
<td>Backup energy source</td>
<td>5</td>
<td>-</td>
<td>24 hours</td>
<td>for 1 unit</td>
</tr>
<tr>
<td>Energy-efficient lighting</td>
<td>1</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General waste bin</td>
<td>2</td>
<td>1</td>
<td></td>
<td>For 1 unit</td>
</tr>
<tr>
<td>Infectious waste bin</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharps container</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trolley for waste movement</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal protective equipment</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste bin for recycling</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste storage area</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite burial in pits (basic disposal)</td>
<td>3</td>
<td>2</td>
<td>For hospital</td>
<td></td>
</tr>
<tr>
<td>Encapsulation of sharps waste (basic disposal)</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical treatment of waste (basic treatment)</td>
<td>5</td>
<td>4</td>
<td></td>
<td>Waste management specialist</td>
</tr>
<tr>
<td>Collection of waste by uncertified treatment facility (basic disposal)</td>
<td>2</td>
<td>1</td>
<td>For 1 unit</td>
<td>Waste management specialist</td>
</tr>
<tr>
<td>Collection of wastes by appropriate treatment facility (adequate disposal)</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfection in autoclave (adequate treatment)</td>
<td>15</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incineration in high-temperature industrial incinerators (adequate disposal)</td>
<td>25</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incineration in high-temperature industrial incinerators with dust filter (adequate disposal)</td>
<td>30</td>
<td>29</td>
<td></td>
<td>For hospital</td>
</tr>
<tr>
<td>Incineration in high-temperature industrial incinerators with dust filter and energy recovery (adequate disposal)</td>
<td>55</td>
<td>54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ash pit for incinerator</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste minimization practices</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Card name</td>
<td>Card cost</td>
<td>Card cost with discount</td>
<td>Application</td>
<td>Condition for discount</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-----------</td>
<td>-------------------------</td>
<td>---------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Borehole (protected water source)</td>
<td>15</td>
<td>13</td>
<td>For hospital</td>
<td>Water resources specialist</td>
</tr>
<tr>
<td>Protected dug well (protected water source)</td>
<td>10</td>
<td>8</td>
<td>For hospital</td>
<td></td>
</tr>
<tr>
<td>Water pipe</td>
<td>8</td>
<td>6</td>
<td>For hospital</td>
<td>Water quality specialist</td>
</tr>
<tr>
<td>Water chlorination</td>
<td>6</td>
<td>3</td>
<td>For hospital</td>
<td></td>
</tr>
<tr>
<td>Water test on residual chlorine</td>
<td>4</td>
<td>2</td>
<td>For hospital (per 1 round)</td>
<td>Water quality specialist</td>
</tr>
<tr>
<td>Fecal indicator bacteria test</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap and sink</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower</td>
<td>5</td>
<td>3</td>
<td>1 per unit</td>
<td></td>
</tr>
<tr>
<td>Deep borehole (protected water source)</td>
<td>40</td>
<td>38</td>
<td>For hospital</td>
<td>Water resources specialist</td>
</tr>
<tr>
<td>Rainwater collection system</td>
<td>5</td>
<td>3</td>
<td>For hospital</td>
<td></td>
</tr>
<tr>
<td>Water storage tank</td>
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<td>Drinking water station</td>
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<tr>
<td>Drinking water transportation to the hospital</td>
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<tr>
<td>Water for non-drinking use transportation to the hospital</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Testing for water pipe leakage</td>
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<td>8</td>
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<td>Search for open water storage within facility</td>
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<td>3</td>
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<td>Environmental modification</td>
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<td>For hospital</td>
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<tr>
<td>Advanced water filtration</td>
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<td>13</td>
<td></td>
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<tr>
<td>A stormwater and greywater collection system</td>
<td>10</td>
<td>8</td>
<td>For hospital</td>
<td></td>
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<tr>
<td>Septic tank (improved sanitation facility)</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Ventilated-improved pit latrines (improved sanitation facility)</td>
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<td>3</td>
<td></td>
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<tr>
<td>Sewage pipes</td>
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<td>6</td>
<td></td>
<td></td>
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<tr>
<td>Toilet</td>
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<td>3</td>
<td></td>
<td>Sanitation specialist</td>
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<td>Hand hygiene station</td>
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<td>3</td>
<td></td>
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<tr>
<td>Fecal sludge off-site transportation</td>
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<td>Fecal sludge treatment</td>
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<tr>
<td>Testing for sewage pipes leakage</td>
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<tr>
<td>Menstrual hygiene supplies</td>
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<td>1</td>
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<tr>
<td>Toilet for people with limited mobility</td>
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<tr>
<td>Pit latrine</td>
<td>3</td>
<td>1</td>
<td>For 1 unit</td>
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</tbody>
</table>
Annex 2. Specific cards

1 Water pipe and tap and sink
   Two water pipes needed to connect a water source with the closest department (unit) and 1 pipe to connect with the next department. Water pipes are considered not functional if a “Tap and sink” card is absent for the department.

2 Sanitation pipe and toilet
   Two sewage pipes are needed to connect the closest department with the sewer collection system and 1 pipe to connect one department. Sewage pipes are considered not functional if a “Toilet” card is absent for the department.

3 Incinerator and ash pit
   “Intensity of flood” card increases by one if an incinerator is present and an ash pit is absent.

4 Electricity supply and water pipes
   Electricity supply is needed for water pipes, including 1 credit for the card "Energy for pumping water" per pipe for the whole game and additional energy (2 credits) if the card "Deep borehole" is present.

5 Testing cards
   The following cards – “Water chlorination”, “Water test on residual chlorine” and “Coliforms test” – are active only for one test and should be bought for each new test during the round or for a new test in the next round. After use, put the card bottom up.
Annex 3. Gameplay example

Image 1 provides an example of a standard game progression.

Image 1: Gameplay example
The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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