



N-12 Public Health Nursing I  
Second Semester, Academic Year 2024-2025

**Environmental Health**

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**Learning Outcomes:**

- Discuss the nature and scope of the different aspects of environmental health
- Discuss the available and recommended methods of promoting the different aspects of environmental health
- Explain the role of the nurse in relation to the different aspects of environmental health
- Discuss the effects of the different aspects of environmental health to families and their members

- > Almost 1 in 4 of total global deaths are **LINKED** to environmental conditions ([WHO, 2020](#))
- > Environmental Health monitors the **RELATIONSHIP** between human health and the environment; Good environmental health = Good human health ([Ranniger, 2022](#))
- > Environmental Health is the **ASSESSMENT and CONTROL** of environmental factors that can potentially affect health ([WHO, 2006](#))

**Core Functions** of Public Health Nurses as Framework for *Addressing EH Issues and Promoting Healthier Communities* ([Ochs et al., 2024](#))

- > **Assessment:** Identify hazards, perform data collection and analysis, assess risks, evaluate impact of environment on health
- > **Policy Development:** Collaborate with community partners and local government to advocate for and drive policies
- > **Assurance:** Monitor and evaluate implementation and effectiveness of policies and programs, ensure provision of action, advocate for updates

**I. Water Quality and Wastewater Management**

Philippine National Standards for Drinking Water ([DOH Administrative Order No. 2017-0010](#))

- Must be **clear** and does not have **objectionable taste, odor, and color**; Must be **pleasant to drink** and **free** from *all harmful organisms, chemical substances, and radionuclides*

- Mandatory parameters include *E. coli*, coliform, arsenic, cadmium, lead, nitrate

**Republic Act No. 9275:**

Philippine Clean Water Act of 2004

- Prohibit **discharging, disposing** material of any kind into water bodies or along margins of any surface water
- Prohibit **directly using booster pumps** in distribution system or tampering with water supply

**Presidential Decree No. 856:**

Code on Sanitation of the Philippines

*To protect drinking water from contamination:*

- Prohibit washing clothes or bathing **WITHIN A RADIUS OF 25 METERS** from any well or other source of drinking water
- Prohibit construction of artesian, deep or shallow well **WITHIN 25 METERS** from any source of pollution
- Prohibit storage of radioactive sources/materials **WITHIN A RADIUS OF 25 METERS** from any well or source of drinking water, unless shielded
- Prohibit **installation of booster pump**, where low-water pressure prevails
- > Only **potable water** shall be used in the manufacture of ice
- > Prohibit burial ground **WITHIN 50 METERS** from either side of river or any source of water supply

Groundwater	Surface Water
spring, well	lakes, rivers
clear, free from organic matter and bacteria	vulnerable to pollution: require treatment

Level I (Point Source)	Level II (Communal Faucet System or Stand Posts)	Level III (Waterworks System / Individual House Connections)
outlet but without distribution system	pipelined system: source, reservoir, pipelined distribution network	system: source, reservoir, pipelined distribution network, individual household taps
spring, well	communal / public faucets	individual connections
go to source to fetch water	go to supply point to fetch water	requires minimum disinfection
rural areas	rural and urban fringe areas	urban areas
thinly scattered houses	densely clustered houses	densely populated

- > Pre-Sedimentation: removes/reduces sediment load
- > Coagulation: adds/mixes coagulant to destabilize and bind particulates/contaminants
- > Flocculation: mixes to aggregate into larger flocs
- > Filtration: removes suspended particles
- > Disinfection: doses with chlorine

- > Scum (oil, grease, fats) - lighter than water, float to top
- > Sludge (soil, bones, unconsumed particles) – sinkable, settle at bottom
- > Effluent - left over after scum floated and sludge settled

- > Boiling water: Bring to rolling boil (bubbles are very large and quickly move to surface where they move rapidly and break) for 1 minute.

### Managing wastewater

- > liquid waste from toilet, bathroom, laundry, kitchen of households; usually deposited in septic tanks or disposed through sewer lines (WHO, 2017)
- > used water affected by domestic, industrial, commercial use; 99.9% water and 0.1% organic matter, microorganisms, inorganic compounds being removed (Tuser, 2021)
- > *from ordinary living processes*: bathing, toilet flushing, laundry, dishwashing
- > may be gray water (from showers, baths, dishwashers, sinks other than kitchen sink) or black water (from toilets and kitchen)
- > may contain toxic chemicals, hazardous and organic substances, and pathogenic organisms

### Water-related diseases

- > Water-borne: infections spread through **contaminated drinking water**, such as with human or animal feces
  - Diarrheal diseases: rotavirus, *E.coli*
  - Typhoid fever: bacterium *Salmonella typhi*
- > Water-washed: due to **lack of proper sanitation and hygiene**
  - Ascariasis: eggs in feces, can contaminate soil
  - Ancylostomiasis: infection with hookworm
- > Water-based: infections transmitted through **aquatic invertebrate**
  - Schistosomiasis: infested water
- > Water-related insect vector: transmitted by **insects** that depend on water for propagation

- Malaria: female *Anopheles*
- Lymphatic filariasis: mosquitoes infected with microfilariae
- Japanese encephalitis: mosquito-borne flavivirus

- > Red tide (toxic algal bloom) - a type of harmful algal blooms (HAB); caused when algae, such as phytoplankton, grow out of control and generate toxic effects on fish, shellfish, birds, people. Impacts cut across fishing industry, public health, environment (Gozum, 2023)
  - higher than safe levels of Paralytic Shellfish Poison (PSP), making shellfish collected unsafe to eat (Bureau of Fisheries and Aquatic Resources)
- > Coliform bacteria - found in soil, water, intestinal tract of animals
  - coliform count: frequent hygienic indicator of unsanitary conditions in food and beverage industries / production

## II. Waste Management and Sewage Disposal

### Presidential Decree No. 856:

#### Code on Sanitation of the Philippines

- Septic tank: receives discharge of plumbing system to remove and digest suspended solid matter in sewage; shall not be constructed under any building and **WITHIN 25 METERS** from any source of water supply
- Refuse: refer to all solid waste products (garbage, ashes, manure, dead animals, street sweepings, industrial wastes); in receptacles shall be protected against vermin and other animals; shall be stored in a suitable container while waiting final disposal

### DOH Administrative Order No. 2019-0047:

#### National Standard on the Design, Construction, Operation, and Maintenance of Septic Tank Systems

- Must be desludged **every 4 years** to maintain its designed treatment efficiency
- Practice **water conservation** to prevent overloading the septic tank system
- Keep trees and deep-rooted plants and shrubs away from the immediate area that may **intrude or clog** the system
- **Do not discharge** the following into a septic tank system: any sanitary napkin, clothing or plastic

material or liner; flammable or explosive substance; disinfectant or deodorant, antiseptic or germicide; stormwater; all large objects, food, oil, grease

### Commonwealth Act No. 383:

An Act to Punish the Dumping into any River

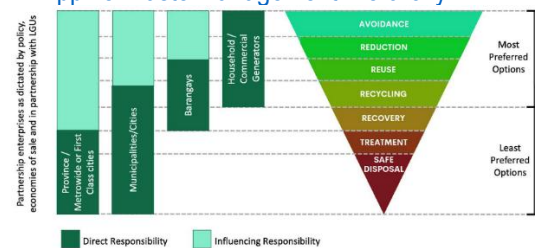
- Prohibit refuse, waste matter, or substances of any kind that may cause **elevation or block**

### Republic Act No. 9003:

Ecological Solid Waste Management Act of 2000

- All collectors and personnel shall be equipped with **personal protective equipment and necessary training**
- There shall be established **Materials Recovery Facility** to receive mixed waste for final sorting, segregation, composting, and recycling
- **No open dumps** shall be established and operated

### Philippine Waste Management Hierarchy



- Preferred waste minimization: **AVOIDANCE** and 3R's: reduction, reuse, recycling
- Emphasis: **minimization of waste**

### Standard Facility Type Classification for SDG Monitoring

WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (2024).

Washdata.org.

<https://washdata.org/monitoring/methods/facility-types>

> standard set of drinking water and sanitation categories that are used for monitoring

- Improved **drinking water sources** - have the potential to deliver safe water by nature of their design and construction
- Improved **sanitation facilities** - designed to hygienically separate excreta from human contact

	DRINKING WATER <sup>2</sup>	SANITATION
<b>Improved facilities</b>	Piped supplies <ul style="list-style-type: none"> <li>• Tap water in the dwelling, yard or plot</li> <li>• Public standposts</li> </ul> Non-piped supplies <ul style="list-style-type: none"> <li>• Boreholes/tubewells</li> <li>• Protected wells and springs</li> <li>• Rainwater</li> <li>• Packaged water, including bottled water and sachet water</li> <li>• Delivered water, including tanker trucks and small carts</li> </ul>	Networked sanitation <ul style="list-style-type: none"> <li>• Flush and pour flush toilets connected to sewers</li> </ul> On-site sanitation <ul style="list-style-type: none"> <li>• Flush and pour flush toilets or latrines connected to septic tanks or pits</li> <li>• Ventilated improved pit latrines</li> <li>• Pit latrines with slabs</li> <li>• Composting toilets, including twin pit latrines and container-based systems</li> </ul>
<b>Unimproved facilities</b>	Non-piped supplies <ul style="list-style-type: none"> <li>• Unprotected wells and springs</li> </ul>	On-site sanitation <ul style="list-style-type: none"> <li>• Pit latrines without slabs</li> <li>• Hanging latrines</li> <li>• Bucket latrines</li> </ul>
<b>No facilities</b>	Surface water	Open defecation

### Ownership of Toilet Facility

> Individual - dedicated **individual household**

> Shared

- local single toilet - shared at local level by a **number of households**
- communal - number of toilets for **predefined community**
- public - in **public areas**, dedicated for everyone

### Types of Toilet Facility

- > Pail system / bucket toilet - uses **bucket / pail**, collects feces and urine together
- > Open pit privy - pit covered by platform with **uncovered hole**
- > Closed pit privy - pit covered by platform with **covered hole**
- > Bored hole latrine - deep but relatively **narrow hole**, made with mechanical / boring equipment
- > Overhung latrine - toilet **house constructed over** body of water
- > Antipolo style - **elevated** toilet house or shallow pit extended upwards
- > Water-sealed latrine - water-sealed **toilet over pit privy**, with S or P bend such that there is water barrier
- > Flush type - waste is disposed **by flushing water through pipes (sewer)** into sewage system or septic tank

### Major Types / Classifications of Waste

- > Biodegradable - can be decomposed by microorganisms into humus-like products

- kitchen/food waste, garden waste, agricultural waste, livestock waste
- > **Recyclable waste** - can be diverted and used for other purposes
  - paper, plastics, glass, metals
- > **Special waste** - must be collected with care and treated and disposed of properly
  - hazardous waste (from manufacturing operations and products), healthcare waste (from health institutions), bulky waste (cannot be placed in separate containers due to size, shape)
- > **Residual waste** - generated after 3Rs reduce, reuse, recycle
  - residuals that can be recycled but not saleable in junk shops, residuals for disposal in sanitary landfills

### Methods of Disposal

- > **Burying** - only **biodegradable** wastes, only for temporary control
  - shall not be less than 1 meter deep, covered with soil: to **prevent excavation**
- > **Hog feeding / feeding to animals** – only if food is **thoroughly cooked**
- > **Composting** - controlled **decomposition** by microorganisms (bacteria and fungi)
- > Garbage collection
- > Eutrophication - due to high population density and lack of appropriate sewage and septage treatment systems
- > Soil-transmitted helminth (STH) infections

### III. Vector Control

Presidential Decree No. 856:

Code on Sanitation of the Philippines

- Construct and maintain **food and drinks spaces** as to exclude vermin (insect/animal vectors)
- Undertake control measures to **eradicate** vectors
- Construct and maintain vermin-proof refuse **cans**

<b><i>Aedes aegypti</i></b>	<b><i>Aedes albopictus</i></b>
- with <b>white/silver</b> scale patches on legs and other parts	- broader temperature range and at <b>cooler temperatures</b>
<b><i>Anopheles</i></b>	<b><i>Culex</i></b>

- lays eggs in <b>marshy areas or near banks</b> of shallow creeks and streams	- lays eggs on surface of <b>fresh or stagnant</b> water
- adult females bite usually <b>late in evening or at night</b>	- looks for water sources to lay eggs after blood feeding
- attracted to <b>dark, sheltered areas</b> for resting during daytime	- <b>don't fly long</b> distances but fly up to 3.2 km

\**Aedes*: *Kadalasang nangangagat sa pagitan ng 6:00-8:00 AM at 4:00-8:00 PM. Tanging ang babaeng lamok lamang ang nangangagat. Nangingitlog sa malinis at hindi dumadaloy na tubig.*

- > flies about 400 feet from breeding ground (can't fly very high but can cover much ground); doesn't fly far from breeding ground and stays close to it

<b>House fly (<i>Musca domestica</i>)</b>	<b>Fruit fly</b>
- typically gray and have four black stripes on thorax	- appear to be brown or tan, usually have red eyes; have a tan thorax with black and grey abdomen
- use mouthparts to liquify solid foods	- eat <b>rotting food matter</b> , especially fruits and vegetables, and any <b>fermenting</b> liquids, like beer, liquor, wine
- capable of transferring more than 100 different pathogens	- breeds in <u>dark, moist, and unsanitary</u> environments, like <b>drains, garbage disposals, and trash bins</b>
- can contaminate food surfaces by spreading disease organisms picked up on their legs and mouths when feeding on <b>trash, feces, and other decaying substances</b>	

<b>American cockroaches</b>	<b>German cockroaches</b>
- red to almost brown, with yellow band	- bronze, half-inch (slightly smaller than American), with two black stripes
- prefers <b>warm and humid</b> environments (sewers and sinks)	- often found in relation to humans and homes

Norway rats ( <i>Rattus norvegicus</i> )	Roof rats ( <i>Rattus rattus</i> )	House mice ( <i>Mus domesticus</i> )
<ul style="list-style-type: none"> <li>- brown with scattered black hairs; gray to white underside</li> <li>- street or sewer rat</li> <li>- have fairly poor vision and colorblind</li> <li>- often rests in <b>basements, piles of debris, sewers</b></li> </ul>	<ul style="list-style-type: none"> <li>- brown with black intermixed; gray, white, or black underside</li> <li>- black rats or ship rats</li> <li>- have large eyes and ears, pointed nose, and scaly tail</li> <li>- <b>contaminate</b> stored food, vectors of dangerous disease</li> <li>- nocturnal, thrive in <b>cold weather</b></li> </ul>	<ul style="list-style-type: none"> <li>- dusty gray with cream belly</li> <li>- spread salmonella through <b>feces</b></li> <li>- bring fleas, mites, ticks, and lice</li> </ul>

#### > Dengue

- Isang impeksyon na dala ng kagat ng babaeng lamok na *Aedes sp.*
- Sintomas: biglaang mataas na lagnat na tumatagal ng 2-7 araw, sakit sa kasukasan at kalamnan, panghihina, rashes sa katawan, pagdurugo ng ilong, pagsusuka at pagtatae na may kasamang dugo
- Makatutulong ang pag-inom ng maraming tubig at pagpapahinga habang nagpapagaling
- Paano maiiwasan?
  - Itaob ang mga lalagyan na maaaring **pag-ipunan ng tubig at pangitlugan** ng mga lamok. Takpan ang iba pang imbakan.
  - I-recycle o itapon ang mga bote at iba pang lalagyan.
  - Magsuot ng long pants at long sleeved na damit.
  - Panatiliing **malinis ang katawan at kapaligiran**.
  - Gumamit ng mosquito repellent araw-araw.

- Makiisa at suportahan ang mga hakbang sa lokal na komunidad.

#### > Leptospirosis

- Sakit na dulot ng *Leptospira bacteria* na nakukuha mula sa ihi ng mga infected na hayop na maaaring makakontamina ang lupa at tubig
- Paano naipapasa? Pagtalsik ng **kontaminadong tubig / ihi** sa mata, ilong at bibig; Pagkain at pag-inom ng **maduming pagkain at tubig**; Paglusong sa maruming tubig habang may **bukas na sugat**
- Sintomas: lagnat, pananakit ng kalamnan, panginig, pananakit ng ulo at katawan, pagtatae, pamamantal, paninilaw ng balat, pamumula ng mata
- Paano maiiwasan?
  - Iwasang maglangoy o lumusong sa **maduming tubig o baha**
  - Gumamit ng bota at gloves kung ang trabaho ay hindi makakaiwas sa maduming tubig
  - Siguraduhin na **malinis ang inuming tubig**
  - Ugaliin ang **tamang pagtatapon ng basura**
  - Panatiliin ang kalinisan ng **bahay at kapaligiran**
  - Maghugas ng **malinis na tubig at sabon** pagkatapos mababad sa kontaminadong tubig

#### IV. Air Quality Control and Sustainable Climate Resilience

Republic Act No. 8749:

Philippine Clean Air Act of 1999

- **Prohibit incineration:** burning of waste, which emits poisonous and toxic fumes
- **Prohibit smoking inside** public building or enclosed public place, vehicle, transport

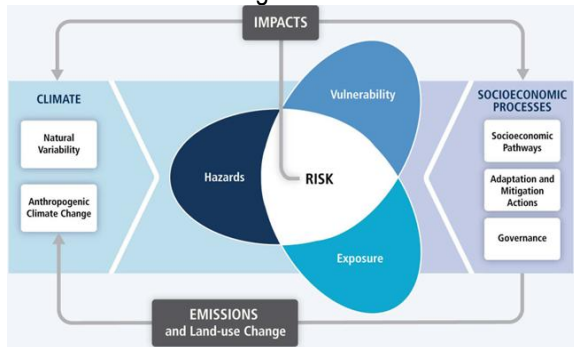
Republic Act No. 9729:

Climate Change Act of 2009

(with amended law [Republic Act No. 10174](#))

- **Climate Risk:** product of climate and related hazards working over vulnerability of human and natural ecosystems
- Barangays shall be **directly involved** with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions.

> Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5): **risk-focused understanding: assessing and managing the risks** of climate change



> Resilience as a system trait overlaps with concepts of **VULNERABILITY, ADAPTIVE CAPACITY,** and thus, risk and resilience as a strategy overlap with risk management, adaptation, and transformation (IPCC AR6)

### Air Quality Index

- > fundamental and understandable tool for gauging air quality and its impact on health
- > developed by United States Environmental Protection Agency
- > based on **5 major air pollutants** regulated by Clean Air Act: ground-level ozone, particulate matter (PM<sub>2.5</sub> [particulate matter with diameter of less than 2.5 micrometers] /PM<sub>10</sub>), carbon monoxide, sulfur dioxide, and nitrogen dioxide
- **Green (0-50) – Good:** Air quality is satisfactory, and pollution poses little or no risk.
- **Yellow (51-100) – Moderate:** Air quality is acceptable; however, there may be concerns for some people sensitive to pollution.
- **Orange (101-150) – Unhealthy for Sensitive Groups:** Sensitive individuals may experience health effects, but the general public is not likely to be affected.

- **Red (151-200) – Unhealthy:** Everyone may start to experience health effects; sensitive groups may experience more serious effects.
- **Purple (201-300) – Very Unhealthy:** Health alert – everyone may experience more serious health effects.
- **Maroon (301-500) – Hazardous:** Health warnings of emergency conditions; the entire population is likely to be affected.

### > Real-Time Ambient Air Quality Monitoring

Air Pollutants	Description	Sources
carbon monoxide	colorless, odorless gas	incomplete burning of carbon-based fuels, including gasoline, oil, and wood
volatile organic compounds (VOCs)	have high vapor pressure and low water solubility	vehicle emissions, industrial chemicals, solvents
lead	highly toxic metal	paint, cosmetic products, hair dye products
ground-level ozone	colorless gas	vehicles and industries
particulate matter	any type of solid particles in the air in the form of smoke, dust, and vapors	vehicle emissions, fossil fuels, industrial discharges, road construction, fertilizer and pesticide processes
nitrogen oxide	mixture of nitric oxide and nitrogen dioxide	burning fuels, gasoline, coal
sulfur dioxide	colorless gas with strong smell at high concentrations	burning coal, most notably in power plants

> Vehicle exhaust, industrial emission and power production, smoke from cooking and heating with

unclean technologies and fuels, agricultural practices, waste burning, and wildfires contribute to **poor air quality**.

- > The **main cause of air pollution in households** is cooking and heating by burning unclean fuels, such as wood, coal, waste or dung, in inefficient and polluting stoves. These lead to emission of fine particulate matter and noxious gases. Other forms of indoor air pollution include radon, tobacco smoke, carbon monoxide, and formaldehyde.
- > Air pollution is **mainly caused** by combustion of fuels and waste, industrial activities, and natural dust.
- > In NCR, different barangays are continuously monitored regarding the open burning of waste ([National Air Quality Status Report, 2021](#))
- > Ventilation: may be improved with sufficient number of windows, particularly in cooking areas with smoke

#### Presidential Decree No. 1096:

National Building Code of the Philippines

- Window Openings: a window or windows with a total free area of openings equal to **at least ten percent of the floor area of room**, and such window shall **open directly** to a court, yard, public street or alley, or open water courses
- > High ambient temperatures / excess indoor heat: In populations exposed, strategies to protect them should be developed and implemented.

## V. Provision of Adequate Housing

### Republic Act No. 9514:

The Fire Code of the Philippines

- Safety Measures for Hazardous Materials: cellulose nitrate plastic, combustible fibers, flammable and combustible liquids or gases, paints, varnishes, combustible waste materials
- Every building or structure, new or old, designed for human occupancy shall be provided with **exits sufficient to permit the fast and safe**

**escape** of occupants in case of fire or other emergencies

### Presidential Decree No. 1096:

National Building Code of the Philippines

- Minimum Size and Dimensions
  - Rooms for Human Habitations: 6.00 square meters with at least horizontal dimensions of 2.00 meters
  - Kitchens: 3.00 square meters with at least horizontal dimensions of 1.50 meters
  - Bath and Toilet: 1.20 square meters with at least dimension of 0.90 meters

### Crowding Index

- described by **dividing the number of persons in a household with the number of rooms used by the family for sleeping**
- A high crowding index gives implication to the ease by which a **communicable disease will be transmitted** from one host to another susceptible host in a household.

- > Crowding: condition where the number of occupants exceeds the capacity of the dwelling space available, resulting in adverse physical and mental health outcomes
  - 1 : 1 ratio (1 person is to 1 habitable room)

- > Adequate Lighting: Increase natural light and having sufficient lighting.

Criteria for Housing to be **Adequate** ([Office of the High Commissioner for Human Rights, 2025; 2009](#))

- > Security of tenure - guaranteed legal protection against forced evictions, harassment, and other threats
- > Availability of services, materials, facilities, and infrastructure - safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage, refuse disposal
- > Accessibility - takes into account the specific needs of disadvantages and marginalized groups
- > Affordability - cost does not threaten or compromise enjoyment of other human rights
- > Habitability - guaranteed physical safety, adequate space, protection against cold, damp, heat, rain, wind, other threats to health and structural hazards
- > Location - does not cut off from employment opportunities, health-care services, schools,

childcare centers, other social facilities; not in polluted or dangerous areas

- > **Cultural adequacy** - respects and takes into account the expression of cultural identity
- > Reduce hazards that lead to unintentional injuries, falls, burns, poisoning.
- > Reduce psychological and social stresses.
- > Promote privacy and comfort.
- > Reduce exposure to threat or violence.
- > Protect populations at special risk.
- > Provide space for play, exercise, recreation.
- > Promote rest, sleep, relaxation.
- > Foster open communication, sense of belonging, support, and security.

**VI. Food Protection and Safety**

Stages of Food Supply Chain, from Farm to Fork:  
Farmer -> Processor -> Distributor -> Retailer -> Consumer

**Presidential Decree No. 856:**

Code on Sanitation of the Philippines

> **Food Establishment**

- must secure a **sanitary permit** from the local health office and **must post** this in a conspicuous place
- all employees must have a **health certificate** issued by the local health authority, only after required **physical and medical examinations**, and **immunizations**
- raw fruits and vegetables shall be **thoroughly washed** before use
- sufficient lighting and adequate ventilation
- washed utensils shall be stored in **clean and dry** place adequately protected against vermin and contamination
- > groceries and sari-sari stores shall not be established **WITHIN A DISTANCE OF 25 METERS** from any source of contamination
- > ambulant food vendors shall sell only bottled food drinks, biscuits, and confectionaries, **not food that requires the use of utensils**

**Republic Act No. 10611:**

Food Safety Act of 2013

- Identify **hazards** in the food supply chain. Assess levels of exposure to the hazards.

**Republic Act No. 7394:**

Consumer Act of the Philippines

- Additional labelling requirements for food: *expiration date, nutritive value, ingredients*

**Five Keys to Safer Food: *Limang Susi sa Higit na Ligtas / Walang Panganib na Pagkain***

**5 SUSI SA HIGIT NA LIGTAS (WALANG PANGANIB) NA PAGKAIN**

**1. PANATILIHING MALINIS**  
**BAKIT?**  
 Higitang hula, laban ng malinis na paglalagay ng mga pagkain, ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit.

**2. IHIWALAY ANG HILAW SA LUTO**  
**BAKIT?**  
 Ang hilaw na pagkain ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit.

**3. LUTUING MABUTI**  
**BAKIT?**  
 Sa karamihan, ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit.

**4. ITAGO ANG PAGKAIN SA TAMANG TEMPERATURA**  
**BAKIT?**  
 Mabilis lamang ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit.

**5. GUMAMIT NG LIGTAS/MALINIS NA TUBIG AT SARIWANG PAGKAIN**  
**BAKIT?**  
 Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit. Ang paglalagay ng mga pagkain sa mga kontaminadong lugar ay maaaring magdulot ng sakit.

**Kaalaman = Iwas Panganib**

1. **Keep clean. *Panatiliing malinis.***  
 > **Wash hands** before handling food and often during food preparation. Wash hands after going to the toilet. Wash and sanitize **all surfaces and equipment** used for food preparation. Protect kitchen areas and food from **insects, pests and other animals**.
2. **Separate raw and cooked. *Ihiwalay ang hilaw sa luto.***  
 > Separate **raw** meat, poultry, and seafood from other foods. Use **separate equipment and utensils** such as knives and cutting boards for handling raw foods. Store food in **containers WITH LIDS** to avoid contact between raw and prepared foods.



- > In the refrigerator, store raw meat, seafood, and poultry **below cooked or ready to eat** foods to avoid cross-contamination.
3. Cook thoroughly. *Lutuing mabuti.*
- > Cook food thoroughly, especially **meat, poultry, eggs, and seafood**. Bring foods like soups and stews to **boiling** to make sure that they have reached 70°C. [FOOD MUST REACH THIS TEMPERATURE to ensure it is safe to eat. This temperature KILLS even high concentrations of microorganisms within 30 seconds.] For meat and poultry, make sure that **juices are clear**, not pink. Ideally, use a thermometer. **Reheat cooked food thoroughly.**
4. Keep food at safe temperatures. *Itago ang pagkain sa tamang temperatura.*
- > **Do not leave cooked food at room temperature for more than 2 hours.** Refrigerate promptly all cooked and perishable food (preferably below 5°C). Keep cooked food piping hot (more than 60°C) prior to serving. **Do not store food too long even in the refrigerator [NOT LONGER THAN 3 DAYS and should not be reheated more than once].** Do not thaw frozen food at room temperature [but in the refrigerator or other cool location].
  - > **THE DANGER ZONE is the temperature range of 5°C to 60°C**, in which microorganisms multiply very fast. Refrigeration SLOWS bacterial growth but microorganisms can still grow. They cannot multiply if it is TOO HOT or TOO COLD. Cooling or freezing food DOES NOT KILL microorganisms but LIMITS GROWTH.
  - > Promptly cool and store leftovers. Prepare food in small amounts to reduce the amount of leftovers.
5. Use safe water and raw materials. *Gumamit ng liqtas / malinis na tubig at sariwang pagkain.*
- > Use safe water or treat it to make it safe. Select fresh and wholesome foods. Choose foods processed for safety, such as pasteurized milk. Wash fruits and vegetables, especially if eaten raw. Do not use food beyond its **expiry date**. [Throw away smashed, swollen, or oxidized cans.]
  - > **“Safe”** means FREE FROM DANGEROUS MICROORGANISMS and TOXIC CHEMICALS at levels that could cause illness and/or disease.

### Food-borne diseases

- > Primary sources of Shiga toxin-producing *E. coli* (STEC) outbreaks: **raw or undercooked** ground meat products, **raw milk**, **fecal contamination** of vegetables [Cook thoroughly!], of water, drinking water, recreational water, and other foods, as well as cross-contamination during food preparation (with beef and other meat products, contaminated surfaces and kitchen utensils); also from bodies of water, wells (WHO, 2018)
- > Food-borne infection: pathogens grow in intestines after eating contaminated food
- > Food-borne intoxication: eating food containing poisonous toxins

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