



Food and Agriculture Organization  
of the United Nations

## HACCP – STEP 6, PRINCIPLE 1

CONDUCT A  
**HAZARD  
ANALYSIS**

FAO Good Hygiene Practices (GHP) and  
Hazard Analysis and Critical Control Point  
(HACCP) Toolbox for Food Safety

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## **HACCP – STEP 6, PRINCIPLE 1**

# **CONDUCT A HAZARD ANALYSIS**

FAO Good Hygiene Practices (GHP) and  
Hazard Analysis and Critical Control Point  
(HACCP) Toolbox for Food Safety

Required citation:

FAO. 2023. *Conduct a hazard analysis – Step 6, Principle 1*. FAO Good Hygiene Practices (GHP) and Hazard Analysis and Critical Control Point (HACCP) Toolbox for Food Safety. Rome. <https://doi.org/10.4060/cc6260en>

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**CONDUCT A  
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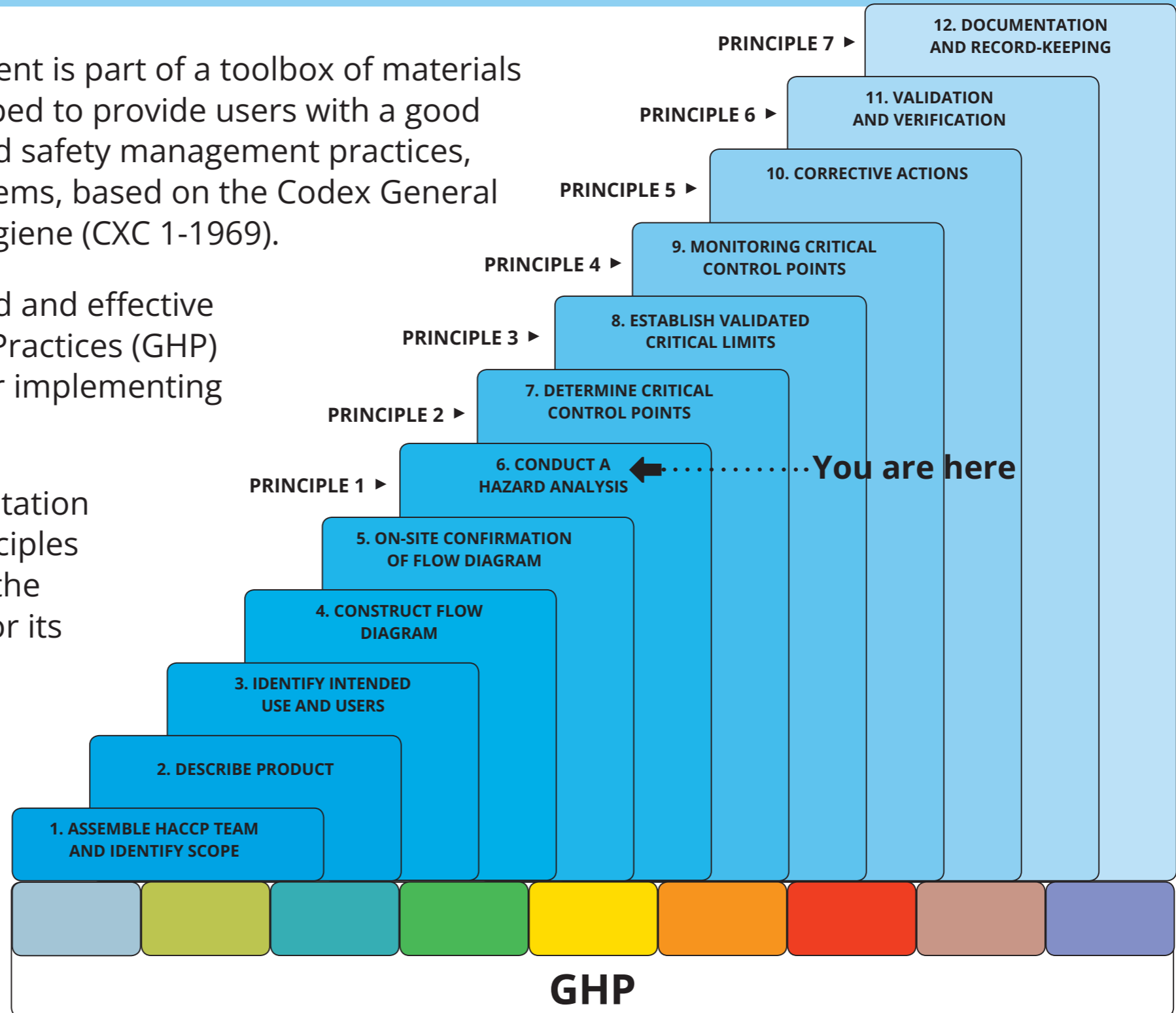
**INTRODUCTION**

This guidance document is part of a toolbox of materials and has been developed to provide users with a good understanding of food safety management practices, including HACCP systems, based on the Codex General Principles of Food Hygiene (CXC 1-1969).



Well established and effective Good Hygiene Practices (GHP) set the foundation for implementing a HACCP system.

This graphic representation shows the seven principles of HACCP along with the 12 successive steps for its application.



## CONTEXT

A hazard analysis consists of identifying potential hazards and evaluating these hazards to determine which are significant for the specific food and food business operation. Hazards that should be prevented, eliminated or reduced to acceptable levels to produce safe food should be identified and appropriately controlled. In some cases, specific hazards can be controlled by applying good hygiene practices and programmes. In other instances, control measures will need to be applied within the production or processing process, e.g. at Critical Control Points (CCPs).

There are various sources of information available to help identify hazards in foods and to explain the hazard analysis for a particular food or process, including commodity-hazard-specific risk assessments and generic HACCP plans.

### Learning objectives

This document provides guidance on how to:

- identify all the potential hazards in a process that may reasonably be expected at each step in the process;
- conduct a hazard analysis for each product or process type that takes into consideration the likelihood of a hazard occurring and the severity of the consequences if it does occur;
- evaluate the control measures that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level; and



- **document these steps as part of the HACCP plan.**

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## HACCP STEP 6

**Principle 1:** Conduct a hazard analysis and identify control measures

**Step 6:** List all potential hazards that are likely to occur and associated with each step, conduct a hazard analysis to identify the significant hazards, and consider any **measures to control** identified hazards

### Codex definitions:

**Hazard:** A biological, chemical or physical agent in food with the potential to cause an adverse health effect.

**Hazard analysis:** The process of collecting and evaluating information on hazards identified in raw materials and other ingredients, the environment, in the process or in the food, and conditions leading to their presence to decide whether or not these are significant hazards.

**Significant hazard:** A hazard identified by a hazard analysis, as reasonably likely to occur at an unacceptable level in the absence of control, and for which control is essential given the intended use of the food.

**Control measure:** Any action or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.





## HACCP STEP 6

### Hazard analysis

To develop a successful HACCP plan, the HACCP team needs to identify all potential hazards in the process, evaluate their level of risk to determine which of them are significant hazards for the food operation then consider measures to control these hazards.



#### Things to consider

Hazards and risks are different for each food business operation.

- Each business should focus on its own hazards and develop its own HACCP plan.
- It is possible to use generic HACCP plans and HACCP form templates (preferably those created for the same process and food type) for guidance and to support the hazard analysis process. However, they should be adjusted and tailored to the specific process and operation.
- A hazard analysis copied from another food business might miss potential hazards and result in ineffective control measures and an ineffective HACCP plan.

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### Things to consider

Hazard control relies on solid Good Hygiene Practices (GHP).

- Verified, well-functioning prerequisite GHP programs are essential to minimize potential hazards.
- If solid GHP are not in place, a business cannot reduce the hazards to a manageable number and focus their HACCP system on the controls of significant hazards.

Know the type of hazards.

- Not all hazards are equally relevant to each food type, product, production process or processing operation.
- Certain hazards are inherent to the particular raw material, food product, while other hazards can be introduced during processing or from the processing environment.
- Some hazards, such as chemical residues, once introduced into the food chain, are very difficult to control and should be addressed at primary production stages. Other hazards, such as certain bacteria, may be ubiquitous.



The HACCP team is responsible for documenting the hazard analysis and decision-making process. An auditor may request a documented rationale to support the inclusion or exclusion of a particular significant hazards within the HACCP plan.

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### The Codex structured approach to hazard analysis

Conducting a hazard analysis includes the following:

- a.** listing all the potential hazards that may be present at each step in the process, from primary production to processing, manufacturing and distribution, until the point of consumption;
- b.** determining which hazards are significant in terms of being reasonably likely to occur at an unacceptable level and potentially affecting safety of the ingredients, processes and products of the food business; and
- c.** describing how significant hazards are controlled within the food business operations (through hazard prevention, elimination or reduction to acceptable levels).

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### a. List all potential hazards

Begin hazard analysis by compiling the list of all potential hazards. All actual or potential hazards that may occur in each ingredient and at each stage of the process should be considered. The HACCP team should use the flow diagrams constructed and confirmed in HACCP Steps 4 and 5 to conduct this analysis, and should consider the following when identifying hazards:

- ingredients, additives, raw materials (considering their origins);
- food contact materials, surfaces, water and air;
- how the product is prepared and sold;
- the process that is applied (requiring a solid knowledge of the technological aspects and workflow, as well as following the process);
- how the product will be used (for example, chilled, refrigerated, as an ingredient);
- the standards the product should comply with (such as, export and import regulations, special customer requirements, etc.);

**cont.**

## HACCP STEP 6

- the final consumer (considering, in particular, whether there any vulnerable groups among the consumers); and
- any processes that might be applied to control the hazard.

### **Particular attention should be paid to the following points when preparing the list of potential hazards:**

- Identify the type of hazard (biological, chemical or physical) which is reasonably likely to occur in each step of the process (considering all inputs in that step).
- Hazards should be recorded clearly, providing specific information, including the type and name of the hazard and describing the source or reason for its presence (e.g. metal from broken blades from chopping, *E. coli* O157:H7 from faecal contamination during evisceration).
- The hazard analysis can be simplified by breaking down complex manufacturing operations and analysing steps in the multiple flow diagrams described in Step 4.

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### b. Identifying significant hazards

In this step, the potential hazards will be narrowed down to the most significant hazards associated with the food or the process under consideration. During this step, each potential hazard is evaluated based on the severity of the potential hazard and the likelihood of its occurrence.

In determining whether there are significant hazards, the following aspects should be considered:

- hazards that **occurred previously or that are associated with producing or processing the type of food**, including its ingredients and process steps (drawing this information from surveys, sampling and testing of hazards in the food chain, recalls, information in the scientific literature and epidemiological data);
- the **likelihood of occurrence of hazards** in the absence of additional controls, considering prerequisite programs;
- the likelihood and **severity of adverse health effects** associated with the hazards in the food, in the absence of controls;
- identified **acceptable levels** of the hazards in the food, for instance, according to regulations, intended use and scientific information;

**cont.**

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- the **nature of the facility and equipment** used in making the food product (for example, grinders could introduce metal shavings, packing into glass jars could cause breakages on the line, and meat slicers can provide harbourage sites for microorganisms);
- survival or multiplication of **pathogenic microorganisms**;
- production or persistence of **toxins** (such as mycotoxins), **chemicals** (such as pesticides, drug residues and allergens) and **physical agents** (such as glass and metal) in both raw material and final food products;
- the **intended use** and the probability of **product mishandling** by potential consumers, which could render the food unsafe; and
- conditions leading to all the above.

After having completed the above steps, the HACCP team should be able to decide **whether the risk of the hazard is negligible, low, medium or high** to understand which hazards are reasonably likely to occur in the absence of control and reasonably likely to cause illness or injury.

cont.

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To decide on the priority level of a hazard, consider the following points, answer these three questions:

- How would the hazard affect a consumer?
- What is the severity of the hazard?
- Has the hazard occurred previously and is it likely to occur in the near future?



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Consider all hazard-related experiences and available data.

### In your business

- recalls experienced;
- analytical data from sampling and testing;
- records of business complaints (for example, a complaint about a product containing metal splints, pointing to a maintenance problem; or information about bloated tins in storage, indicating that the heat treatment is ineffective);
- list of non-conforming products; and
- surveillance and monitoring data (microbiological or chemical analysis results).

### In other businesses and in the scientific literature

- available hazard databases from various national and international authorities;
- generic HACCP models, specific to particular commodities and processes; and
- scientific advice and commodity specific risk assessments produced by international organization and committee, such as the Joint FAO/WHO Scientific Advice Programmes.



**More information on hazard analysis is available in Supporting documents.**

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### **c. Control significant hazards**

After identifying the significant hazards, the HACCP team should decide how a significant hazard is controlled at each step of the process. Effective control measures should be identified or designed that will prevent, eliminate or reduce to an acceptable level each hazard.

The HACCP team should:

- describe the control measures for each significant hazard (for example, GHP measures that are in place or processes designed to eliminate each hazard);
- identify the food safety outcomes or targets required; and
- provide evidence that demonstrates that the control measures are capable of controlling hazards to an acceptable level, if properly implemented (by validating the control measures).

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### Things to consider

- Even with effective control measures, a hazard can be present but may not pose a serious risk.
- A single significant hazard may need more than one control measure. (For instance, to control *L. monocytogenes*, a heat treatment may be needed to kill the organism in the food and cleaning and disinfection may be needed to prevent the transfer of the organism from the processing environment.)
- A single control measure may address more than one significant hazard. (For instance, a heat treatment can control both *Salmonella* and *E. coli* O157:H7 when they are present as hazards in the food.)
- Listing all the measures used to control hazards in each food production step will enable the HACCP team to determine whether the necessary controls are in place.
- Identify processing steps where controls are missing.
- Identify hazards that are not being effectively controlled, as measures may need to be adjusted, replaced or changed.

## HACCP STEP 6

### Documenting the hazard analysis

Food businesses should document the hazard analysis for their own records and for food safety inspectors, clients and auditors who expect to be shown a documented and clearly understandable hazard analysis (See **Supporting documents** for templates and examples).



A hazard analysis worksheet should be prepared in such a way that hazards are clearly identified and necessary controls are clearly described for each process step.

The following is an example of a hazard analysis table.

#### TIPS

The hazard analysis form or table should also include:

- a clear description of the hazard
- the significance of the hazard (risk level)
- control measures for the hazard



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Process step	Description of problem	Hazard type			Description of hazard
		B	C	P	
<b>Preparing raw material</b>	<ul style="list-style-type: none"> <li>Raw material contaminated with microorganisms, dirt.</li> <li>Storage temperatures too high.</li> </ul>	X			Contamination with microorganisms can lead to food poisoning and bad quality of final product.
	<ul style="list-style-type: none"> <li>Animal fed with contaminated feed or on medication.</li> </ul>		X		Residues of unwanted chemicals can interfere with fermentation and lead to rejection of final product.
	<ul style="list-style-type: none"> <li>Bits of hard matter present in milk.</li> </ul>			X	Stones or other hard bits can be chocked on by customers or lead to lesions or a broken tooth.
<b>Filtering</b>	<ul style="list-style-type: none"> <li>Filter is not clean.</li> </ul>	X			Contaminations of milk with microorganisms.
	<ul style="list-style-type: none"> <li>Residues of cleaning chemicals.</li> </ul>		X		Residues of unwanted chemicals can interfere with fermentation and lead to rejection of final product.
	<ul style="list-style-type: none"> <li>Filter broken.</li> </ul>			X	Physical contaminants are not removed.
<b>Heating</b>	<ul style="list-style-type: none"> <li>Required heating temperature not reached/time of heating too short.</li> </ul>	X			
	<ul style="list-style-type: none"> <li>Residues of cleaning chemicals.</li> </ul>		X		Residues of unwanted chemicals can interfere with fermentation and lead to rejection of final product.
				X	

**B: biological hazard    C: chemical hazard    P: physical hazard**

## HACCP STEP 6

### Updating the hazards analysis

The HACCP team should convene on a regular basis to re-assess the hazards.

Hazards and risks might change over time for a specific food or process due to:

- a change in raw materials, which can introduce new hazards;
- process changes, which can lead to new hazards or conditions leading to their presence;
- product formulation changes, which can lead to new hazards and conditions leading to their presence; and
- new consumers, who might belong to a vulnerable population group.


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In order to control the emergence of new hazards or new hazard risk combinations, the HACCP team should **consult relevant publications**, including:

- newsletters, databases and guidance material made available by competent authorities;
- business association guidance materials, publications and information events;
- legal texts that can provide guidance on the hazards a business should focus on;
- scientific publications;
- websites and publications of international organizations (such as Codex, the Food and Agriculture Organization of the United Nations [FAO], the World Health Organization [WHO] and the World Organisation for Animal Health [WOAH]); and
- press and social media.

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**EXERCISE: FOOD SAFETY FOR THOUGHT**

<p>This is the little “game” we created. This will apply to all HACCP steps, except the intro.</p>	<p><b>GHP PROGRAMMES</b> </p> <ul style="list-style-type: none"> <li data-bbox="987 613 1509 705">1. INTRODUCTION AND CONTROL OF FOOD HAZARDS <input type="checkbox"/></li> <li data-bbox="987 746 1509 838">2. PRIMARY PRODUCTION <input type="checkbox"/></li> <li data-bbox="987 878 1509 970">3. ESTABLISHMENT - DESIGN OF FACILITIES AND EQUIPMENT <input type="checkbox"/></li> <li data-bbox="987 1011 1509 1103">4. TRAINING AND COMPETENCE <input type="checkbox"/></li> <li data-bbox="987 1144 1509 1236">5. ESTABLISHMENT MAINTENANCE, DISINFECTION, AND PEST CONTROL <input type="checkbox"/></li> <li data-bbox="987 1277 1509 1369">6. PERSONAL HYGIENE <input type="checkbox"/></li> <li data-bbox="987 1410 1509 1502">7. CONTROL OF OPERATION <input type="checkbox"/></li> <li data-bbox="987 1543 1509 1635">8. PRODUCT INFORMATION AND CONSUMER AWARENESS <input type="checkbox"/></li> <li data-bbox="987 1676 1509 1768">9. TRANSPORTATION <input type="checkbox"/></li> </ul>	<p><b>Please explain your choices.</b></p>
<p style="text-align: center;"><b>6. CONDUCT A HAZARD ANALYSIS</b></p>		
<p><b>GHP are fundamental to the successful application of HACCP.</b></p> <p><b>Think of a food operation that you are familiar with, and select those GHP elements that you feel are most relevant for the application of HACCP step 6.</b></p>		



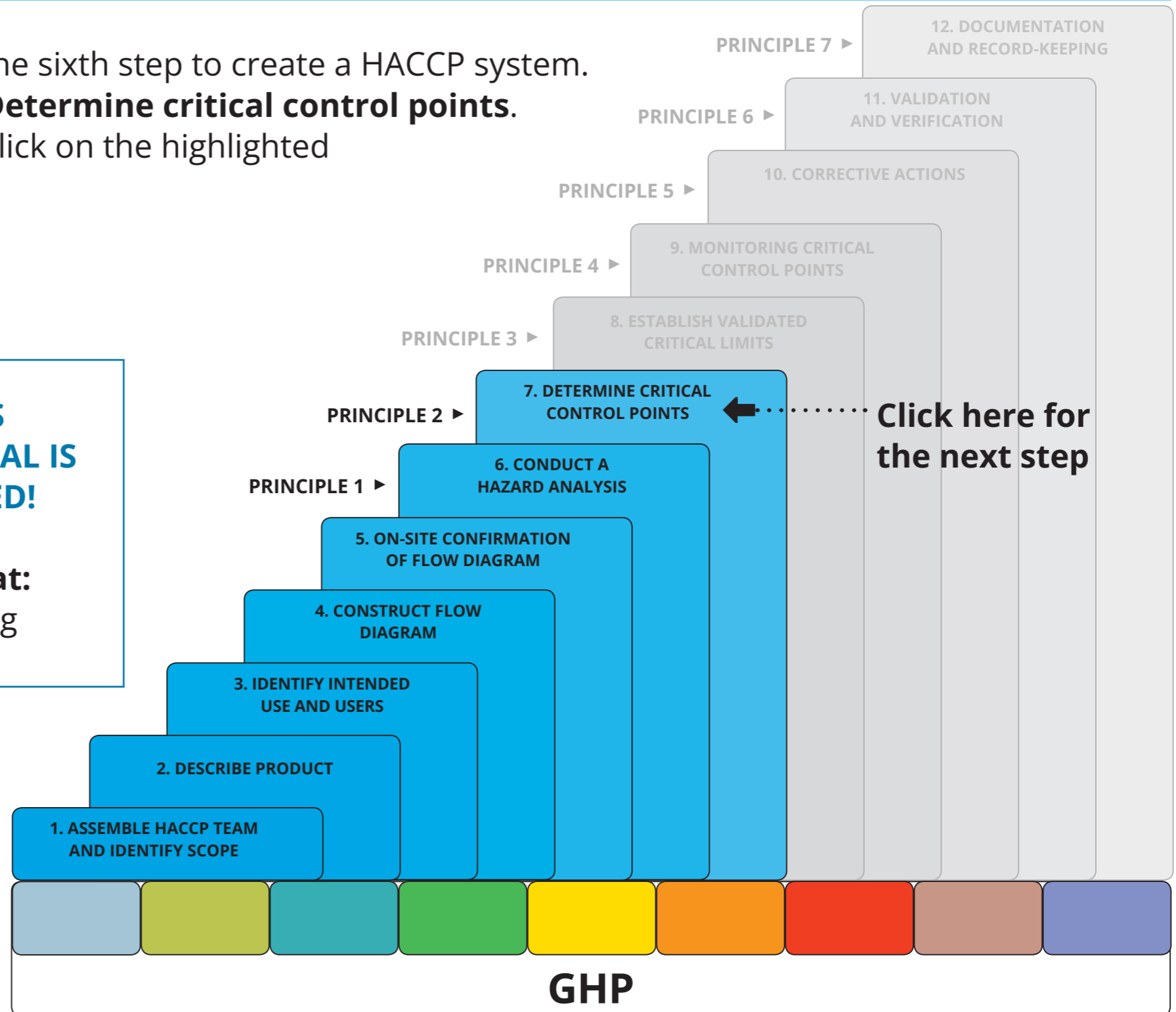
# CONDUCT A HAZARD ANALYSIS

## KEEP READING

You have completed the sixth step to create a HACCP system. The next step will be **Determine critical control points**. To continue reading, click on the highlighted card below.

**FEEDBACK ON THIS GUIDANCE MATERIAL IS ALWAYS WELCOMED!**

**Please contact us at:**  
food-quality@fao.org



## KEEP READING

[GHP and HACCP Toolbox for Food Safety](http://www.fao.org/good-hygiene-practices-haccp-toolbox)

[www.fao.org/good-hygiene-practices-haccp-toolbox](http://www.fao.org/good-hygiene-practices-haccp-toolbox)

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